Sinergie SIMA
Management Conference


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Management of sustainability and well-being for individuals and society

Conference Proceedings

Long Papers

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13-14 June 2024

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To the reader,

this volume contains the long papers of the Sinergie-SIMA 2024 Management Conference, hosted by the University of Parma on June 13th and 14th 2024.

Theory and practice in the field of management have been challenged by the emergence of sustainability and well-being as major global policy priorities. Both sustainability and well-being are complex, value-laden, and strongly interconnected; however, they tend to exist in separate realms.

Sustainability literature has recorded an evolution in the way the concept of sustainable development is understood, leading to the articulation of sustainable development as human "well-being" and "flourishing", rather than "needs". Nevertheless, some scholars have pointed out a lack of clarity in the conceptualization, which causes some ambiguity in terms of definition (Ronen & Kerret, 2020). Kjell (2011) observed that human needs and well-being are poorly understood, characterized, and developed by sustainability research. Along the same vein, Helne & Hirvilammi (2015) observed that the overarching goal of sustainable development (i.e., well-being) has often been narrowly interpreted, mainly in economic terms, while connections between the natural environment and human flourishing have been overlooked. More recently, O'Mahony (2022) remarked that the literature conceptualizing human well-being continues to exist largely outside sustainable development. Hence, placing well-being more clearly within the sustainability framework could be highly beneficial to sustainability.

Concurrently, the literature on well-being is almost entirely dissociated from the contributions of nature or the relationships with ecological and planetary systems (Roberts et al., 2015), and the importance of social dimensions is an emergent conclusion. Therefore, the rationale of contextual systems inherent to sustainability research (incorporating views of times, society, and biosphere) could significantly enrich well-being research, fostering a more holistic perspective on well-being and an increased awareness of the limits of individual well-being pursuits (Kjell, 2011).

In brief, though well-being has major implications for sustainable development and vice versa, the body of literature that effectively integrates sustainability and well-being remains in an embryonic stage.

The above considerations aim to act as catalysts for an interdisciplinary debate within the field of management. Enriching the conception of flourishing well-being in sustainability and the contribution of nature to well-being can produce impactful scientific research, as O'Mahony (2022) points out. Equally important is the analysis of the links between sustainability and well-being, encompassing synergies and trade-offs at the organizational level, in value chains, and in interactions with stakeholders across various industries.

The Sinergie-SIMA 2024 Management Conference welcomed contributions based on different theories, methodological approaches, and units of analysis with the potential to empower a transformation for flourishing individuals, society, and the natural world alike. More precisely, the Conference was a great occasion to discuss the research efforts of our research community within tracks related to the:

- Conference theme (Management of sustainability and well-being for individuals and society),
- SIMA thematic groups (Entrepreneurship, Innovation & Technology Management, Intelligenza manageriale nel management, International Business, Marketing, Purpose-driven Businesses, Retailing & Service Management, Small & Family Business, Strategic Communication, Strategy & Governance, Supply Chain Management, Logistics & Operations, Sustainability, and Tourism & Culture Management),
- special tracks (Examining the social and environmental relevance of sustainable digital business models: Impact on business practices and consumers, Growing resilient Italian SMEs, and Perspectives on grand challenges in international business and implications for companies),
- Management Case Studies.

The Conference call for papers gave the opportunity to submit either short and long papers. Overall, the editorial staff received 277 submissions of which 215 short papers and 62 long papers.

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

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

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

The evaluation process ended with the acceptance of 211 short papers and 58 long papers. This volume proposes the papers whose Authors have authorized their publication.

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

While thanking all the Authors, Chairs, and participants, we hope that this volume will contribute to advance knowledge about the management of sustainability and well-being for individuals and society.

The Conference Chairs

Guido Cristini, Beatrice Luceri, Arabella Mocciaro Li Destri, and Marta Ugolini

SUMMARY

Track 1 - Entrepreneurship

Circular Economy in Startup and SMEs for Sustainable Ecosystems: a Bibliometric Analysis

MARILENA BREDICE[1] ANNA VITTORIA FORMISANO[2] MICHELE MODINA[3]

Abstract

Frame of the research. *In recent years, circular economy (CE) practices have emerged as critical to addressing economic, social and environmental challenges and have attracted the attention of academics, policymakers and firms.*

Purpose of the paper. *This paper systematically reviews and analyzes the existing literature on CE and its implementation in startup and small and medium enterprises (SMEs) to foster a sustainable ecosystem, with the intent of clarifying its theoretical conceptualization and highlighting areas that need further research.*

Methodology. *Utilizing bibliometric methodologies, it explores the progression of research, identifies influential authors and publications, and points key thematic clusters within the literature.*

Results. *The results highlight that implementing the CE in startups and SMEs requires understanding the context and overcoming barriers, but can drive innovation, improve industry performance, and foster dynamic capabilities through collaboration at various levels, rethinking business models, and technology integration.*

Research limitations. *Limitations of the research include the exclusive use of indexed databases and the selection of only English-language contributions.*

Managerial implications. *Our analysis offers crucial managerial guidance for startups and SMEs to navigate toward a sustainable and innovative ecosystem, highlighting the imperative of strategically integrating CE principles in their business models.*

Originality of the paper. *This paper is the first to address a theoretical conceptualization in the management literature on the role of startups and SMEs in the CE transition to foster a sustainable ecosystem.*

Key words: *Circular Economy, Startup, SMEs, SDGs; Sustainability*

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1. Introduction and literature background

Recent decades have witnessed a growing challenge by policymakers, businesses, and civil society actors to effectively address the imperative of solving the economic, social and environmental issues that hinder global progress toward sustainable development of our planet. In pursuit of this ambitious goal, the adoption of circular economy (CE) practices is slowly gaining recognition for its role as a significant contributor to achieving the Sustainable Development Goals outlined in the United Nations 2030 Agenda for Sustainable Development (Schroeder *et al.*, 2019; Belmonte-Ureña *et al.*, 2021). Balancing socio-economic interests with the planet's finite ecological systems is a fundamental goal of sustainability (Boluk *et al.*, 2019). In a CE, the economic and environmental value of materials is preserved for as long as possible by keeping them in the economic system, extending the life of products created from them, or putting them back into the system for reuse (Den Hollander *et al.*, 2017). In addition, CE principles support the adoption of clean energy, process optimization, collaborative exchanges among different actors, resource sharing, and continuous improvement. These practices not only are useful for improving the ecological performance of firms, but also contribute to the broader goal of promoting a more sustainable and resilient global economy (Agyemang *et al.*, 2019).

The first key feature of CE is its emphasis on creating an economy capable of self-regeneration through the development of eco-innovations (Hofstra and Huisingh, 2014). These innovations play a crucial role in preserving natural capital by promoting the use of renewable resources and improving the use and revaluation of materials through practices such as reuse and recycling. The second characteristic of CE is the extension of the product life cycle, with the goal of maximizing the use value of goods over time through product design that facilitates repair and maintenance, as well as the exploration of new uses for products at the end of their life cycle (Rousseaux *et al.* in 2017). The third attribute of CE is to promote a transition to new purchasing habits and a new consumer culture. A shift to a "product-as-a-service" business model is encouraged (Annarelli *et al.*, 2016), which has already been proven in many industries such as transportation (e.g. Bla-Bla Car), entertainment (e.g. Netflix), tourism (e.g. Airbnb) and fashion (e.g. Rent the Runway).

The business organization becomes critically important in the face of contemporary challenges, including the climate crisis, COVID-19 pandemic, wars, and concerns about the limited availability of natural resources. These pressing issues highlight the need for innovative business models that can produce and deliver sustainable products and services. In this context, circular business models emerge as key drivers for organizational excellence and the creation of sustainable supply chains (De Angelis *et al.*, 2021). The break away from the conventional linear economy model, characterized by the "take-make-dispose" system, in which raw materials are collected, processed into products, used, and finally discarded as waste, has gained wide recognition. The transition to a circular economy model not only addresses environmental concerns by minimizing waste, but also contributes to social wellbeing and financial sustainability (Lewandowski, 2016; Ferasso *et al.*, 2020).

Adopting circular economy principles to build a sustainable ecosystem requires the formulation of innovative visions and strategies. In this context, startups are increasingly recognized as a powerful catalyst for driving the innovation processes needed to facilitate a successful circular transition (Lewandowski, 2016; Rizos *et al.*, 2016; Spender *et al.*, 2017). Indeed, with their inherent flexibility, new visions, and propensity to think outside the box, startups are increasingly perceived as essential players in driving the changes needed to achieve a circular economy (De Mattos and De Albuquerque, 2018).

Startups not only show a propensity toward a sustainable approach, but also tend to embrace disruptive and radical innovations. In this context, research emphasizes the importance of circular startups in adapting technologies associated with Industry 4.0 (Silva and Sehnem, 2022; Sehnem *et al.*, 2023) and the ability to disrupt existing institutions and create new ones to reshape institutional foundations during the transition to a circular economy (Närvänen *et al.*, 2021). In addition, they demonstrate a holistic approach to sustainability by actively engaging diverse stakeholders within the supply chain (Sehnem *et al.*, 2021). Startups, as new market players, can adopt circular business

models from their beginnings and are not exposed to the risk of cannibalizing the market share of their older products or depreciating previous investments in production processes (Hockerts and Wüstenhagen, 2010).

At the same time, small and medium enterprises (SMEs) can play a crucial role in the debate on CE and the creation of a sustainable ecosystem, both because of their numbers and the resulting impact on environmental problems. In fact, the central role of SMEs in most economies has prompted several researchers to analyze the potential for implementing the CE in SMEs by highlighting its barriers and opportunities (Prieto-Sandoval et al, 2021).

Several works have been focused on understanding the actions taken by SMEs in response to the challenges and opportunities presented by the CE. These studies aim to understand the degree to which SMEs have incorporated CE practices and find a different degree of maturity achieved in environmental management (Ormazabal and Puga-Leal, 2016; Bassi and Dias, 2019) related specifically to the fragmentation and heterogeneity that characterizes SMEs.

Other studies have identified the main drivers and barriers influencing the adoption of CE practices by SMEs, concluding that the perception of sustainability as a cost rather than an investment is the main barrier to the implementation of circular economy practices, followed by the absence of clear guidelines defining sustainability for SMEs and the bureaucratic difficulties faced by companies in implementing sustainability regulations (Mura *et al.*, 2020). CE strategies have been explored as promising business opportunities for SMEs in terms of material savings, exploration of new markets, increased internal efficiency, and overall better business performance (Longo *et al.*, 2005; Hillary and Burr, 2011; Rizos *et al.*, 2016).

Advances in environmental management practices have encouraged many SMEs to innovate their business models, incorporating sustainable approaches such as recycling and remanufacturing (Ongondo *et al.*, 2013). In addition, many SMEs, following in the path of startups, have explored alternative strategies, including offering rental services in place of traditional sales models (Bakker *et al.*, 2014; Sundin, 2015), implemented dematerialization initiatives in product design and manufacturing (Valušytė, 2021), and other innovative approaches in line with the principles of resource efficiency and waste reduction.

Due to their small size and inherent flexibility, small and newly established firms are often considered more adaptive to CE principles (Bauwens *et al.* in 2020). Despite the increasing attention from the literature, there is a considerable lack of clarity about theoretical conceptualization in management literature on the role of startups and SMEs in CE transition to foster a sustainable ecosystem. There is little engagement among management and organization studies scholars (De Angelis, 2020), as the scientific literature has been developed through research outside the management and organizational theory tradition (Lahti *et al.*, 2018). In fact, there is fertile ground for additional and systematic research at the intersection between CE and the strategic management field, which calls for scholars to deepen the role of CE in companies' business model design (Fraccascia *et al.*, 2019; Lüdeke-Freund *et al.*, 2018; Centobelli *et al.*, 2020).

Based on these considerations, we chose to produce an unbiased, clear and replicable blueprint of current knowledge on this topic. Recognizing the existence of gaps in the prevailing literature on the topic, we undertook an exhaustive review of the relevant literature using bibliometric methodologies. The approach used allowed us to understand the chronological development of the role of startups and SMEs in promoting CE in the context of a sustainable ecosystem. It also allowed us to identify the most influential authors and publications in this area. We were able to identify key thematic clusters within the existing literature. These are key to identifying trending topics, thus offering valuable insights to inform and shape the direction of future research in this area. This assessment provides a sound theoretical basis for identifying nascent challenges and serving as an effective roadmap for academics and researchers in the coming years.

Our analysis allows us to provide answers to the following research questions.

RQ1: How has the research landscape evolved on the implementation of CE in startups and SMEs to foster a sustainable ecosystem?

RQ2: Who are the most influential authors on the implementation of CE in startups and SMEs to foster a sustainable ecosystem?

RQ3. What specific issues are most discussed about the implementation of CE in startups and SMEs to foster a sustainable ecosystem?

In the remainder of the paper, we will examine how the three themes, startups and SMEs, circular economy, and sustainability, are related. In particular, we will adopt bibliometric techniques to get a broader view of the research area and to produce and outline a coherent map of the research agenda that will be useful to researchers and practitioners.

The remaining sections of the paper are as follows. Section 2 outlines the methodological approach and explains the data set creation process. Next, Section 3 explores the results of the bibliometric analysis, focusing on the growing areas of research in the context of the role of startups and SMEs in the development of a circular economy. Section 4, shares concluding remarks and highlights key directions for managers and policymakers. The last section, section 5, presents future research avenues.

2. Data and Methodology

To achieve our set goals, we have employed bibliometric analysis, a method that has proven essential in highlighting and fostering interest in new research areas (Verbeek *et al.*, 2002; Khan *et al.*,2022). The appeal of bibliometric analysis lies in its proven ability to process vast amounts of scientific data, made easier by the development and availability of sophisticated software tools such as VOSviewer (Van Eck and Waltman, 2010) or Bibliometrix (Aria and Cuccurullo, 2017).

The accuracy of bibliometric analysis depends on the use of credible sources that ensure the reliability and relevance of the scientific material examined, which is why we have chosen to use Scopus and ISI Web of Science (WoS) (Zupic and Čater, 2015; Donthu *et al.*, 2021).

This study concentrated solely on literature written in English, without imposing any temporal limitations, aiming to encompass all relevant research within the field. Within the Scopus database, the search was narrowed to articles classified under the category of “business, management and accounting”. Similarly, for Web of Science, attention was given to articles within the “business” and “management” categories. To achieve a thorough and inclusive review, “grey literature” including conference papers, books, book chapters, and reviews was also examined (Adams *et al.* 2017; Hiebl 2023).

The following search query was used:

- On Scopus:

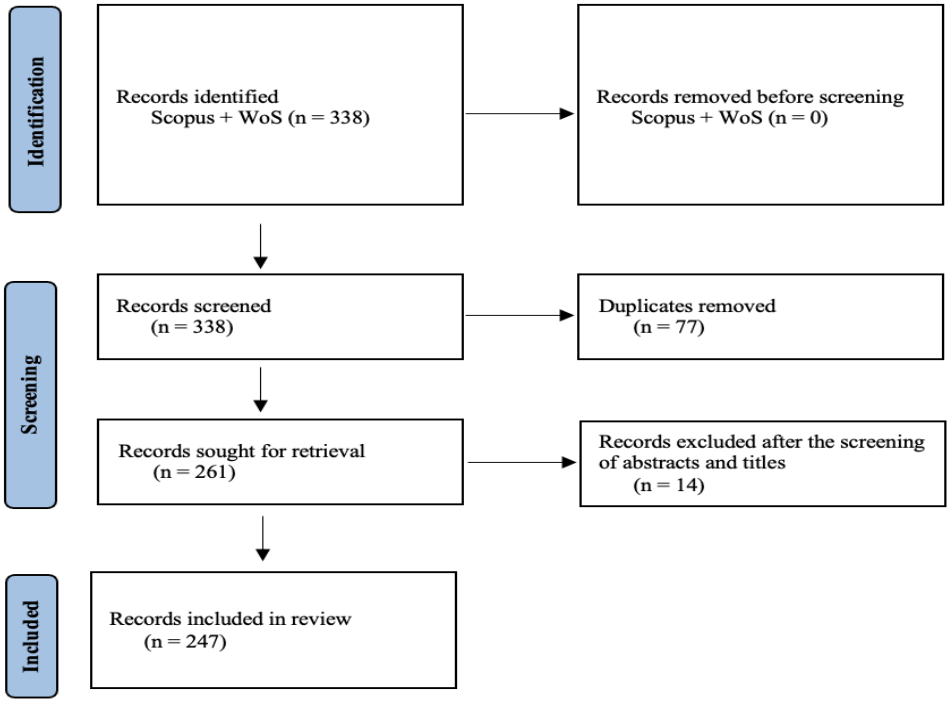
(TITLE-ABS-KEY ((“circular economy” OR “circularity” OR “circular strateg*”*)* AND *(*“sustainab*” OR “sustainable society” OR “sustainable development” OR “sustainable business*” OR “SDG*”*)* AND *(*“startup*” OR “start-up*” OR “start up*” OR “small and medium-size* enterprise*” OR “small and medium size* enterprise*” OR “small and medium enterprise*” OR “small medium enterprise*” OR “SME*”*)*))

- On Web of Science:

(TOPIC ((“circular economy” OR “circularity” OR “circular strateg*”*)* AND *(*“sustainab*” OR “sustainable society” OR “sustainable development” OR “sustainable business*” OR “SDG*”*)* AND *(*“startup*” OR “start-up*” OR “start up*” OR “small and medium-size* enterprise*” OR “small and medium size* enterprise*” OR “small and medium enterprise*” OR “small medium enterprise*” OR “SME*”*)*))

Figure 1 summarizes the process we followed to arrive at the composition of our final dataset. The search protocol was clearly outlined using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) framework (Page *et al.*, 2021), to maintain a process that is both transparent and replicable (Lim *et al.*, 2022)

Fig. 1: Identification, screening, and selection of papers according to the PRISMA 2020 framework



Source. Our elaboration

Our final dataset consists of 247 articles that were analyzed through bibliometric techniques such as performance analysis and science mapping.

For the first analysis, we used the Bibliometrix software, in order to measure the productivity and impact of specific entities in the scientific sector, such as authors or journals (Gutiérrez-Salcedo *et al.*, 2018; Fusco *et al.*, 2020). Conversely, scientific mapping is used to identify the conceptual structure and social interactions related to the topic addressed (Cobo *et al.*, 2011). We adopted the VOSviewer software for this type of analysis, which allowed us to develop thematic maps based on keyword co-occurrence, and citation maps (Antons *et al.*, 2019). Co-occurrences were used to create similarity matrices, representing the strength of the association between elements on the map based on their level of similarity (Van Eck and Waltman, 2010). Finally, the analysis of co-citations, which assumes that two articles frequently cited together may be related on specific topics, was also implemented (White and Griffith, 1981).

3. Results

3.1 Main results

Table 1 shows the main information about the data obtained. The 247 papers, covering a time span from 2009 to 2023, came from a variety of sources, including journals, books, and other sources, representing 111 entries.

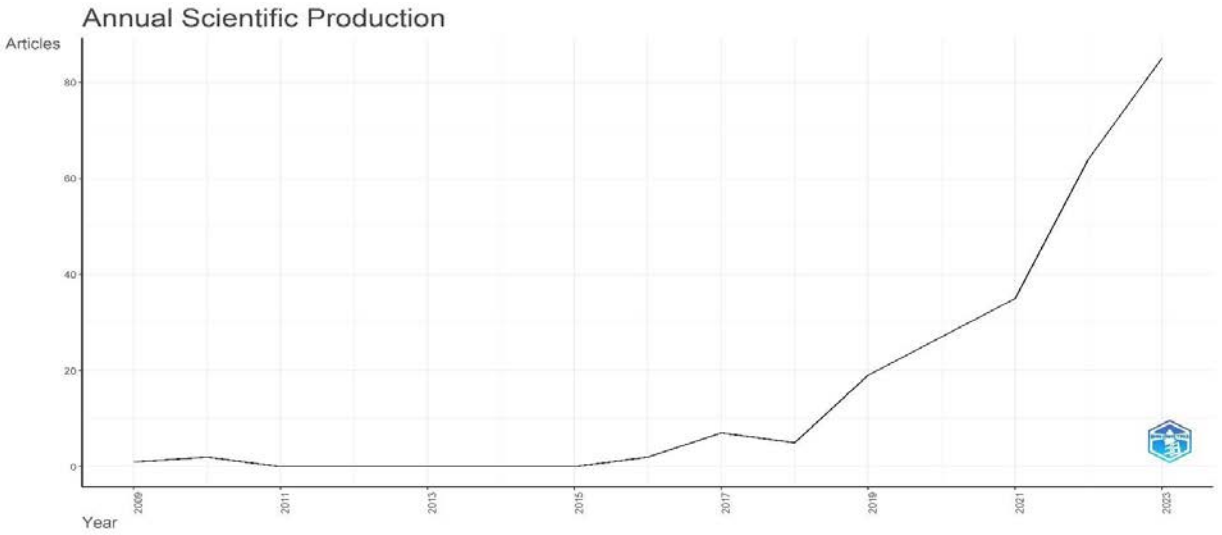
The annual scientific production (Figure 2) covers a period of 15 years, in fact the first publication was in 2009. During 2011-2015 the production of material related to the role of startups and SMEs in fostering CE seems to have stopped, and interest in this topic resumed in 2016. Since then, research on the topic has continued to grow steadily and significantly to reach 85 articles written in the year 2023.

Tab. 1. Main information about data

Timespan	2009: 2023
Sources (Journals, Books, etc)	111
Documents	247
Authors	726

Source. Our elaboration

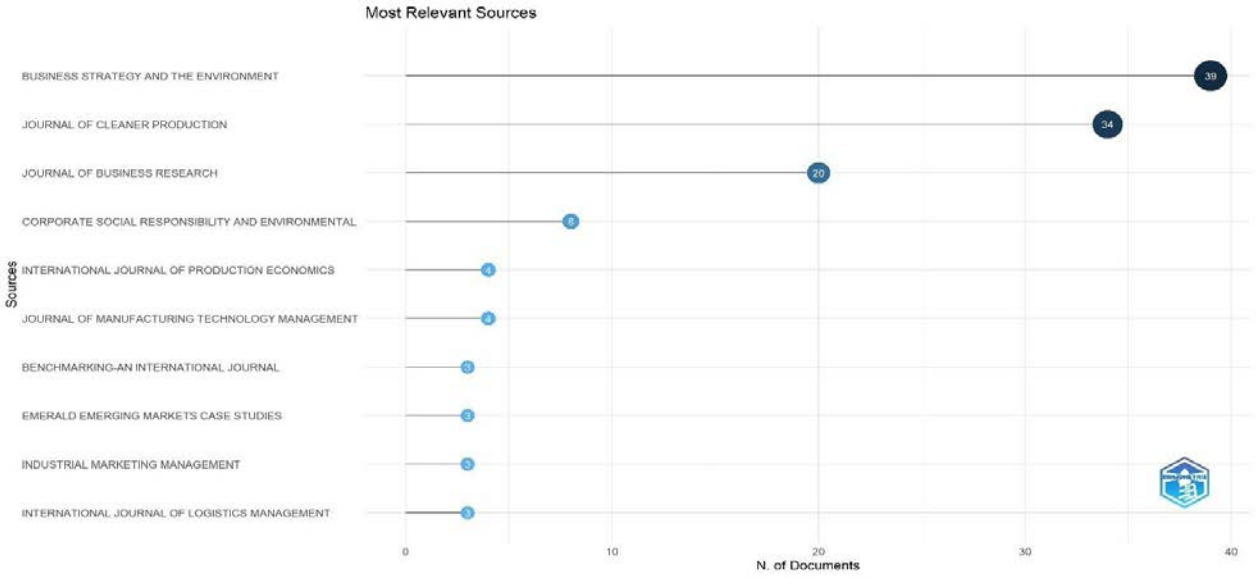
Fig. 2: Annual scientific production



Source. Our elaboration

Figure 3 describes the top ten sources from which we retrieved most of the papers analyzed and shows that there are three main journals that focus on the issues under analysis. The most relevant is the journal Business Strategy and the Environment, published by Wiley, which with 39 published papers accounts for 16% of the entire sample. The second most relevant source is the Journal of Cleaner Production published by Elsevier, which provided 34 research articles, or 14% of the articles found. The third most relevant source is Journal of Business Research, published by Elsevier with 20 articles to its credit, or 8% of the total.

Fig. 3: Most relevant sources



Source. Our elaboration

To perform the bibliometric analysis, the 10 articles with the most citations were analyzed (Table 2). The two main research strands that emerge from the analysis of most global cited papers are business model innovations and industry 4.0 technology.

The most cited works by Todeschini *et al.* (2019) focus on startups in the fashion industry to investigate the innovative business models adopted that have sustainability as their defining characteristic, especially in terms of value proposition. The first implication they reach concerns the fact that sustainability-oriented business model innovation in the fashion industry tends to be markedly different for incumbents and startups. Indeed, the latter are typically born sustainable and use their flexibility to design innovative business models that deliberately incorporate sustainability principles. A second conclusion concerns the role of high technology, which seems to be useful when it comes to radically rethinking production processes and thinking about scalable solutions but is not a prerequisite for the success of innovative business models in the fashion industry at the time of experimentation. In addition, the results highlighted the importance of partner engagement and involvement and of staying committed to the core values of sustainability. Finally, it emerges that a supportive business ecosystem that promotes knowledge and resource sharing and facilitates the creation of collaborations between startups and incumbents is essential.

Antikainen and Valkokari (2016) build a framework for sustainable circular business models innovation. Based on the case study of a startup, they identify trends and drivers of sustainable business model innovation (the business ecosystem level) by trying to understand its value to partners and stakeholders within a company (the business level) and assess the impact of sustainability and circularity (the sustainability impact level). The framework outlined includes the idea of continuous iteration with assessment of the sustainability and circularity of the business model. Circularity focuses on visualizing the model to comprehend the necessary actors, relationships, cycle stages and flows of materials and information. This work aims to complement existing business model tools by adding the business ecosystem level, sustainability cost-benefit analysis, and iterative cycles of sustainability and circularity assessment.

In the strand of research inherent in the adoption of circular business models Guldmann and Huulgaard (2020) which aims to provide an overview of the barriers to the adoption of circular business models to facilitate their circumvention. The article presents a study of the circular business model innovation process in 12 Danish companies, with a comparison analysis between startups and incumbents. The authors point out that barriers to innovation of circular business models are found at all socio-technical levels, with most barriers being present at the organizational level, followed by the value chain level, the employee level, and finally the market and institutional level. Regarding the comparison between startups and incumbents, the analysis shows that circular startups did not experience barriers at the employee level, due to the absence of pre-existing organizational lock-in, while all incumbent firms did. The authors conclude that large firms experience on average both more internal barriers and more external barriers than small firms.

In their study, Caldera *et al.* (2019) explore the evolution and potential of lean and green practices to enable transitions to sustainable business practices. The authors focus on manufacturing SMEs in Australia, identifying four key enablers and six key barriers to sustainable business practices drawn from a series of in-depth interviews. The results highlight that regulatory, coercive, and mimetic factors can influence SMEs in environmental, social and economic decision-making and legitimate the transition to sustainable business practices. Among the barriers to sustainable business practices are lack of knowledge, skills, and awareness; time constraints; lack of financial resources; risk of implementing sustainable practices; existing organizational culture; existing rules and regulations. On the other hand, the four key factors are related to integrated strategy that consolidates organizational processes with appropriate lean and green tools; continuous improvement; stakeholder engagement; and simplification of processes to ensure transparency and traceability.

Further contribution on the topic of circular business model adoption comes from Henry *et al.* (2020), who analyze the business models of circular startups and how they differ from incumbent companies embracing CE. The paper analyzes the circular business model strategies and innovations

adopted by startups to identify five archetypes of circular startups: design-based (to increase utilization efficiency or avoid residual resource flows), waste-based (to extract value from unexploited external waste streams), platform-based (to facilitate the negotiation or sharing of products, knowledge, infrastructure or services), service-based (to incorporate products into a system of services without the ownership of the customer of the physical good) and nature-based (to provide services or products with the aim of reducing the input of renewable natural capital). The authors also highlight how circular startups tend to adopt strategies corresponding to higher levels of circularity than historical operators. Moreover, the innovations brought by startups mainly concern socio-institutional changes, acting on the theoretical point that new technologies must build the necessary socio-institutional rooting and spread throughout society to succeed.

Kiefer *et al.* (2019), aims to analyze the role of resources, competences, and dynamic capabilities as determinants (drivers and barriers) of different types of eco-innovation in SMEs. The analyses carried out reveal that the determinants of systemic and radical eco-innovations differ substantially from those for continuous improvements. The authors suggest that the physical resources, competences and dynamic capabilities, the involvement in green supply chains, a favorable corporate culture, the technological push, and the financing resources of the market and internal are the engines of these eco-innovations. On the other hand, the need for cooperation, and an ISO ecological certification, as well as dependence on the technological path are barriers to the implementation of eco-innovations.

Dey *et al.* (2020) address three research issues: how the circular economy's fields of action are linked to the performance of sustainability; what are the problems, challenges, and opportunities for adopting the circular economy in SMEs; and what key strategies, resources and skills facilitate the effective implementation of the circular economy in SMEs. The study reveals that the whole field of action of the circular economy (take, make, distribute, use and recover) of SMEs is related to economic performance, but only production and use are related to environmental and social performance.

Weissbrod and Broken (2020) studies how a large enterprise can develop the organizational capability of experimentation to achieve an ambitious value creation goal of transforming the business model from linear to circular. Authors reached the following conclusions. The introduction of lean startup principles brings benefits in business model transformation. The desire to use already known processes reinforces the company's innovation status quo, hindering new business models. There is a need to create internal participation at all seniority levels to foster rapid action. The corporate mindset dominated by economic value creation can block social and environmental value creation experimentation activities.

Kumar *et al.* (2020) deepen the second strand of studies identified among the most cited documents: the theme of Industry 4.0. They propose research on the application of Industry 4.0 technologies in SMEs for ethical and sustainable operations by identifying fifteen challenges that influence the application of these technologies in SMEs. The authors observed that the lack of motivation from partners and customers in applying I4.0 technologies is the main challenge facing SMEs. In addition, the study noted that the lack of long-term planning on the adoption of I4.0 technologies for ethical and sustainable operations, lack of awareness on I4.0 contributions to ethical and sustainable production, lack of managerial support for I4.0 technologies, and the high initial cost of I4.0 technologies for sustainability; are the second, third, fourth, and fifth challenges for SMEs, respectively.

Birkel and Müller (2021) conduct a systematic literature review to elaborate a holistic perspective on the potentialities of Industry 4.0 for the management of the supply chain regarding the triple bottom line, highlighting potential conflicts and enabling technologies. Among the facilitators of Industry 4.0, the authors highlight the virtual design and simulation of processes, transparency in the supply chain and human-machine interaction technologies. Regarding the potential conflicts and trade-offs that arise from the analysis, the authors point out that for many components and materials, energy required and its impact for recycling could be higher than the total environmental impact of extraction and production from conventional sources. In addition, the management of a closed cycle

of material flows leads to high complexity in design, production, and logistics. In addition, often the lack of coordination through the independent functioning of each member of the supply chain can bring to various conflicts such as objective, domination or perceptive conflicts, which require a broad dialogue between companies, political entities and society.

Tab. 2: Most global cited documents

Author	Paper	TC
TODESCHINI BV, 2017, Bus. Horizons	Innovative and sustainable business models in the fashion industry: Entrepreneurial drivers, opportunities, and challenges	283
KUMAR R, 2020, J. Clean. Prod.	Application of industry 4.0 technologies in SMEs for ethical and sustainable operations: Analysis of challenges	233
ANTIKAINEN M, 2016, Technol. Innov. Manag. Rev.	A Framework for Sustainable Circular Business Model Innovation	207
GULDMANN E, 2020, J. Clean. Prod.	Barriers to circular business model innovation: A multiple-case study	187
CALDERA HTS, 2019, J. Clean. Prod.	Evaluating the enablers and barriers for successful implementation of sustainable business practice in 'lean' SMEs	187
HENRY M, 2020, J. Clean. Prod.	A typology of circular start-ups: Analysis of 128 circular business models	185
KIEFER CP, 2019, Bus. Strategy Environ.	Drivers and barriers of eco-innovation types for sustainable transitions: A quantitative perspective	176
BIRKEL H, 2021, J. Clean. Prod.	Potentials of industry 4.0 for supply chain management within the triple bottom line of sustainability - A systematic literature review	164
DEY PK, 2020, Bus. Strategy Environ.	Circular economy to enhance sustainability of small and medium-sized enterprises	163
WEISSBROD I, 2017, J. Clean. Prod.	Developing sustainable business experimentation capability - A case study	148

Source. Our elaboration

From the Figure 4 it is possible to immediately understand the semantic domain of the most frequent words we found analyzing publications. We observe some essential fields of interest within the realm of developing circular economy strategies in startups and SMEs: sustainable development, innovation, barriers, performance, business models.

Fig. 4: Word Cloud

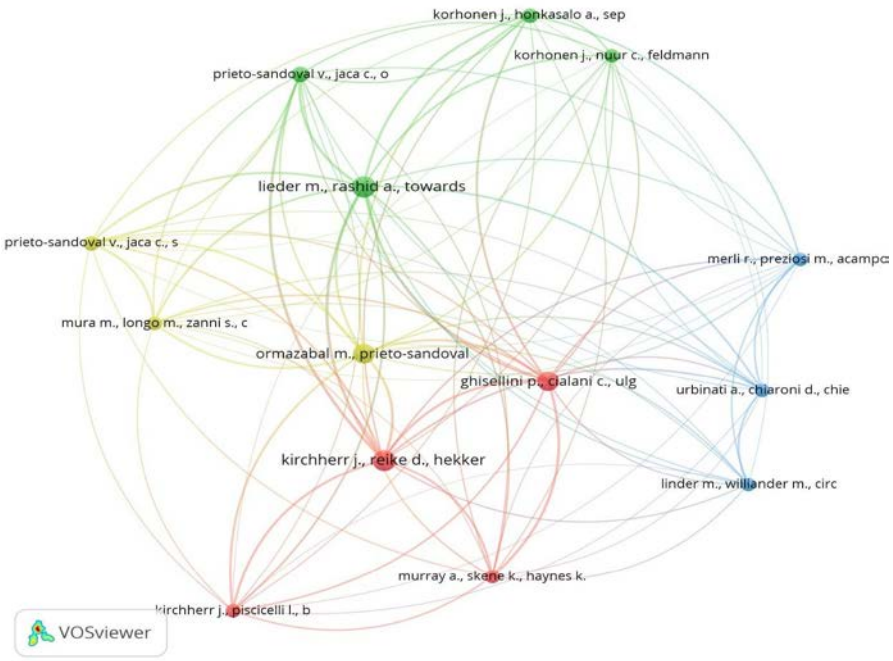
Source. Our elaboration

3.2 Science mapping analysis

Co-citation analysis

To determine the similarity between multiple papers by examining the number of citations received we used Co-citation analysis (Small, 1973). The basic idea behind the analysis is that if two articles are frequently cited together, this indicates that they probably deal with similar topics or content (Zupic and Cater, 2015; Feng *et al.*, 2017; Batistič *et al.*, 2017; Batistič and Van der Laken, 2019). The result of the co-citation analysis is shown in Figure 5, where nodes represent the cited authors and lines indicate the connections between them. The thickness of the lines is an indicator of the strength of the relationship, with thicker lines suggesting more significant connections. The closeness of the nodes determines the strength of the connections, while the size of the nodes reflects the extent of co-citation for the respective article.

Fig. 5: Co-citation analysis



Source. Our elaboration

Only documents cited at least eleven times were considered, with 14 papers reaching this threshold. The four clusters that emerged from the analysis are summarized in Table 3 and represent many research strands within existing literature on the role of startup and SMEs in the transition toward a circular economy.

Tab. 3: Co-citation analysis

Red cluster	The red cluster highlights the origins and conceptualizations of the CE, tracing its meanings and discussing how it has been operationalized in business and policy. It examines the transition to a CE by identifying its basic principles, advantages and disadvantages, and barriers to its implementation. The origins of CE are rooted in ecological and environmental economics and industrial ecology, and its goal is to reduce environmental pressure from economic growth. In China, it is promoted as a top-down national policy goal, while in other areas such as the European Union, Japan, and the United States it is a tool for designing bottom-up environmental policies. The transition to CE requires the involvement of all actors in society and their ability to connect and create appropriate models of collaboration and exchange (Ghisellini *et al.*, 2016). CE is often represented as a combination of reduction, reuse and recycling activities, while it is often not emphasized that the circular economy requires systemic change (Kirchherr *et al.*, 2017). This represents one of the most sensitive and criticized aspect in the literature. CE is supposed to be based on three pillars, economic, social and environmental, but the practice mainly focuses on redesigning production and service systems to benefit the environment; there is no explicit recognition of the social aspects (Murray *et al.*, 2017). In fact, cultural barriers, particularly a lack of interest and awareness on the part of civil society and a hesitant corporate culture, are considered the main barriers to CE. These are also induced by the lack of synergistic government interventions to accelerate the transition to a CE (Kirchherr *et al.*, 2018).
Green cluster	This cluster explores the various aspects of the circular economy, from its implementation in the manufacturing industry to its relationship with eco-innovation to debates and criticisms about its controversial nature and limitations. The concept of CE has been developed from a multidisciplinary perspective such as ecology, economics, engineering, and design. The literature agrees that CE is characterized by three different levels of research and implementation. The micro level is characterized by business improvement processes and eco-innovation development. The meso level includes companies that are part of an industrial symbiosis. The macro level is strongly focused on the development of eco-cities, or eco-communities through institutional intervention (Prieto-Sandoval *et al.*, 2018). For manufacturing companies, developing new innovative business models that fit the CE environment involves rethinking partnerships. To give practical guidance on how to implement CE, a concurrent approach is suggested that works through top-down public institutions and through bottom-up industry (Lieder and Rashid, 2016). Despite various attempts to define a framework for CE, the lack of clarity around the concept is highlighted by emphasizing the need for the involvement of many schools of thought to make concrete progress (Korhonen *et al.*, 2018a). Among the main limitations and challenges for CE are identified: thermodynamic limits, spatial and temporal boundary limits, limits imposed by the physical scale of the economy, limits raised by path-dependency and lock-in, limits of governance and management, limits of social and cultural definitions (Korhonen *et al.*, 2018b)
Blue cluster	The blue cluster addresses circular innovation of business models that aim to create value by minimizing waste, maximizing resource efficiency, and rethinking traditional linear approaches of production and consumption.

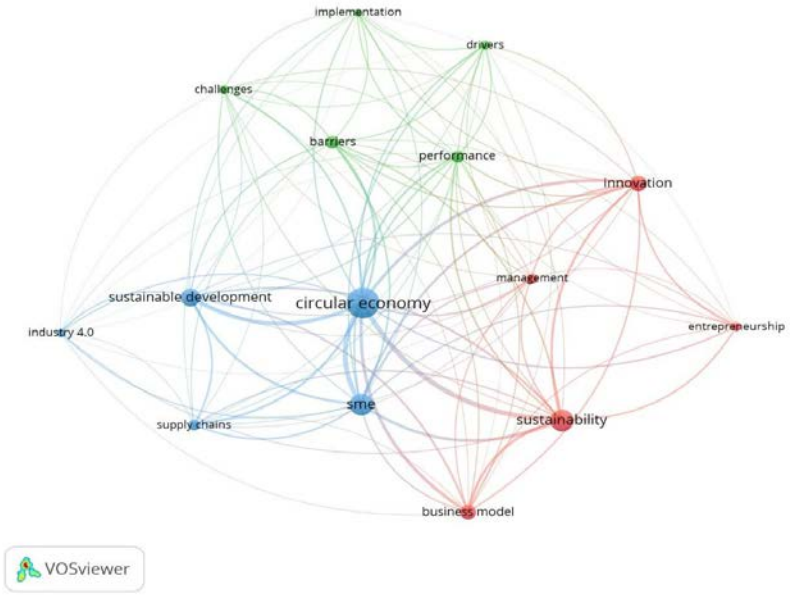
	A taxonomy of circular economy business models is proposed based on the degree to which circularity is adopted along two main dimensions: the implementation of the circularity concept in proposing value to customers, and the ways through which firms interact with suppliers and reorganize their internal activities (Urbinati *et al.*, 2017). It is possible to highlight how business model strategies, focus mainly on studying the strategy of closing material cycles, while slowing down cycles, which requires a radical change in consumption and production patterns, is only marginally included in respect to the implementation of CE (Merli *et al.*, 2018). Finally, it is shown how validation of a circular business model always involves a higher business risk than validation of a corresponding linear business model (Linder and Williander, 2015).
Yellow cluster	The yellow cluster examines the challenges and opportunities of implementing circular economy principles in SMEs, identifying key strategies, resources and capabilities needed for SMEs toward a successful transition. Studies on the introduction of CE practices in SMEs do not lead to uniform results. Some authors conclude that SMEs implementing CE strategies are focused on legal compliance and, in many cases, are concerned about their company's image. SMEs also do not tend to engage in environmental issues because they do not think it will increase their profits and competitiveness (Ormazabal *et al.*, 2018). In more recent studies, it is shown that SMEs that implement CE practices perceive them as a business opportunity rather than as a source of value creation for companies (Mura *et al.*, 2020). Among the main strategies adopted by SMEs can be identified those oriented toward material supply management, those aimed at circular and sustainable product design or technological modernization, strategies related to supply chain management and its optimization, and those related to the marketing of by-products and excess electricity and/or thermal energy to another consumer (Prieto-Sandoval *et al.*, 2019).

Source. Our elaboration

Co-occurrence analysis

To delineate the intellectual framework of research contribution on the impact of the circular economy and sustainability on small and medium-sized enterprises and startups to foster ecosystem development, we conducted a co-occurrence analysis. Co-occurrence measures how often specific words or themes co-appear within a set of academic papers, indicating their thematic or conceptual connection (Donthu *et al.*, 2021). We focused on keywords that surfaced at least twelve times across 247 studies in our dataset and from a total of 1295 keywords, we identified 15 divided in three clusters (Figure 6).

Fig. 6: Co-occurrence analysis



Source. Our elaboration

Blue Cluster

The circular economy aims to reduce waste, pollution and improve resource efficiency through cleaner production to ensure sustainable development (Le *et al.*, 2023; Mondal *et al.*, 2023). Applying this logic, social and governance objectives can also be achieved by exploiting the opportunities generated by digital technologies, Internet of Things, machine learning and 3D printing that ensure

greater efficiency, multi-stakeholder collaboration and above all innovation (Guldmann and Huulgaard, 2020; De Las Mercedes Anderson-Seminario Alvarez-Risco, 2022).

On the other hand, by implementing circular business models, companies can contribute to sustainable growth in view of the 2030 Agenda goals (Guldmann and Huulgaard, 2020).

A proper selection of stakeholders involved in the entire circular supply chain can foster the creation of higher quality products, higher customer satisfaction and lower production costs, generating a regenerative cycle of production and consumption (Ljumović and Hanić, 2023), also to foster the integration of SMEs into a wider circular economic system (Rok *et al.*, 2021; Mondal *et al.*, 2023).

The adoption of Industry 4.0 principles, including supply chain integration, stimulates the evolution of SMEs towards circular economy practices, also improving the sustainability of the business initiative (Findik *et al.*, 2023).

Reducing the obstacles that companies face regarding resistance to change, lack of long-term vision and limited awareness of the benefits of adopting advanced technologies (Suchek *et al.*, 2022) can be accelerated through the adoption of the dictates of Industry 4.0.

In this context, FinTech, facilitates access to innovative Industry 4.0 technologies for SMEs by promoting the achievement of sustainable development practices through the circular economy (Suchek *et al.*, 2022).

However, it is necessary that the transition to a circular economy is supported by both global and regional interventions, such as those of the European Union, OECD, PACE aimed at promoting initiatives through research, studies and measuring the effects of the CE (Ljumović and Hanić, 2023).

The importance of the role of sustainability in the management of individual company projects is also highlighted, positive connections have been identified between sustainable project management and its success in reducing environmental and social impacts (Milošević *et al.*, 2023).

Red cluster

According to Barford and Ahmad (2023), while the circular economy focuses on environmental and economic aspects, sustainability considers the environmental, social and economic aspects in the same way. The importance of the role of sustainability also emerges in the management of individual company projects; in fact, positive connections have been identified between sustainable project management and its success in reducing environmental and social impacts (Milošević *et al.*, 2023).

Toljaga-Nikolić (2023) defines sustainable project management as “a mechanism that should help the organization transform its business by implementing a strategy of sustainable development, which should result in creating value both for the organization and for society”.

Furthermore, in order for sustainable entrepreneurship to develop, corporate management should pay equal attention to all dimensions of the “triple bottom line” (economic, social and environmental) by achieving a certain level of profit, improving people’s lives and protecting the planet, respectively (Awana *et al.*, 2023; Castellani *et al.*, 2023).

From the existing literature, it has emerged that entrepreneurial sustainability originates from the identification, processing, and utilization of opportunities of an economic nature generated by market failures that drive companies to create new products, processes or services. It is inevitable that these processes consider the environmental and social changes caused by innovations (Ferreira and Ferreira, 2023).

Factors within companies that can facilitate the implementation of circular and sustainable business models include employee and top management commitment, managers’ personal knowledge of such issues, participation in groups of like-minded companies and customer demand for sustainable products or services (Ostermann *et al.*, 2021).

As noted in the literature, innovation in business models aims to integrate “sustainability goals into business models” both “to achieve a positive impact on society and/or the environment in combination with the pursuit of profits” and to achieve business success (Rok *et al.*, 2021). But while start-ups are more likely to develop business models based on digitisation and customer orientation,

established companies base them on complex value generation and distribution structures, requiring a high amount of capital (Palmié *et al.*, 2021).

Obviously, no circular business model can be suitable for all types of companies, in fact each sector requires different business models and consequently different digital innovations: in some sectors process innovations might be more relevant, in others product innovations (Huynh, 2021). Usually, large companies tend to adopt circular economy principles such as recycling and reuse in a marginal way, avoiding revolutionizing the business model. In contrast, small and medium-sized companies and start-ups are more likely to radically innovate their business models (Huynh, 2021).

Green Cluster

In recent years, the topic of the circular economy has been attracting much interest among researchers and among companies that undergo substantial transformations to adapt to sustainable practices by revolutionizing their business model due to adaptations to new resource management policies through recycling and reuse of materials (Elf *et al.*, 2022).

These changes are influenced by several drivers and are hampered by multiple barriers that impact the effectiveness of adopting sustainable practices (Geissdoerfer *et al.*, 2023).

Internal and external factors are highlighted (Suchek *et al.*, 2022; Barford and Ahmad, 2023) that can accelerate or slow down the implementation of EC; the former refer to internal company resources and competencies, while the latter are represented by public policies, market dynamics, technological advancement and stakeholders (Day *et al.*, 2020).

Hunynh (2021) highlights the importance of considering both factors for the transition to circular business models.

The main barriers to the adoption of CE include lack of institutional support, low environmental awareness, lack of economic incentives (Centobelli *et al.*, 2021), as well as challenges related to governance, economics, technology, knowledge and skills, management, culture, society, and the market (Chowdhury *et al.*, 2022).

These obstacles, typical of small and medium-sized enterprises, are manifested by a lack of commitment on the part of company management and complex administrative procedures that do not allow or slow down the adoption of sustainable practices (Cavicchi *et al.*, 2022).

However, Cavicchi *et al.* (2022) also argue that SMEs can overcome these challenges through cooperation with universities and through the adoption of circular business models, thus demonstrating that it is possible to turn barriers into opportunities for growth and innovation

On the other hand, drivers that facilitate the adoption of CE include economic efficiency, cost reduction, environmental appreciation, and a strong corporate culture. Information technology emerges as a primary driver, along with the importance of ethical leadership and effective collaboration in the value chain (Chowdhury *et al.*, 2022). These elements, together with technological innovation, corporate social responsibility practices, and changing consumer habits, can push SMEs towards greener and more sustainable business models, offering economic, environmental, and social benefits (Herrero - Luna *et al.*, 2022; McDougall *et al.*, 2022).

Finally, the literature emphasizes that the implementation of CE and the improvement of sustainable performance depends on the capabilities of companies that can embrace adaptation to change and innovation (Kiefer *et al.*, 2019; Herrero - Luna *et al.*, 2022).

4. Discussion and conclusion

The main objective of this study was to systematize the scientific output related to the introduction of CE practices in startups and SMEs to foster sustainable ecosystems through a bibliometric analysis. Although there are systematic reviews and other separate types of analysis on these topics, to the best of our knowledge, this study is the first to conduct a combined assessment of the literature at the intersection of the research fields in question. Our research aims to offer significant perspectives on

the rapidly evolving domain of CE and sustainability strategies in startups and SMEs. An examination of the temporal development of this research area over fifteen years indicates that the emphasis of this field is rather recent, showing a growing interest in the literature since 2016. Nonetheless, there is a significant increase in scientific output, implying a growing importance of this topic in academia due to its mainly managerial implications.

The results of this bibliometric analysis will help scholars better understand the global overview of CE strategies implemented in startups and SMEs for a sustainable society. From the study conducted, it appears that CE represents a transition from a linear economic model to a closed-loop system in which products and materials are kept in use for as long as possible. This transition presents new business opportunities for companies in various sectors. CE also requires a new perspective on business practices, design, consumption, and behavior, as well as new strategies for supply chains and logistics, knowledge management, and human resource management. To implement CE principles, it is essential to consider the context, trade-offs, barriers, and determinants that affect the adoption of CE practices in startups and SMEs.

Startup and SMEs' CE practices can drive business model innovation, improve industry performance, and build dynamic capabilities. However, the challenges of implementing CE practices require experiences, knowledge, and networks to overcome. The implementation of a CE is a complex process that involves collaboration and coordination among various stakeholders (internal and external), principles, and technologies. The involvement of businesses, governments, consumers, and researchers is essential to ensure inclusivity and consideration of economic, social, and environmental factors. The application of principles such as eco-innovation, supply chain management, industry 4.0, internet of things, big data, and life cycle assessment is necessary to achieve CE goals from startup and SMEs.

All these aspects underline the potential of startups and SMEs in driving collaborative efforts toward sustainable practices, showing their central role in reshaping industry norms and promoting a more environmentally conscious and socially responsible business ecosystem.

From our analysis we can draw relevant managerial insights that can guide startups and SMEs toward a more sustainable, resilient, and innovative ecosystem. The rapidly changing landscape is forcing businesses not only to embrace CE, but also to strategically integrate it into their operations to remain competitive. It is essential that policymakers are first and foremost focused on providing firms with the guidelines and tools they need to take advantage of new technologies and circular business models, which can be particularly valuable for startups and SMEs. This certainly means facilitating access to innovative financing aimed at sustainability, but it also means outlining clear CE regulations that encompass social as well as economic and environmental dimensions.

From a theoretical perspective, this study provides a detailed analysis of the network of researchers in the field of CE strategies of startups and SMEs, while also presenting a number of research paths that offer interested scholars the opportunity to further deepen their understanding of the topic, outlining the most promising areas of inquiry and gaps to be filled.

However, bibliometric analysis, while a useful tool for assessing scientific output and identifying research trends, has certain limitations. Contributions not indexed or not present in the databases used could be excluded from the search results, compromising the completeness of the representation of existing research. In addition, the consideration of only English-language contributions could result in linguistic biases in the results.

Ultimately, while bibliometric analysis provides a broad overview of the area of interest, other methods of analysis, such as systematic literature reviews and meta-analyses, may be needed for a more comprehensive understanding of the various topics to explore in greater depth the different facets of the CE strategies of startups and SMEs.

5. Future research avenue

The literature review reveals several gaps that could be filled in future research. Therefore, in the following table (Table 4) we have summarized future directions for researchers, divided into specific subject areas, which would be interesting to address in further exploration.

Tab. 4: Future research directions by topic

Startups and circular economy	Investigate how circular startups can coordinate activities across the entire business value chain to minimize environmental impact (Awana *et al.*, 2023) Analyzing the business models and types of innovation implemented, understand the role of startups in the transition to the circular economy (Henry *et al*., 2020) Identifying, through an analysis of different regional contexts, the institutional or legal barriers faced by circular startups (Rok *et al*., 2021)
Skills and circularity	Identify the skills that SMEs will need to acquire in terms of digital technologies, such as artificial intelligence, machine learning, or virtual reality, in order to create a positive image to generate a competitive advantage based on the circular economy (Chowdhury *et al.*, 2022)
Dynamic capabilities and circular economy	To investigate how dynamic capabilities foster the implementation of the circular economy (Khan *et al.*, 2020) To investigate whether a dynamic circular environment influences as a moderating factor in the relationship between dynamic capabilities and the circular economy, as well as between dynamic capabilities and performance (Khan *et al.*, 2020) To investigate the dynamic capabilities that enable companies to transform their core competencies into circular activities in order to gain a competitive advantage (Katz-Gerro and Sintas, 2018)
ESG factors and circular economy	Analyzing how circular economy activities impact ESG scores to better understand the effects on sustainability rather than corporate performance (D'Angelo *et al.*, 2023) Investigate how ESG information, disseminated by companies or retrieved through social networks, influences the market (De Giuli *et al.*, 2023)
Innovation and circular economy	Examine how different types of innovation influenced the sustainable and/or circular performance of SMEs (Zhang *et al*., 2022) Through a dynamic analysis, based on longitudinal data, analyze the relationship between circular eco-innovations and business performance (Demirel *et al.*, 2019)
Leadership and circular economy	Study the impact of different types of leadership on the adoption of the circular economy and the digitization factors influencing such adoption (Choudhari *et al*., 2022) Exploring the factors that facilitate the success of green entrepreneurship and digitization in various sectors to create environmentally sustainable systems (Mondal *et al.*, 2023)
Subjective factors and circular economy	Exploring how organizational culture, motivation, and personality influence behavior in the workplace context with reference to environmental protection (Banwo and Du, 2019)
SME and circular economy	Explore how circular economy practices can be integrated into the social contexts in which SMEs operate (Mura *et al.*, 2020) Conduct an in-depth analysis of the contextual factors influencing the implementation of circularity by small and medium-sized enterprises, at the national or sectoral level, to better understand the development mechanisms of firms (Demirel *et al.*, 2019) Measuring the impact of economic, social, and environmental dimensions on the performance of small and medium-sized enterprises (Khan *et al.*, 2022)
Digital technologies and circular economy	Check whether the adoption of digital technologies and the circular approach in companies may lead to negative consequences in terms of data security, privacy, skills (Perotti *et al.*, 2023)
Ecosystems and circular economy	Analyzing how the resources, legitimacy, capacities, and power of different ecosystem actors can disseminate CE knowledge and promote circularity in the ecosystem (Audretsch and Fiedler, 2023) Study the life cycle of ecosystems in the context of circularity (Audretsch and Fiedler, 2023)
Managerial approach and circular economy	To study sustainability and circular economy-oriented managerial approaches involving different sets of family SMEs in different territorial and sectoral contexts (Valenza *et al.*, 2023) To shed light on how various sustainability-oriented managerial approaches can contribute to the development of the SDG goals (Valenza *et al*., 2023) Analyzing how organizations are assimilating and implementing the circular economy (Barreiro - Gen and Lozano, 2020)
Public-private partnerships and the circular economy	Analyzing how public-private partnerships can drive the transition to a more sustainable and circular economy (Mondal *et al.*, 2023) Analyzing where policymakers and investors should focus their resources to promote the circular economy (Henry *et al.*, 2020)
Circular economy Implementation Methods	Identifying and analyzing differences between circular economy actions implemented by companies in relation to sectoral activity and country (Triguero *et al.*, 2022)
Consumers and circular economy	Check the role of consumers in the business transition to a circular economy (Triguero *et al*., 2022)

Source. Our elaboration

We also believe that further research could address the development of appropriate strategies and tools to disseminate and foster the application of CE principles in real-life scenarios. Such research could evaluate ideal practices for knowledge transfer and education, determining which forms of information are most effective for the various stakeholders. It would also be useful to investigate how companies, policymakers, consumers, and local communities can be informed about the benefits of CE and encouraged to contribute to its implementation.

In addition, future studies could investigate the use of digital technologies, such as artificial intelligence and big data analysis, to facilitate the transition to a circular economic model, thereby improving traceability and efficient resource and waste management.

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Stitching Sustainability with Capital: Unravelling the Potential of Equity Crowdfunding for Sustainable Fashion Firms[1]

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Abstract

Frame of the research. *The paper is focused on the interplay between equity crowdfunding (ECF) and the integration of sustainable practices within the fashion sector. It explores the intersection of finance, sustainability and fashion, to shed light on ECF's potential to lead a paradigm shift towards more sustainable business models.*

Purpose of the paper. *This study aims to deepen the complex interplay between ECF and sustainable innovation, with the objective of identifying how ECF may act as a catalyst for sustainable transformation within the fashion industry. The goal is to highlight ECF's strategic potential to foster sustainable business practices in fashion.*

Methodology. *Our study employed a comprehensive exploratory multiple case study methodology, examining eight fashion firms that successfully launched ECF campaigns. We conducted thematic content analysis through qualitative coding on data from semi-structured interviews with firms' representatives.*

Results. *The findings delineate four main themes emerging from the analysis of ECF and sustainability within the fashion domain. Results showcase ECF as a potential mechanism to encourage sustainable innovation in fashion, by also facilitating a deeper engagement with investors and consumers.*

Research limitations. *The specificity of the sample selection and geographical focus may circumscribe the generalisability of our findings. The potential scarcity of comprehensive data may affect the thoroughness of our analysis. Lastly, the qualitative methodological approach introduces the potential for interpretative bias.*

Managerial implications. *This study underlines the strategic utility of ECF in meeting social and economic corporate sustainability goals, urging firms to integrate sustainable practices across their operations and maintain transparent stakeholder communication.*

Originality of the paper. *This research enriches the discourse on sustainable finance and fashion by elucidating the role of ECF in driving sustainability. It suggests ECF as a crucial facilitator of sustainable innovation and as a financial tool for industries towards a more sustainable trajectory.*

Keywords: *equity crowdfunding, sustainable fashion, innovation, sustainable business models, financial strategies for sustainability*

1. Introduction

The fashion industry finds itself at a crucial juncture, necessitating a profound transformation to address the environmental challenges it significantly contributes to. Positioned as one of the foremost global polluters, the conventional linear production model employed by the fashion sector has had severe environmental repercussions (European Environmental Agency, 2019). The rapid ascent of fast fashion has only exacerbated these issues, fostering unsustainable practices and reckless resource

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depletion. Given the escalating environmental toll of the fashion industry, coupled with the relentless expansion of production and the diminishing product quality, the call for the adoption of circular business models to usher in sustainability is unequivocal (European Commission, 2022).

Entrepreneurs operating within the fashion domain are increasingly recognising the imperative to pivot towards sustainability and circularity (Todeschini *et al.*, 2017). Therefore, they are increasingly fostering sustainability into their endeavours, from the selection of materials to the application of innovative production techniques, with the primary objective of reducing the industry's ecological footprint (Bocken *et al.*, 2014).

However, the transformation towards circularity in fashion necessitates innovative solutions and substantial investments. Traditional financing channels may not always align with the sustainability objectives brought about by circular business models. Hence, there is a pressing need to explore alternative funding sources.

Effectively conveying the potential of sustainable fashion projects to prospective financiers is a complex undertaking, given the multifaceted nature of sustainability (Vismara, 2019). This is where equity crowdfunding platforms come into play, offering suitable means for entrepreneurs to showcase their sustainable fashion initiatives to investors who prioritise sustainability (Calic & Mosakowski, 2016). By accentuating the positive environmental and social impacts of their ventures, sustainable fashion projects can attract like-minded investors eager to contribute to the sector's advancement.

This research embarks on a journey to delve into the convergence of circular business models and equity crowdfunding campaigns within the fashion industry. While extant research has predominantly centred on reward-based crowdfunding platforms, the role of equity-based crowdfunding platforms in this context remains underexplored. These platforms, which enable individuals to invest and gain ownership equity, hold promise as alternative financing mechanisms for sustainable fashion firms (Belleflamme *et al.*, 2014). An exploration of equity-based crowdfunding in the fashion industry promises unique insights into its potential to enhance long-term financial sustainability.

The outcomes of this study can potentially cater to fashion entrepreneurs, investors, and policymakers alike. As charting a more sustainable course for the fashion industry is an increasingly more pressing need, the urgency to address this sector's challenges amplifies. Leveraging equity crowdfunding investments to underpin circular business models may thus contribute to reveal the presence of a transformative tool in the quest for a more sustainable and rejuvenated fashion ecosystem.

Following this introductory section, the subsequent sections of this paper are structured as follows. Section 2 will present the theoretical framework, providing a comprehensive foundation for the study. Section 3 will detail the methodology, elucidating the approach to data collection and the data analysis phase. In Section 4, the findings will be thoroughly examined, offering insights into the relationship between sustainability among fashion equity crowdfunding campaigns. Finally, in Section 5, the discussion will present the implications, significance, and potential avenues for further research stemming from the study's findings.

2. Theoretical Framework

2.1 Sustainability in the Fashion Industry

The T&A industry's impact on the environment is substantial, due to resource-intensive production processes and high waste generation. This sector is characterised by high water and energy consumption, extensive chemical usage, pollution and significant waste generation, particularly in the textiles and clothing segments (Jacometti, 2019). Manufacturing processes frequently depend on non-renewable energy sources, exploit water and natural resources and incorporate the use of harmful chemicals (Denuwara *et al.*, 2019; European Environmental Agency, 2019). Moreover, the industry's worldwide supply chain is linked to insufficient labour rights and transparency, potentially resulting in human rights violations and illicit practices (Fondazione per lo Sviluppo Sostenibile & FISE

UNICIRCULAR, 2021). Therefore, political actors have been proactive in addressing these environmental challenges, promoting sustainable practices, and advocating for the adoption of a circular economy model within the T&A sector (European Commission, 2022).

The rise of fast fashion has further intensified these concerns, resulting in a substantial increase in post-consumer waste. In response, the circular economy model, emphasising Reduce, Reuse, and Recycle principles, provides a strategic approach to counteract these negative impacts (Parthiban & Duraisamy, 2019). Particularly, circular practices bring about eco-friendly processing and sustainability throughout the textile supply chain, aiming at reducing waste at every stage of production and consumption (Thorisdottir & Johannsdottir, 2019; Weber *et al.*, 2016).

The implementation of circular economy practices underscores the importance of integrating these strategies across the fashion value chain, going beyond mere waste management. A holistic approach is essential to achieve genuine circularity in the fashion industry (Brydges *et al.*, 2022). In this context, the adoption of circular business models, which encompass practices like upcycling, return policies, repairing and recycling, is crucial to achieve sustainability in the T&A industry. Entrepreneurs are gradually transitioning from the traditional linear production model to circular and responsible resource management, recognizing the necessity of such a shift for the industry's future sustainability (Belz & Binder, 2017; Bocken *et al.*, 2014).

The integration of technologies like blockchain and IoT is enhancing traceability and supporting circular economy models in the T&A value chain, facilitating the sector transition to more sustainable practices (Alves *et al.*, 2022; Leal Filho *et al.*, 2019).

Nevertheless, transitioning to a circular economy in the T&A industry poses various challenges, including technological, financial, and human resource constraints. This transition requires sensitisation and collaborative efforts from industry stakeholders, public authorities, consumers, and waste management facilities (Saha *et al.*, 2021). Consequently, effective transformation can be supported by platforms like the equity crowdfunding ones, where monetary interests can be aligned to sustainable development objectives (Yaşar, 2021).

2.2 Equity crowdfunding and the T&A sector

Equity crowdfunding is appearing as a potential mechanism for entrepreneurs championing sustainable initiatives in the fashion industry. Equity crowdfunding platforms may enable sustainable-oriented entrepreneurs to present their sustainable fashion projects to a wider audience. Indeed, current literature confirms that entrepreneurs can attract like-minded investors who share the same priorities in their investment decisions thanks to equity crowdfunding, and this could be applied to sustainability motives, too (Civardi *et al.*, 2023).

Examining equity-based crowdfunding platforms in the context of sustainable fashion offers a promising avenue to achieve long-term financial sustainability in the T&A industry (Dalla Chiesa *et al.*, 2022). The synergy between equity-based crowdfunding and sustainability transcends mere financial transactions, as this approach underscores a collaborative relationship between investors and fashion brands, united by a mutual commitment to sustainability. Beyond financial backing, these investors contribute valuable ability and share a vision for positive change within the T&A sector.

While current literature predominantly delves into reward-based crowdfunding platforms, which provide non-financial incentives to backers, there is a growing focus on equity-based crowdfunding platforms as an alternative financing avenue (Vismara, 2019). These platforms enable individuals to invest in businesses and gain ownership equity or shares, making them particularly pertinent for startups across various sectors as the fashion one (Belleflamme *et al.*, 2014). Research has shown that such platforms significantly influence funding outcomes, with environmentally sustainable projects often receiving more funding compared to non-sustainable ones (Calic & Mosakowski, 2016; Ko & Ko, 2021).

In essence, exploring the convergence of equity-based crowdfunding and sustainable fashion

unveils a landscape where financial considerations align with aware commitment to ecological and social well-being. It provides insights into a realm where financial sustainability can coexist harmoniously with environmental and social stewardship, offering a hopeful perspective for the T&A industry journey towards a more sustainable and prosperous future.

3. Methodology

3.1 Sub-paragraph title

Considering the evolving nature of the subject matter under investigation, our research adopted a comprehensive exploratory approach through a multiple case study methodology involving eight distinct firms operating in the fashion sector, all of which have successfully conducted ECF campaigns (Table 1). This methodological framework is particularly apt for addressing 'how' and 'why' inquiries, providing a structured basis for comparative analysis across diverse cases. This approach is also in line with established recommendations for the examination of emerging trends within industries (Yin, 2002; Urbinati *et al.*, 2018).

Tab. 1: General information on the interviews

Firm	**Typology**	**Position**	**Length of the interview**
Firm no 1	Production	Founder	55'
Firm no 2	Production/E-commerce/Shop	CEO	83'
Firm no 3	Marketplace	Co-founder	44'
Firm no 4	E-commerce	CEO	35'
Firm no 5	Production/E-commerce	Co-founder	55'
Firm no 6	Marketplace	Managing Director	42'
Firm no 7	Shops	CEO	39'

Source: Authors' elaboration

To effectively pursue our research aims, we employed a thematic content analysis (Braun & Clarke, 2006) to scrutinise the experiences and perspectives of fashion firms engaged in successful ECF campaigns. Our primary aim was to discern themes and patterns emerging from these firms' experiences, while also focusing on challenges, strategies, investors' engagement, and the key factors affecting crowdfunding success.

The research setting was defined by the selection of fashion firms incorporating sustainability practices in their production and/or distribution value chains. This focus derived from consumers' focus for sustainable products and international regulations aimed at reducing the environmental impact of the fashion sector. The chosen firms showed innovative approaches to sustainability, encompassing the use of recycled materials, fair labour practices, water conservation in textile manufacturing, and commitment to sustainable distribution operations. The sample of firms involved in the study includes diversified firms in terms of scale, geographic presence, industrial fields, and market scopes (Table 1). Moreover, these firms show variations on ECF campaigns objectives, overall funds raised and their organisational structures.

As a first step, we deeply analysed the initiatives undertaken by each selected firm as part of our case study, thus identifying the specific actions implemented by these to enhance sustainability and the resources allocated for social purposes. These aspects are identified as pivotal ones influencing the outcomes of each crowdfunding campaign. Preliminary data were gathered from firms' websites, ECF platforms, press releases, news reports, and public entities' information sources. The choice of the Italian scenario is deliberate, considering it has been one of the first EU countries to have introduced regulations for ECF campaigns and to have assisted substantial growth in the ECF market over the last decade.

Since the first preliminary review of the literature and this on-the-field investigation, we set up the

interview questions structure. The interview questions attempted to follow the chronological deployment of crowdfunding initiatives and explore firms' inner structures, their experiences with ECF and the key achievements reached during the campaigns. Specifically, demands were constructed as open-ended inquiries based on the notions outlined in this study, although any direct reference to theoretical underpinnings was deliberately avoided while conducting the interviews.

Primary data were obtained through semi-structured interviews conducted with founders or key decision-makers within the selected fashion firms that successfully navigated ECF ventures. Participants were provided with information about the study's purpose, and their anonymity is rigorously preserved throughout the entire research process.

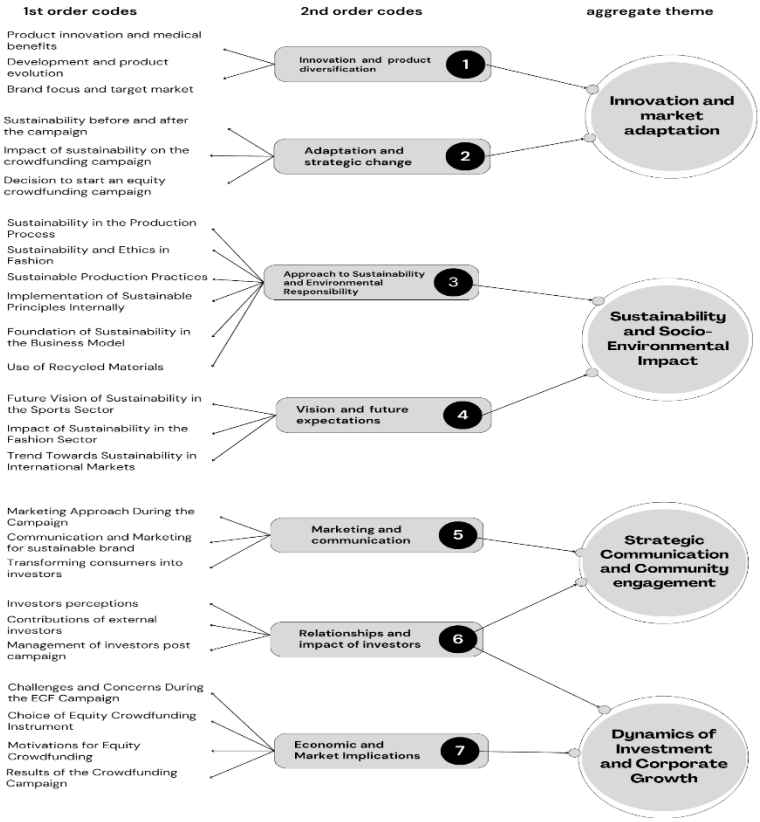
Interviews were conducted via video conferencing and lasted approximately 30-45 minutes. Additionally, they were audio-recorded with participants' consent and then transcribed for analysis (Riessman, 2008). After that, the transcribed data underwent thematic content analysis to allow for the identification, analysis, and reporting of patterns within the data (Braun & Clarke, 2006).

Qualitative coding was employed to distil raw data into foundational concepts, then abstracted to discern internal consistencies and inter-case linkages (Eisenhardt & Graebner, 2007). The coding process ranged from brief phrases to entire paragraphs, to preserve the original context of respondents' statements. The analysis proceeded iteratively, with codes organised into potential themes and sub-themes. A collaborative approach constantly involving the three coauthors ensured a comprehensive coding system, in line with the methodological principles emphasising multiple researchers for qualitative data analysis (Creswell & Poth, 2018).

4. Main findings

Thanks to the thematic content analysis procedure, we were able to detect first and second order codes which we will present in detail in the following sections, in correspondence with the 4 main aggregated themes emerging from our research (Tab 1).

Tab.1 Coding scheme



Source: Authors' elaboration

4.1 Theme 1: Innovation and Market Adaptation

This theme discusses how fashion firms are dynamically innovating and adjusting to a swiftly changing marketplace. It includes launching new, consumer-focused products and services that not only meet consumer needs but often predict them, leveraging new technologies and innovative approaches. It also includes the adaptation of business models to capitalise on the opportunities offered by e-commerce and digitalisation, highlighting a trend towards customization, product diversification, and strategic adjustment. Firms emphasise the importance of remaining flexible and responsive, adapting not just to survive but to thrive in a constantly changing market context also thanks to new business strategies harnessing the potential of e-commerce and digital technologies (Huynh, 2022).

The emerging trend consists in creating distinct products that merge technological advances with real-world utility. In this context, two interviewed firms produce professional and leisure sportswear, thus embedding innovation and research in their fashion offer.

"In essence, we are producers... We were founded with the aim of introducing an innovative product concept... We integrate biomechanical science... Based on these studies, we develop targeted products that provide real and tangible benefits."

All firms highlight the importance of innovation in their offer, from product to circular business models (Kozlowski *et al.*, 2016). Indeed, the fashion sector is considered as suffering from static dynamics, without a real market evolution despite the collections flow over time. In relation to this, most of the firms emphasised the relevance of customers' opportunities to personalise products and receive dedicated support on the outfits creation. This underscores the increasing necessity of fashion firms to focus on their distinctive brand identities and, therefore, target specific market segments as key for their success.

"Gaia presents itself as a virtual friend for all users, but it is personalised for each registered user on the platform, knowing their tastes and emotions".

Moving further, most of the firms report to be born as innovative startups. The decision to embark in ECF campaigns served their desire to grow, expand and become economically viable businesses:

"We needed to complete a round of fundraising; we had already completed some initial rounds... As we needed additional financial resources, we decided to launch an equity crowdfunding campaign."

After the successful conclusions of their campaigns, they nevertheless kept up the pace by progressively adjusting their business methods to support their competitiveness in an evolving market landscape. Flexibility of their business models allowed their evolutionary growth and maintenance of economic sustainability over time, beyond the timeframes of their ECF campaigns:

"We initially established this brand as if it were a leisurewear brand for players... Today, our work primarily involves collaborating directly with clubs or the end consumer."

Importantly, the interviewed businesses focused on the role of digitalisation in bringing about their business activities. While some firms also sell through physical shops, these ones are not configured as the core business channels. Particularly, some of them are configured as online marketplaces selling multiple fashion brands' products and all of them have e-commerce channels through which they reach their customers' segments. Contrary to initial expectations, not all firms are producers per se but some work as fashion tech firms and online platforms selling other T&A firms' products:

"Our main goal is to sell online across multiple channels and, above all, to internationalise sales... We are not a fashion firm. We are experts on technological services."

The interviewees highlight the need to adapt to new customers' exigencies and markets contingencies. Given the variety of firms operating in the T&A sector, firms make themselves distinguishable through new business models to reach their customers and the implementation of technological services at clients' disposal. Specifically, their businesses cover consulting services dedicated to registered platforms, online selling channels for external fashion producers and even the combination of both production, e-commerce, and consulting activities all-in-one.

"We have developed a live shopping platform that is integrated into our proprietary websites. We have our own brand of classic tailored men's clothing, as well as a streetwear brand, and we distribute other 60 brands through this network of sellers available in live sessions, offering guidance to the end user within the e-commerce platform. Therefore, without leaving the e-commerce environment, it is possible to receive guidance and purchase products with the advice of an expert seller who knows the product well."

It is in this context that the importance of reaching customers in a sustainable manner emerges, leading us to the second topic emerging from our analysis.

4.2 Theme 2: Sustainability and Socio-Environmental Impact

This topic underscores the rising significance of sustainability and socio-environmental responsibility within the fashion industry. It encompasses practices of sustainable production, the employment of eco-friendly materials, initiatives aimed at diminishing environmental impact, and the pursuit of carbon neutrality. It also illustrates how firms are implementing measures to enhance their social footprint, such as advocating for fair labour conditions and the development of products that exert a positive influence on society. This reflects a growing awareness and a proactive response to the demands of a market increasingly conscientious about environmental and sustainability issues (Jia *et al.*, 2020).

Focusing firstly on the environmental aspects emerging from the analysis, the topic highlights the importance of incorporating sustainability within the structure of business operations. It goes beyond sustainable manufacturing or the use of recycled materials to include a strategic, inclusive approach where sustainability is a fundamental aspect of the business ethic (Braun *et al.*, 2021). Businesses are actively working to minimise their environmental footprint, undertaking efforts to achieve carbon neutrality and create eco-friendly e-commerce solutions. Here, sustainability is seen as both a moral responsibility and a unique selling proposition, significantly influencing brand perception.

"...we use organic products... 90% of our packaging is made from compostable materials or recycled plastic."

As for the fashion manufacturers, environmental sustainability is at the core of production processes. First, T&A producers involved in ECF campaigns make use of recyclable and sustainable materials which are carefully selected and respond to internal sustainability requirements. In addition, interviewed manufacturers pay attention to the implementation of low-impact printing and dyeing procedures, which are among the most environmentally impactful stages of fashion production. Apart from showing positive impact in environmental terms, these green processes go to the benefit of the products quality and durability.

"I start with the raw material, which is usually the only point of focus when talking about sustainability and is certainly the most evident aspect in our case. It involves primarily using materials sourced from production waste, surplus production, and/or regenerated sources."

"We use eco-friendly printing and dyeing techniques that not only have a low environmental impact, but also ensure the longevity of the products."

Among producers, the 'Made-to-Order' business model stands as pivotal sustainability practice, ensuring zero-waste, avoiding resource drains and inventory stock. In close relation to this stands the importance of continuative, non-seasonal collections made of standardised products which can be customised upon clients' requests.

"...the decision not to create a true seasonal sample collection, but to offer a series of individual products throughout the year. Often, these are the same products we have been offering for four years since the beginning of our firm. This allows us to have less inventory..."

Nevertheless, the implementation of sustainable production processes emerges as a key factor not only during the production phase, but also during the distribution stage. As a matter of fact, not only producers but also e-commerces and online distribution platforms report paying due attention to sustainable packaging and the choice of logistic infrastructures which aim at reducing the environmental impact of transportation.

"Logistics has a strong impact, as well as e-commerce service and returns. Therefore, we have started selecting some suppliers who have chosen to be 100% carbon neutral, for example, and we are beginning to offer it as a service to our partners."

For all the firms involved, the adoption and implementation of sustainability practices is highly felt as an issue of environmental responsibility. Even firms which are not solely responsible for the production processes, indeed, declare their intentions to implement sustainable business models and strive to reduce their carbon footprint. This stands a priority which is brought about despite budgetary boundaries and the need to support competitiveness, which limit the range of implementable sustainable actions.

"*From the first day, we strived to build a business model that not only creates high-quality products but does so in the most responsible way possible.*"

Moving to consider sustainability in its broader meaning, most of the firms underscore the importance of the social impact of fashion firms. While some mention the implementation of sustainability measures to the benefit of internal employees, other firms' representatives touch the relevance of implementing corporate sustainability practices with suppliers and in the choice of partnering brands. These actions respond to internal and external ethical practices and are coherent with fashion firms' awareness on the importance of adopting sustainable initiatives at 360°.

"*We strive to be ethical both towards the user and sustainable in the fashion industry, so we pay special attention to brands that aim to become more sustainable."*

Sustainability is considered a key topic in the future vision of the fashion firms involved in our sample. All of them report the willingness to implement more and better sustainability services to their clients and affiliates soon, as well as within their firm structures. This rising awareness is also dictated by the strategic importance of the topic for the fashion sector. Thus, several firms of our sample have decided to adopt environmentally sustainable practices internally, to respond concretely

and effectively to calls for a broader transformation of the T&A field. This occurred even in situations where sustainability was not among the core corporate values:

"We have undertaken two significant actions. The first is to become carbon neutral us... The other initiative is to offer our partner firms the opportunity to create a fully sustainable e-commerce platform."

"Sustainability has become one of our strategic pillars... we are trying to do and have already started some initiatives to understand how to make our firm more sustainable."

Future expectations regard the rising importance of the topic for consumers and for the fashion industry in general, marking the progressive shift from fast fashion (McNeill & Moore, 2015). While this is a trend internationally relevant and ongoing, however, some firms express lower optimism for the Italian consumers. As a matter of fact, this latter category seems to be less sensitive to sustainable fashion products and unwilling to give up cheapness for higher quality and items respectful of sustainability principles. However, this is also a matter of affordability and knowledge of the benefits and advantages of sustainable fashion, which are out-of-range in the case of Italian SMEs:

"Italy is still in an early adopters' stage [...] Italian small firms fight for their survival."

Significantly, however, the sustainability component was not reported as being among the key motivations moving ECF backers to invest in their businesses proposals. This directly leads us to the next section on the third topic emerging from the thematic analysis, focusing on dynamics of investment and firms' growth.

4.3 Theme 3: Strategic Communication and Community Involvement

This theme highlights the importance of strategic communication and community engagement in the context of equity crowdfunding and beyond. It proves how firms utilise various channels and communication tactics to engage their stakeholders, from customers to investors. It emphasises the importance of transparency, honesty, and authenticity in brand storytelling and marketing campaigns. Furthermore, it illustrates how active community engagement can not only increase support for the crowdfunding campaign but also strengthen customer loyalty and brand reputation.

A key role for the involvement of all investors' categories was played by effective communication efforts. Given the peculiar dynamics of ECF campaigns and the importance of directly involving investors with diversified degrees of ability, we tried to deepen how these firms conducted their campaigns from the communication standpoint. However, firms' representatives reported differences in communicative efforts from other investment instruments, but not because of the fashion sector impact.

"I observed significant differences in communication compared to other investment projects, but I did not notice differences due to our sector."

Apart from information available from the ECF platforms publishing the campaigns, some firms decided to undergo additional marketing actions to support their ECF efforts. This differed across firms, however, as some others opted for more traditional social media advertisement and word-of-mouth communication.

"We haven't done a lot in terms of marketing... we have communicated through our channels but in a rather limited way."

"We have always relied on ambassadors, so boys and girls who have tried the product for free and then created content talking about it."

Despite the diverse communication efforts in marketing terms, all interviewees underlined the key role of transparency in communication with their backers. Transparency stood as a key element for communication with investors before, during and after ECF campaigns. It translated in complete documents provision and availability to give additional information and clarifications to potentially interested backers, in a process defined as stressful and time consuming. While documents and formal communication served more formal investors with a professional interest in funding the campaign, respondents also documented the importance of keeping contact with their communities of small investors and being ready to clarify any potential source of concern for them. Indeed, as most of them did not know the ECF mechanisms but were eager to giving support to the campaigns, additional informal communication efforts had to be undertaken by firms' representatives to ensure smooth investing processes.

"All documents were ready for download from the very beginning, making our ethical transparency and commitment easily observable and understandable."

"Transparency is fundamental... transparency and showcasing who we are, what we do, our past, and everything else have certainly contributed significantly."

Moreover, the coding process of the interviews highlighted the relevance of investors' values and perceptions of the seriousness of the campaign and their core corporate values. As a matter of fact, ECF campaigns give the possibility to cater to a wider public of investors who share the same values and practices with the firms they decide to support (Civardi *et al.*, 2023). Therefore, apart from transparent communication efforts, value sharing often played a pivotal role in retaining and attracting new investors, especially for firms directly embedding sustainability as core of their business proposal.

"The theme of sustainability has been particularly relevant for most investors. I honestly think that those who have invested [...] have also taken into consideration the firm's values along with the business plan."

Thus, given the purpose of our study, during the interviews we attempted to explore in depth the role played by sustainability efforts to the outcomes of the ECF campaigns. Although some firms remarked the importance of the emphasis of communication on sustainability on the attraction of new investors, this was not considered a determinant factor. Contrary to our expectations, apart from the firms with a core strong sustainable identity, firms' representatives mostly reported the absence of a direct linkage between investors' support and their sustainability efforts:

"Unfortunately, to date, customers don't care much [about sustainability] ..."

"Italian SMEs often find themselves struggling for survival rather than thinking about anything else... We don't see a great push or interest towards e-commerce or sustainability."

The last quoted sentence, indeed, realistically reports that Italian firms fall well behind other European countries in terms of sustainability efforts, mainly due to the Italian industrial ecosystem conditions. Customers are, unfortunately, not ready yet to give up economic convenience to the benefit of environmental sustainability. Therefore, the efforts towards sustainability of these fashion firms were considered as important by investors, but not essential. When solicited to reflect upon this, in fact, firms' representatives most frequently reported that sustainability did not constitute a

determinant factor for their investors' decisions to support their ECF campaigns. Conversely, these firms confirmed the successful leverage on innovation topics, which catered especially to a public of unknown investors. This appeared evident also for the firms embracing sustainability as core value of their business proposal, conformingly to what indicated by current literature (Todeschini *et al.*, 2017):

"In my opinion, it's a rather secondary issue... having sustainable themes represents an additional advantage, but what certainly stands out today is innovation."

For the firms involved in our sample, a direct connection between the decision to implement sustainability efforts and the starting of the ECF campaigns was absent. Some of them decided to include references to sustainability later, after the conclusion of the campaign, while other ones only hinted at sustainable values during the ECF initiative and currently do not include it as one of the core values keys to the business success. Nevertheless, sustainability was considered as a strategic communication tool to be emphasised during the campaigns:

"During our campaign, we communicated that we were committed to sustainability to a certain extent, but what we would actually do was not entirely clear even to us. [...] I believe we were not particularly decisive on the issue of sustainability."

Therefore, although the current scenario confirms other priorities tend to prevail over sustainability concerns, sustainable efforts are worth remarking to cater additional investors' support. Given that, in the next section we will delve deep into backers' dynamics and the linkage to corporate growth.

4.4 Theme 4: Dynamics of Investment and Corporate Growth

Overall, his thematic exploration delves into the use of equity crowdfunding by firms as a mechanism for financing their expansion and innovation endeavours. It includes how firms manage expectations and relationships with investors during and after crowdfunding campaigns, and how ECF dynamics affected their growth and relations with investors. The theme also deepens the significance of the symbiotic relationships proved between corporations and investors, illustrating that crowdfunding transcends mere capital provision to foster a community of support. Furthermore, this discourse elucidates the challenges and strategic considerations pertinent to investor management and the allocation of financial resources. It underscores the criticality of maintaining an equilibrium between economic sustainability and the pursuit of investments aimed at fostering growth, thereby highlighting a nuanced understanding of equity crowdfunding within the corporate finance landscape.

The first sub-theme emerging from the thematic content analysis of the interviews explores more in depth the interactions and the relations with the backers of the ECF campaigns conducted by the interviewed firms. All firms report two main types of supporters, i.e. professional investors, and small ones. For most of the interviewees, this latter category includes consolidated customers and the community of people who already knew the product and were turned into investor partners during the ECF campaign.

"*We have put a lot of effort into building our community, both among the sellers, some of whom have become partners, and among the customers who have chosen to invest in the campaign due to the benefits offered, trust in the project, or their proximity to us, and so on.*"

The role played by external investors, however, differs across the interviewed firms. While external investors generally played a remarkable role, they contributed to different extents to the success of ECF campaigns of our sample of firms. Professional investors often invested considerable amounts of money, but the human aspect of the relationships with them is less relevant than with the

rest of the community and other close investors. As a matter of fact, while small investors often belonged to the customers' bases of the firms involved, professional ones who did not know the brands before had to rely on public information posted on ECF platforms or retrievable through other online sources. Due to their ability and detached perspective, this category of investors paid more attention to performance and other key aspects related to digitalisation and sustainability.

"In the end, we closed at 430 thousand euros... we raised about 80-90-100 thousand euros of the total 430 from people I didn't know."

"*In the end, focusing our communication on the platform in a very pronounced way, showcasing our values and certifications, was inevitable. [...] This was important, especially for investors who did not know us. [...] it is certainly true that they see sustainability as an added value for the future."*

In this context, most interviewees reported that they had to be at complete disposal for meetings and clarifications by new backers while ECF campaigns were ongoing. This was even more important in the preliminary phases, when necessary, documentation had to be prepared and made available to investors' scrutiny. These tasks were reported by many as being among the key commitments that had to be performed at best, given the importance of attracting new investors beyond those that already knew and trusted the brand. Thus, the conversion of new investors is reported as being a time-consuming and challenging task, requiring information and documentation from firms' side attesting their plans for economic viability in a transparent manner. Overall, hindrances about the management of ECF campaigns was related especially to the preceding stages of the ECF campaigns and while they were ongoing.

"*The difficulties during the campaign were mainly related to the organisation of the content and preparation. [...] Without any doubts, there were difficult moments during the campaign, especially when it was necessary to dedicate a lot of time to convert some investors rather than others*".

However, efforts in investors' engagement were rewarded with positive relationships with backers during and after the ECF campaigns themselves. After the conclusion of the campaign, almost all interviewees had the opportunity to meet investors in person and keep relations with the most important ones, through regular updates and annual meetings with the main stakeholders. This is considered among the positive aspects of relations with investing partners, also given the limited impact that these ones could have on firms' internal decisions. As investors in ECF become partners in the project but have limited influence on the creativity process, afterwards relations management is neither complex nor demanding as during the campaigns themselves.

"As for the investors, I have an excellent relationship with all of them... investors do not have a real impact on the firms' creativity. [...] I can't say the situation is complicated... many investors don't have voting rights because their investment is asset-based."

Another key topic emerging from the coding process is related to the key economic and market implications of the pandemic. The decision to opt for ECF campaigns as financial instruments was determined by the need to collect funding to start with business activities on a larger scale or get additional resources when the firm was already established and stable, to enlarge some units, bolster in-place operations or implement new, additional ones.

"We needed to complete a fundraising round; we had already completed some initial rounds... Needing additional financial resources, we decided to launch an equity crowdfunding campaign."

All firms in our sample successfully concluded one or more than one round of ECF. Although most successful ECF projects propose highly innovative products or services, often implying important digitalisation efforts, also firms with an apparently simple fashion offer reached and overcame the established funding threshold by catering to investors' values and professional evaluations, too. Despite the peculiarity of the ECF instrument, however, most of the respondents reported experiencing no differences worth reporting in the collection of funding with respect to other financial tools. While some representatives shown moderate enthusiasm on the use of ECF, others expressed wider support for it:

"If we were to go back and find ourselves in the same situation again, yes, I would recommend it [i.e., ECF] to other firms, startups, or innovative SMEs that have the opportunity to do so."

All in all, the determinant factors for the success of the campaign rested importantly with effective communication efforts and active investors' involvement.

5. Discussion

The interconnection between innovation, sustainability, investment dynamics, and strategic communication in the fashion industry reflects a deep understanding of its current challenges and opportunities. This thematic analysis highlights how fashion firms, through ECF campaigns, have demonstrated a remarkable capacity for innovation and adaptation to the needs of the current market, integrating aspects of sustainability as a key element for success.

Innovation in the fashion sector is manifested not only through the development of new products but also thanks to the adoption of innovative business models and the use of advanced technologies. This innovative drive is often led by the desire to respond more effectively to consumers' needs, anticipate market trends, and optimise the shopping experience through digital channels (Huynh, 2022). However, innovation also extends to sustainability, where the adoption of eco-friendly materials, low-impact manufacturing processes, and circular economy strategies become distinctive elements of corporate value, creating an intrinsic link between technological progress and environmental commitment (Kozlowski *et al.*, 2016). Firms that have conducted ECF campaigns have distinguished themselves by offering innovative proposals, emphasising the importance of sustainability as a critical factor to access specific market segments and strengthen competitiveness. Geissdoerfer *et al.* (2017) highlight how circular business models (CBM) assert themselves as essential strategic approaches, responding not only to the immediate needs of consumers but also anticipating future market evolutions. These allow firms to proactively position themselves for long-term success, integrating innovation and sustainability into a single corporate development model.

Proposition 1: Fashion firms should invest in the development and implementation of circular business models, to contribute to greater environmental sustainability and attract conscious investors and customers.

Sustainability has emerged as an imperative not just for ethical reasons or regulatory compliance, but also as a response to the growing expectations of consumers. Fashion firms that integrate sustainability into the core of their operations and communication strategies can differentiate themselves in a saturated market, attracting customers who value environmental and social ethic practices (McNeill & Moore, 2015). Firms, even those that in the past adopted a limited approach to sustainability or focused primarily on some aspects, are acknowledging the importance of adopting a broader and more integrated commitment. Sustainability is no longer seen merely as a set of isolated practices but as a corporate philosophy that encompasses all dimensions of the business, from product conception to end-of-life, including production, distribution, and consumption. This holistic approach

to sustainability represents a response to increasing pressures from consumers, stakeholders, and public institutions, demanding a concrete commitment to more environmentally and socially responsible practices. The realisation of circular business models, aimed at reducing waste through reuse, recycling, and lower use of natural resources, is establishing itself as a key strategy for fashion firms wishing to innovate and remain competitive in a rapidly evolving market. This transition towards sustainability implies a rethinking of production processes, product life cycles, and consumption patterns, pushing firms to explore new ways to create added value in an ethical and sustainable manner.

Proposition 2: Fashion firms should integrate sustainability not only into products but across all operational phases, from production to distribution. This includes adopting sustainable materials, reducing the carbon footprint, and promoting ethical labour practices.

Proposition 3: It is advisable to implement monitoring and reporting systems that measure the impact of the firm's sustainable practices, allow for the assessment of progress, the identification of areas for improvement, and transparent communication of outcomes to stakeholders.

Funding strategies, especially through equity crowdfunding, highlight the importance of building a supportive community around the firm. These investment dynamics require transparent and honest communication, where the sharing of corporate values, including those related to innovation and sustainability, plays a crucial role in investors' engagement (Civardi *et al.*, 2023; Mollick, 2014). An authentic and consistent narrative increases trust and stakeholders' support, facilitating not only fundraising but also the building of a loyal and committed customer base. Investors, especially the most expert ones, tend to evaluate corporate values, including sustainability, as crucial elements in their investment decisions. This indicates that corporate values can have a significant impact on social relations with investors, beyond mere financial performance.

Proposition 4 : It is key to promote training and education programs for employees, suppliers, and partners on the importance of sustainability and how sustainable practices can be integrated into their daily operations. This can help spread a culture of sustainability both within and outside the organisation.

The interdependence between innovation, sustainability, targeted funding, and impactful communication requires fashion firms to adopt holistic managerial and business development strategies. This necessity is based on the understanding that each element impacts on the others, thus steering the industry towards a future characterised by responsible innovation (Todeschini *et al.*, 2017; Kaplan & Haenlein, 2010). In this context, the ability to transform customers into investors highlights the importance of tapping into different backers' segments, an approach that deviates from traditional financing mechanisms.

Proposition 5: Designing ECF campaigns that not only seek funding but also build and strengthen a community around the firm is fundamental to firms' long-term success. This approach can transform customers into long-term investors and supporters.

Remarkably, it emerges that sustainability has garnered great appreciation among consumers, acting not only as a catalyst attracting a broad spectrum of investors but also creating a community of customers deeply connected by sustainability values. This aspect can be interpreted through the lenses of signalling theory, according to which firms can leverage sustainability as a communicative tool to convey their commitment to social and environmental issues, thus attracting investors and customers who share similar ethical principles to achieve a distinctive market position (Connelly *et al.*, 2010).

In conclusion, success in the fashion industry today necessitates a balanced focus on innovation, sustainability, effective investment dynamics and strategic communication, which together form a holistic business strategy capable of navigating the complex dynamics of the contemporary market.

5.1 Theoretical Contributions

This study aims to comprehensively explore the intersections among various research fields, including ECF, sustainability, strategic management and sustainable open innovation, to make a significant contribution to knowledge in these areas.

First and foremost, this study contributes to ECF literature, which traditionally focuses on financial dynamics, investors' motivations, and strategies for campaign success (Ahn, 2022). However, this paper goes further by examining how ECF can play a role not only as a financial tool but also to promote sustainable initiatives. By bridging ECF with sustainability, it creates a connection between two separate research domains, offering fresh insights into how ECF can contribute to sustainability goals within the fashion industry.

Secondly, the shift from general literature on other forms of crowdfunding to ECF as a new financial instrument remarks a significant change in funding projects oriented towards positive social and environmental impacts. While traditional crowdfunding has received considerable attention as a means of financing sustainable initiatives, ECF introduces an element of direct investment, making this form of funding particularly attractive for projects with strong commitment to sustainability. This transition represents a significant evolution in the perception and management of sustainable investments, underscoring the value of ECF as a strategic tool in sustainability promotion.

Furthermore, this study integrates current literature on strategic management, providing a fresh and renewed perspective on how financing strategies, particularly ECF, can align with corporate sustainability goals. It demonstrates how firms can implement innovative financial instruments to support their progressive shift towards more sustainable business models, highlighting the pivotal role of ECF in this transition process.

Finally, underlining the linkage between sustainable open innovation literature and sustainability management literature represents another noteworthy theoretical contribution of this study. Indeed, the paper examines how open innovation practices, when oriented towards sustainability, can enhance firms' ability to generate new solutions addressing market and environmental challenges. These intertwined concepts emphasise the importance of firms adoption of innovative and sustainable management approaches, highlighting how ECF can serve as a catalyst for such initiatives.

To sum up, this interdisciplinary analysis significantly contributes to the dialogue among the fields of ECF, sustainability, strategic management, and sustainable open innovation. It offers new perspectives on how fashion industry firms can navigate contemporary challenges, leveraging ECF not just as a source of funding but also as a strategic tool to promote innovation and sustainability.

5.2 Managerial Implications

The analysis emerging from our paper highlights the relevance of the ECF as a financial instrument to successfully navigate through the risks of the initial phases of a new firm, in terms of both economic and social resources. Particularly, the paper underscores that, despite being a field relatively less considered by the ECF, also new ventures in the fashion industry can benefit from it in reputational and financial terms. As a matter of fact, the study proves that firms who do not possess a highly innovative potential can make use and benefit from the ECF instrument. Despite the efforts spent in the preparation and during the ECF campaign, all firms report that the payback was significant, under both financial and networking aspects.

In addition, the paper suggests to fashion firms' representatives and managers to emphasise corporate efforts on sustainability, which our interviewees documented as an important payback approach. The emerging message is clear: sooner or later, the demonstration of corporate concrete

efforts in a more sustainable direction will be necessary. Communication actions meant to show the presence of adequate corporate engagement on sustainability at 360° are already even more necessary, at least for marketing purposes.

As a matter of fact, stressing the importance of corporate sustainability values is to be considered strategic to appeal to more categories of investors, i.e. both corporate experts and community members. An important leftover emerging from our analysis is the relevance of investors' diversification and the importance of cultivating personal relationships especially with small investors. Indeed, the latter category of backers often overlaps with the firm's customer base, fostering a symbiotic relationship where investors not only contribute financially but also serve as brand ambassadors. Conversely, the process of converting small investors into loyal customers underscores the reciprocal benefits of such stakeholder engagement, enhancing the brand market presence and customer loyalty.

Further, sustainability has the potential to attract a broader spectrum of investors, spanning from corporate professionals to community members. This insight is a key factor in appealing to investors' growing preference for ethical and sustainable practices, thereby broadening the investor base beyond traditional financial metrics to include socio-environmental impacts as a core investment criterion.

In conclusion, it is necessary to adopt a multifaceted approach to leveraging ECF within the fashion sector. This entails a concerted focus on sustainability as a cornerstone of business strategy, proactive communication to underscore the firm's commitment to sustainable practices, and the strategic cultivation of investors' relationships to foster a broad-based support network. This holistic strategy not only facilitates capital acquisition but also enhances the firm's brand reputation, operationalizes its commitment to sustainability, and ultimately, secures its competitive positioning in the rapidly evolving fashion marketplace.

5.3 Limitations

This study on the role of innovation, sustainability, strategic funding, and effective communication in the fashion industry makes significant contributions to existing literature, highlighting how fashion firms can navigate contemporary challenges and position themselves for future success. However, its scope and applicability are subject to various limitations that deserve attention. The selection of the sample and the specific geographic context may affect the universality of the findings, making it difficult to apply them to other contexts or sectors of the global fashion industry. Additionally, data collection may be limited by the availability of detailed information, affecting the depth of the analysis and understanding of internal business dynamics. Assessing the impact of sustainability practices represents another challenge, given the lack of standardised metrics, making it complex to quantify the size and effectiveness of firms' sustainable initiatives.

Temporal variability adds another layer of complexity, with market trends, consumers' preferences, and environmental regulations constantly evolving, which can make conclusions less valid or relevant over time. External factors, such as economic changes or global crises, can significantly impact the fashion sector and its practices, factors that might not have been fully considered in the study. Lastly, the qualitative orientation of the study, while offering detailed insights, can introduce interpretive biases and limit the ability to generalise findings.

Finally, the absence of long-term follow-up prevents a comprehensive understanding of the lasting effects of the sustainability and innovation strategies adopted by firms.

Acknowledging these limitations is crucial not only to correctly contextualise the study's findings, but also to outline directions for future research. Addressing these limitations in future studies using larger samples, more comprehensive data collection methodologies, and longitudinal approaches could provide further insights into the dynamics of the fashion industry and contribute to a greater understanding of the importance of integrating innovation, sustainability, funding and strategic communication.

6. Conclusions

This study suggests that for fashion firms to effectively meet current challenges and foresee future trends, a comprehensive approach that addresses consumers' demands while deeply committing to sustainable and responsible practices is needed. Engaging stakeholders, especially through equity crowdfunding campaigns, is identified as a valuable method to enhance consumer-brand relationships by converting customers into active investors and brand ambassadors. This highlights a trend towards consumer support for businesses with a real commitment to sustainability, underlining the necessity for transparent and genuine communication.

The findings indicate that sustainability is turning into a strategic imperative, significantly affecting market competitiveness, customers' loyalty, and investors' appeal. Firms that successfully incorporate sustainable practices into their operations not only contribute positively to the environment and society but also achieve distinctive market positioning.

Furthermore, the study adds further evidence to the signalling theory, showing that sustainable practices can act as strong indicators of a firm's social and ethical commitments, thereby attracting like-minded investors and customers. Embracing circular business models and investing in sustainable technologies are presented as essential strategic tools for fashion firms.

Overall, the study conveys that a holistic approach to business management, focusing on innovation, sustainability, strategic stakeholder engagement, and clear communication, is important for achieving long-term success in the fashion sector. Firms committed to these principles are better equipped to handle current challenges and are positioned as pioneers towards a more sustainable and ethical fashion industry future.

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Pathways to Success: Analyzing the Impact of Innovation, Team Creativity, and Intellectual Property on Equity Crowdfunding in Italy

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Abstract

Frame of the research. *The digital transformation has significantly impacted how ventures are funded, with equity crowdfunding emerging as a focal new way of financing for firms seeking financial support. This evolution prompts a deeper examination of the factors influencing equity crowdfunding campaign success, particularly in the context of regulatory, cultural, and innovation dynamics.*

Purpose of the paper. *This study aims to uncover the multifaceted conditions that lead to successful equity crowdfunding campaigns, focusing on the roles of radical innovation, team creativity, and intellectual property rights within the Italian market. It seeks to provide a nuanced understanding of how these elements interact to influence equity crowdfunding outcomes.*

Methodology. *Employing fuzzy-set Qualitative Comparative Analysis (fsQCA), the research analyzes 43 equity crowdfunding campaigns from Italian platforms. This method allows for the identification of complex causal relationships between contributing factors and crowdfunding success, offering a configurational perspective on the data.*

Results. *The findings reveal that a combination of radical innovation, team creativity, and the strategic use of intellectual property rights significantly enhances the likelihood of equity crowdfunding success. However, the impact of these factors varies, suggesting the existence of multiple paths to achieving campaign goals.*

Research limitations. *The study's scope, limited to Italian equity crowdfunding platforms, may affect the generalizability of the results. Furthermore, the fsQCA method, while powerful in identifying configurations of success, might not fully capture the individual effects of the variables considered.*

Managerial implications. *For entrepreneurs, strategically leveraging innovation and creativity, along with a clear intellectual property strategy, can be key to crowdfunding success. Equity crowdfunding platforms could also benefit from offering tools and resources to help campaigns highlight these aspects to potential investors.*

Originality of the paper. *This research contributes to the crowdfunding literature by applying fsQCA to explore the complex interplay of innovation, creativity, and intellectual property in crowdfunding success. By focusing on the Italian market, it also enriches the understanding of how cultural and regulatory contexts influence crowdfunding dynamics.*

Key words: *Equity Crowdfunding; Innovation; Team Creativity; Intellectual Property rights; QCA*

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1. Introduction

The advent of equity crowdfunding (ECF) since its regulation in the USA by the Jobs Act in 2012 has marked a significant shift in the entrepreneurial financing landscape. This financing mechanism has been pivotal in addressing the funding gap for small firms and startups, especially those poised for high growth, underscoring the transformative impact of ECF on the access to capital for emerging ventures (Valenza *et al.*, 2021; Eldridge *et al.*, 2021). The facilitation role of online platforms, as outlined by Vulkan *et al.* (2016), amidst diverse national regulations, further accentuates the global reach and appeal of ECF (Hornuf and Schwienbacher, 2018).

Extending the analysis to the core of this investigation, this study delves into the nuanced interplay among creativity, radical innovation, and intellectual property, positing these elements as fundamental to the success of equity crowdfunding campaigns.

Drawing on previous research on creativity provided by Gardner (2001), Feist (1998), and Lubart and Guignard (2004), creativity is envisioned as a cornerstone of innovation, offering original solutions and perspectives that bear cultural and economic significance. However, fewer studies have explored the impact of the team creativity for ECF campaign success, this study posits creativity as catalyst in enhancing the appeal and outcome of crowdfunding endeavors.

Moreover, the exploration of radical innovation, characterized by its departure from established norms and its potential to instigate market and industry transformations (Garcia and Calantone, 2002), aligns with the thesis that creativity, fueled by curiosity and passion, is instrumental in navigating the risks associated with groundbreaking ventures (West and Hirst, 2005; Damanpour and Gopalakrishnan, 1998; Hebda *et al.*, 2012; O'Connor and Rice, 2013; Keizer and Halman, 2007). This research advocates for the integration of innovation and creativity within a conducive ecosystem, suggesting that such a blend is critical for the success of equity crowdfunding campaigns. The synergy between intellectual property and innovation, especially within the strategic and economic growth contexts, is further examined.

Insights from Hottenrott *et al.* (2016) and Gredel *et al.* (2012) underscore the value of patents and trademarks in elevating startup valuations and attracting investment, proposing that a history of registered intellectual property can significantly influence the success of crowdfunding campaigns.

Yet, the financing of radical innovation presents notable challenges, as indicated by the literature, which points to a funding gap for such ventures (Keupp and Gassmann, 2013; Woschke *et al.*, 2017; Caggese, 2019).

This study aims to elucidate the factors driving the financing and success of radical projects through ECF, employing the fuzzy-set Qualitative Comparative Analysis (fsQCA) methodology (Ragin, 2009). Data from online questionnaires across Italian crowdfunding platforms provided 43 observations, analyzing the impact of four antecedent conditions on campaign outcomes.

Findings reveal a complex landscape where the success of ECF campaigns is less about the creative dynamics or the innovation-friendly environment per se but more about how the potential backers perceive the practical implications and transformative potential of the innovation. Patents emerge as significant, affirming their role in signaling groundbreaking ideas and a firm's commitment to technological advancement. Conversely, the role of trademarks, unless part of a holistic innovation strategy, appears less focal, aligning with broader research trends in the field. Finally, the study provides important insights that contribute to both scholarly understanding and practical applications in these interrelated fields, marking a significant contribution to the evolving dynamics of entrepreneurial finance and innovation.

2. Theoretical Framework

Creativity, a multi-dimensional and evolving construct, has been extensively explored and redefined through various scholarly lenses over time. Adopting an individual-focused perspective, as

highlighted by Gardner (2001), creativity is perceived as the capacity of individuals to not only develop novel solutions to problems but also to innovate and pose questions in a manner that is both original and culturally significant. This notion of creativity encompasses the ability to produce work that is innovative, of high quality, and aesthetically compelling, as noted by Feist (1998) and further elaborated by Lubart and Guignard (2004).

The importance of creativity is relevant for generating distinctive and imaginative ideas that challenge established norms and expand the realm of what is achievable, a notion emphasized by Amabile (1988). Anderson *et al.* (2014) offer a contemporary perspective, defining workplace creativity and innovation as complex processes that involve the development and implementation of novel and improved methods. Creativity thrives not only as an individual endeavor but also within collaborative environments, as it promotes a diversity of ideas and paves the way for innovative outcomes, as observed by Paulus and Nijstad (2003) and further supported by Zhou and Shalley (2003), who emphasize the synergistic effect of collaborative creativity in organizational settings.

West and Hirst (2005) delve into the dynamics of innovation and creativity within organizations, highlighting the benefits of creating an environment that encourages risk-taking and nurtures the creative process. This perspective is supported by Amabile *et al.* (1996), who suggest that providing organizational support for innovation-through leadership encouragement, workplace freedom, and the availability of resources for creative projects-can positively influence the likelihood of achieving innovative outcomes. In further investigations, Amabile and Fisher (2012) sheds light on the essential elements of creativity within organizations, such as expertise, creative-thinking skills, and intrinsic motivation, suggesting that these components, when fostered by a supportive organizational environment, have the potential to greatly enhance an organization's capability for innovation.

Additionally, Gilson and Shalley (2004) contributed by examining the impact of team composition on creativity and innovation. Their findings indicate that teams composed of individuals with diverse backgrounds, viewpoints, and areas of expertise tend to be more adept at generating innovative solutions and creative concepts.

Creativity could serve as a critical role in equity crowdfunding campaigns, acting as a catalyst for innovation and creative problem-solving. This element would endow teams with the capability to effectively capture the attention of potential investors and the public. Such visibility could initiate a network effect, as underscored by Hornuf and Schwienbacher (2018), where increasing interest in a project could lead to drawing in even more supporters, creating a positive cycle of engagement and support. Therefore, creativity could serve as the bridge between conceptual innovation and practical problem-solving, enriching the project's appeal and strengthening emotional ties with investors. It underscores the project's capacity for novel thinking and its commitment to addressing challenges in groundbreaking ways, thereby bolstering investor confidence and support.

Proposition 1: Teams with high creativity tend to launch equity crowdfunding campaigns more successfully, attract a larger number of investors, and meet or exceed their funding goals.

Creativity is a fundamental but not sufficient element for the innovation process. For innovation to be discussed, it is necessary that the creative idea be implemented in the business reality (Amabile, 1996). The next step requires that the creative idea be combined with resources and competencies capable of giving the idea a useful form: by selecting the right ideas to work on, their application will lead to innovation (McAdam and McClelland, 2002). The primary characteristic of innovation is change, and the degree of novelty of a product/process or service created by a firm depends on its divergence from previous achievements and from the market's past experiences.

Radical innovation, characterized by transformative changes, is deeply rooted in creative thinking, and often stems from challenging existing norms and exploring unconventional paths, as noted by Damanpour and Gopalakrishnan (1998). These innovations are driven by intense curiosity and a deep passion for work, traits attributed to radical innovators by Hebda *et al.* (2012). Garcia and Calantone (2002) highlighted the unique ability of radical innovations to create demand for previously unknown

products or services, thereby opening new markets and industries. However, an inherent characteristic of radical innovation is its intrinsic uncertainty and risk, especially regarding outcomes and investment returns, a feature that underscores the unpredictable and potentially high-risk nature of investing in and developing groundbreaking innovations, as discussed by O'Connor and Rice (2013) and Keizer and Halman (2007).

Despite the challenges they present, the transformative impact of radical innovations is profound, though it requires careful navigation through their complexities and uncertainties. Tidd and Bessant (2014) also note that creative individuals often have a natural inclination to embrace these risks, a disposition that leads to revolutionary discoveries and significant progress. This risk-taking tendency is a distinctive attribute of creative minds, enabling them to break new ground and drive innovation, leading to significant advancements and breakthroughs in various domains.

Radical innovation, while promising, often encounters difficulties in securing traditional funding due to its inherent high risk and the uncertainty it brings. The literature widely acknowledges a significant gap in the financing of radical innovation, highlighting a notable shortage of funding for such ventures (Keupp and Gassmann, 2013; Woschke *et al.*, 2017). Caggese (2019) elaborates on this issue, noting that insufficient financing for radical innovation can create substantial barriers to entry, effectively diminishing competition. This scarcity of financial resources hampers the ability of firms to pursue and introduce radical innovations, subsequently impeding productivity growth at the firm level.

Equity crowdfunding has been recognized as a viable alternative to conventional funding sources, offering valuable support for entrepreneurs pursuing innovative projects. This perspective is supported by the research of Vulkan *et al.* (2016) and Vismara (2018), who note the increasing importance of equity crowdfunding in providing critical funding for ventures that might not fit traditional financing models. This method of funding has proven particularly advantageous for small enterprises with high innovation potential, a finding supported by the research of Valenza *et al.* (2021) and Eldridge *et al.* (2021). However, Liu and Su's (2018) investigation into Chinese crowdfunding platforms indicates that projects with a radical bent often exhibit weaker financial performance compared to incremental projects that are more aligned with established market trends. This observation points to a potential market hesitation or conservative response towards radical innovation efforts, likely due to the heightened uncertainty these ventures entail.

In contrast, Stanko and Henard's (2017) study reveals a positive association between the level of innovation and investor engagement in equity crowdfunding, suggesting a preference among early-stage investors for projects characterized by radical innovation. These insights align with previous research by Stanko and Henard (2016) and Metrick and Yasuda (2010), which underscore the appeal of pioneering projects to investors seeking high-growth opportunities. Further supporting this view, Le Pendeven and Schwienbacher (2023) observed that highly innovative projects tend to attract more attention and funding than their less innovative counterparts, highlighting the role of innovation as a significant quality signal for investors.

Proposition 2: Projects with a high degree of radical innovation attract greater interest and funding in equity crowdfunding, despite the risks associated with them.

The synergy between intellectual property (IP) and innovation, particularly radical innovation, is integral to shaping contemporary business strategies and driving economic growth. Intellectual property is pivotal in closing the information gap for new ventures, effectively showcasing their innovative capacity to investors. As Hottenrott *et al.* (2016) articulate, IP assets do more than just highlight a company's innovative ability; they serve as compelling beacons to attract financiers and lenders. This notion is further reinforced by Gredel *et al.* (2012), who illustrate the role of innovation's tangible outputs in securing vital financing or loans that are essential for the growth and success of burgeoning companies.

Research by Hsu and Fang (2009), and Hsu and Ziedonis (2013), underscores the significant role of patents in enhancing start-up valuations. This benefit stems from patents serving dual roles: as

indicators of a firm's technological competence and as protective mechanisms. Venture capitalists often view patents as markers of a firm's technical expertise and potential for innovation, seeing them as symbols of a firm's commitment to technological advancement and an indication of the quality and promise of its innovations.

In the realm of equity crowdfunding, the strategic display of intellectual property protections is a key factor in shaping investor decisions. Ahlers *et al.* (2015) highlight that patent ownership can deter future market entrants while also signaling a company's strength and quality. The absence of IP rights can deter investment due to increased risks and a lack of protection. Conversely, projects with IP rights are more likely to attract crowdfunding, as these rights add tangible value to their business ventures.

Beyond legal benefits, holding a patent showcases a company's technological sophistication and innovative capabilities. Greenberg (2013) and Hsu and Ziedonis (2013) note that patents allow firms to communicate complex technical details to potential investors, such as developmental stages or market positioning. This clarity provided by IP assets is invaluable to crowdfunders, offering them a deeper understanding of the companies they might support. Consequently, intellectual property is a significant tool in equity crowdfunding, enhancing a company's attractiveness to investors by mitigating uncertainties and highlighting its innovative strengths.

Trademarks also play a crucial role for firms, signaling various stages of their development and market readiness. Mendonça *et al.* (2004) observed that trademarks reflect a start-up's marketing progress, while Greenhalgh and Longland (2005) noted their representation of product or service maturity. Block *et al.* (2015) further emphasized that trademarks indicate a firm's market orientation and market access capabilities. Trademarks thus offer a holistic view of a firm's progress in essential business areas. Particularly, the service sector shows a strong connection with trademark filings, as Jensen and Webster (2011) have pointed out, underscoring the vital role of trademarks in areas where traditional patent protection might not apply. In the realm of equity crowdfunding, there's a varied perspective on the impact of a project's intellectual capital on funding success. Ahlers *et al.* (2015) considered intellectual capital as part of the venture quality construct, using patents as a measure. Their findings indicated that intellectual capital does not significantly influence the success of funding. Similarly, Vismara (2018) concluded that intellectual capital, assessed through the holding of patents by ventures, is not a crucial factor for the success in equity crowdfunding. Contrastingly, Battaglia *et al.* (2022) discovered that intellectual capital (patents, R&D activities, educational level of the team) along with the proportion of equity retained by project founders and the extent of their social networks, significantly and positively influences fundraising success. These factors are also viewed by external investors as indicative of the quality of crowdfunding campaigns. These conflicting results highlight an ongoing debate and lack of consensus in academic research regarding the role of intellectual capital, specifically intellectual property rights, in the success of equity crowdfunding campaigns.

Proposition 3: The presence of intellectual property strengthens the value proposition of an equity crowdfunding project, enhancing its appeal to investors, and contributing to its financial success.

3. Methodology

This study utilizes the fuzzy-set Qualitative Comparative Analysis (fsQCA) methodology, as articulated by Ragin *et al.* (2006), for its empirical analysis. FsQCA is distinguished by its ability to identify both necessary and sufficient conditions for a given outcome. It achieves this by revealing causality through pinpointing essential conditions for the outcome and those that are sufficient to realize it. Central to QCA, as highlighted by Fiss (2007), is the concept of 'equifinality, ' which acknowledges the existence of multiple pathways leading to the same outcome.

Ragin *et al.* (2006) underscores the advantages of fsQCA over crisp-set QCA (csQCA), particularly in terms of data calibration. While csQCA limits values to binary states (presence = 1 or absence = 0), fsQCA offers a more nuanced approach by allowing an infinite range of membership degrees to a condition or outcome, varying from 0 to 1. This flexibility is especially beneficial in contexts marked by ambiguity, such as equity crowdfunding, where it captures varying degrees of membership and acknowledges inherent uncertainties. FsQCA excels in identifying complex interplays of conditions that collectively contribute to successful outcomes (Ragin *et al.*, 2006). It acknowledges the principle of equifinality, where diverse pathways can lead to similar results. Additionally, fsQCA is adept at capturing non-linear relationships between factors, offering a more authentic depiction of their interactions. By examining both necessary and sufficient conditions, fsQCA provides a comprehensive understanding of the causality behind successful equity crowdfunding campaigns.

Following Ragin's *et al.* (2006) methodology, the primary steps in fsQCA analysis include: (1) Identification of relevant conditions and cases, (2) Calibration of conditions and outcomes, transforming raw data into fuzzy data ranging from 1 (full presence) to 0 (full absence), (3) Analysis of necessary conditions for the desired outcome, and (4) Construction of a truth table, considering frequency and consistency thresholds. This table includes all possible combinations of causal conditions, with logical remainders excluded based on frequency and consistency thresholds, as recommended in the literature. Ragin (2009) suggests including 75-80% of cases in the analysis, while Fiss (2011) recommends a minimum consistency threshold of 0.75.

Data for this study was collected via online questionnaires from companies that launched equity crowdfunding campaigns on Italian platforms, resulting in 43 observations. This approach, which leverages the extensive reach of online questionnaires, ensures a sample representative of the Italian equity crowdfunding landscape, enhancing the robustness of the QCA analysis.

The questionnaire was designed to capture key variables of the study, with scales validated in previous research to ensure reliability. The degree of innovation was measured using a scale from Dominguez-Escrign *et al.* (2019), notable for its high Cronbach's α of 0.93. While team creativity was assessed via a scale from Rego *et al.* (2007), as further validated in studies like Barczak *et al.* (2010) and showing Cronbach's α of 0.85.

In the study, participants were also queried about their engagement in filing for a patent or trademark prior to initiating their equity crowdfunding (ECF) campaign. This inquiry into patent and trademark filings is pivotal in the context of equity crowdfunding, as these elements serve as quality signals, which are considered significant predictors of an ECF campaign's success (Battaglia *et al.*, 2022).

In terms of outcome, causal conditions, and calibration, the literature emphasizes the need for clear definitions. The outcome in this study is defined as the success of a fundraising campaign, measured by the ratio of funds raised to the target amount. This ratio serves as a proxy for the campaign's success rate (De Crescenzo *et al.*, 2020).

To ascertain factors that potentially affect equity crowdfunding campaign outcomes, this study identified four antecedent conditions, detailed in Table 1 along with their sources.

Tab. 1: Description and codification

Type	***Name***	***Description***	***Codification***
Outcome	CAMPSUCC1	Measures the success of the ECF campaign as the ratio between the initial target amount and the funds raised.	Fuzzy value
Condition	RAD1	Measures the perceive level to which the project presented is radically innovative. A high rating in this variable indicates a project that breaks away from current conventions or standards, offering something significantly new.	Fuzzy value
Condition	CREAT1	Represents the perceived level of creativity of the team behind the project. Teams with a high score in this variable are considered particularly original and ingenious in their approach to project development.	Fuzzy value
Condition	PATENT1	Refers to the filing of a patent prior to the launch of the equity crowdfunding campaign.	Crisp value
Condition	TRADEMARK1	Refers to the filing of a trademark prior to the launch of the equity crowdfunding campaign.	Crisp value

Source: our elaboration

Calibration is a fundamental step in fuzzy-set Qualitative Comparative Analysis (fsQCA), necessary for transforming raw data into fuzzy values that accurately represent varying degrees of set membership. This study employs Ragin's *et al.* (2006) direct method of calibration, which involves rescaling data across a continuum from 0.0, signifying complete non-membership, to 1.0, indicating full membership in the set. A critical aspect of this calibration is the identification of a cross-over point, set at 0.5, which marks the level of 50% membership. Specifically, the breakpoints were set as follows: for full membership (Quartile 3), cross-over point (Median) and full non-membership (Quartile 1).

However, as noted by Crilly *et al.* (2012) the software fsQCA 3.0 drop the values of 0.5, therefore they are replaced by 0.49 to avoid ambiguity at the mid-point. Table 2 outlines these calibration thresholds, providing a clear framework for the conversion of standard data into a fuzzy set. This calibrated data is then analyzed to understand the causal relationships and contributions of various conditions to the outcome of the equity crowdfunding campaigns.

Tab. 2: Calibration of data

	Full membership	***Cross-over point***	***Full non-membership***
RAD1	4, 33	3, 5	2, 87
CREAT1	4, 95	3, 95	3, 38
CAMPSUCC1	1, 81	1, 02	0, 55
PATENT1	1		0
TRADEMARK1	1		0

Source: our elaboration

4. Findings

FsQCA facilitates the discovery of causal combinations that contribute to the success of equity crowdfunding campaigns. This approach allows for a nuanced understanding of the factors driving these outcomes. The suggested model include:

MODEL:

Campaign Success = f (RAD1, CREAT1, PAT1, TRADEMARK1)

Below are presented the results of the fsQCA analysis, which detail the contingency factors influencing an equity crowdfunding round's success or failure (outcome).

4.1 Analysis of necessary conditions

	Consistency	***Coverage***
		PRESENCE OF THE OUTCOME
RAD1	0.965285	0.605067
CREAT1	0.911917	0.698413
PAT1	0.581865	0.467917
TRADEMARK1	0.734715	0.457419

Source: our elaboration

Necessary conditions are defined as those prerequisites essential for realizing a specific outcome. A condition is considered necessary if its consistency level is above 0.9 (Schneider and Wagemann, 2012). Table 3 reveals that two variables exceed the 0.9 consistency threshold - RAD1 with a consistency of 0.965285 and CREAT1 with a consistency of 0.911917 - solely in relation to the presence of the outcome. These are interpretable as indispensable conditions for the successful realization of the outcome. This indicates that the presence of RAD1 and CREAT1 is pivotal for securing the desired outcome. Notably, RAD1, exhibiting a consistency of 0.965285, is highly correlated with the occurrence of the outcome, suggesting that its absence markedly reduces the

probability of success. In a similar vein, CREAT1, with a consistency of 0.911917, also demonstrates a strong link to the positive outcome.

4.2 Analysis of sufficient conditions

For this analysis the consistency cut-off adopted is 0.8 for campaign success. According to the empirical literature the consistency cut-off should be greater than 0.75. Additionally, the frequency threshold was set to 1.

The output of the QCA yields three distinct solutions: parsimonious, complex, and intermediate. Each solution embodies a different balance between empirical data-based generalizations and theoretical specificity. For the purposes of this study, is examined only the parsimonious solution, which is preferred over the other two for analyses that utilize generally large samples usually ranging from 10 to 50 observations-as corroborated by previous studies within the literature employing this methodology. As elucidated by various scholars, the parsimonious solution concentrates on the minimally necessary disjunctions of minimally sufficient conditions and encompasses 'core' conditions. This solution is deemed more precise due to its utilization of limited configurations. Consistency is analogous to goodness of fit in quantitative methodology (Woodside, 2013).

Tab. 3: Pathways for the success of ECF campaign

Configuration No.	***1***	***2***	***3***	***4***
RAD1		○	■	■
CREAT1	○		○	
PAT1	○			■
TRADEMARK1		■		○
Raw coverage	0.317098	0.350777	0.736788	0.136788
Unique coverage	0	0.0347151	0.171503	0.0512953
Consistency	0.845304	0.880364	0.88875	0.756447
Solution coverage			0.831088	
Solution consistency			0.837598	

Source: our elaboration

The symbol '○' means absence of the condition and '■' means presence of the condition. Blank cells indicate that the presence or absence of the condition does not matter. These are "do not care" conditions.

5. Discussion

The primary objective of this study is to conduct a comprehensive analysis of the various elements that influence the success of equity crowdfunding campaigns. To achieve this goal, we have employed the Fuzzy Set QCA methodology, allowing us to examine and identify different configurations of factors that significantly impact the outcome of such campaigns. We have specifically focused on three key factors: the perceived degree of project radicalness, the level of creativity attributed to the team behind the initiative, and the presence of intellectual property, including patents and registered trademarks, associated with the project.

The findings derived from our QCA analysis have revealed intriguing combinations of these factors, prompting further reflection and consideration. Therefore, a thorough exploration of these interactions and an analysis of their implications can provide valuable insights into the dynamics of crowdfunding and the strategies that can enhance its effectiveness. Fuzzy Set QCA methodology represents an innovative and advanced approach to data analysis, offering opportunities for further research and applications within this domain. A deeper understanding of the role of these factors in crowdfunding success has the potential to significantly influence how startups and emerging businesses plan and execute their funding strategies, ultimately fostering innovation and economic growth.

One initial consideration revolves around the level of project radicalness, especially concerning the presence of patents. This consideration highlights a crucial aspect: while an exceptionally innovative and appealing project can attract the interest of investors, the fundamental key to success in a crowdfunding campaign lies in the project's connection with a patent. Within the literature, there is a common consensus regarding the measurement of radicalness using patents, particularly through the utilization of patent citations, which reflect the recognition and impact of a patent within the scientific and technological community (Albert *et al.*, 1991; Rosenkopf and Nerkar, 2001; Shane, 2001).

Consequently, it becomes evident that a well-defined strategy for managing intellectual property and patent rights within the context of equity crowdfunding is of paramount significance. Entrepreneurs and startups should not only focus on generating innovative ideas but also on properly safeguarding and promoting them through patent registration. This not only ensures legal protection for their innovations but can also serve as a pivotal strategic lever to attract broader and more substantial financial support from investors. These considerations resonate with results of previous studies as (Battaglia *et al.*, 2022) indicating that patents and other forms of intellectual capital are perceived as quality signals by external investors on Italian platforms. Rossi *et al.* (2020) highlight the variability in the significance of patents across different platforms and markets, such as US and UK.

Moreover, the absence of a trademark within this context suggests that, for projects characterized by a high potential for radical innovation, the significance of trademarks may be less pronounced compared to projects of a more incremental nature. Unlike patents, which predominantly pertain to the legal protection of technological aspects, trademarks are commonly employed to safeguard products introduced to the market or those already in use (Kalanje, 2006). Trademarks hold significance as they serve as indicators of a startup's progress in marketing (Mendonça *et al.*, 2004), preparedness for product or service development (Greenhalgh and Longland, 2005) and their market orientation and market access capabilities (Block *et al.*, 2015).

Within the realm of highly radical projects, the emphasis may be more on showcasing the uniqueness and validity of the technology itself rather than safeguarding the commercial aspect or the name linked to the project. Regarding the two forms of innovation, radical and incremental, Chan and Parhankangas (2017) argue that the outcomes of campaigns differ. Crowdfunding campaigns characterized by incremental innovation are perceived as more comprehensible and generate greater user value, while those characterized by radical innovation entail higher development risks and result in lower participation from financiers.

Contrasting results from Le Pendeven and Schwienbacher (2023) indicate that the ECF campaigns of the most innovative ventures attract more investors and more capital than those of less innovative ones. The configurations revealed by the QCA analysis support the latter, shedding light on the indispensable role of radical innovation as a critically important factor for achieving success in an equity crowdfunding campaign.

The nuanced role of patents and trademarks in equity crowdfunding can also suggests divergent strategies across various sectors. In industries where service quality and brand experience are paramount, trademarks may carry more weight than patents. This potential distinction might reflect sector-specific investor preferences, wherein supporters in service-oriented industries may prioritize brand identity and consumer trust, as highlighted by Mendonça *et al.* (2004), Greenhalgh and Longland (2005), and Block *et al.* (2015). Conversely, in sectors where innovation and technical expertise are of greater significance, patents may assume a more dominant role.

The body of research exploring the intersection between creativity and innovation highlights a mutual influence between these two fundamental dimensions. According to Amabile (1988), the value of creativity lies in its ability to generate new and original ideas, challenging existing standards and pushing the boundaries of what is possible. Anderson and colleagues (2014) describe creativity and innovation in the workplace as complex processes that involve the conception and implementation of novel and improved methods. This dynamic of mutual reinforcement between

creativity and innovation, although well documented in academic literature, exhibits nuances when observed in the context of equity crowdfunding. In this setting, the interaction between the two dimensions manifests in a more subtle and indirect manner, sometimes eluding the direct perception of investors. This phenomenon underscores the importance of the preliminary creative phase of the campaign, during which the foundational ideas are generated. However, this close link between creativity and campaign success does not seem to be immediately evident to investors, indicating that, although creativity is essential in the generation of initial ideas, its direct impact on the success of equity crowdfunding may not be perceived as decisive. This observation calls for a deeper reflection on how the dynamics of creativity and innovation translate into tangible outcomes in emerging financial contexts such as equity crowdfunding.

However, the significance of the team's composition and characteristics in securing campaign success has been underscored in several studies. It has been observed that campaigns benefit from larger teams (Lagazio and Querci, 2018; Vismara, 2016), and the presence of female members within the founding team is linked to more successful crowdfunding endeavors (Elitzur and Solodoha, 2021). Moreover, the educational background, professional experiences, and to a lesser degree, the gender composition of the team are instrumental in garnering increased financial contributions and a broader investor base (Barbi and Mattioli, 2019).

Consequently, the literature emphasizes how certain more tangible and quantifiable team characteristics play a crucial role in determining the success of an equity crowdfunding campaign. This could suggest a tendency among investors to prefer a more pragmatic, results-oriented approach, positively valuing the presence of concrete elements such as trademarks and patents, which offer a form of security and potential competitive advantage for the company. This pragmatic approach reflects a preference for investments in projects with a solid legal and commercial foundation over purely creative ideas that may not easily translate into commercially viable entities.

In this context, firms seeking funding through equity crowdfunding are advised to consider how presenting their credentials, in terms of tangible assets and intellectual property protection, can be a decisive factor in attracting investments. This does not diminish the importance of creativity as a driver of innovation but highlights the need to balance innovation with more pragmatic and reassuring aspects for investors, demonstrating how innovation can be effectively implemented and protected in a competitive market environment.

6. Conclusions

In synthesizing the findings of this study, it becomes evident that the success of equity crowdfunding campaigns hinges on a delicate interplay between creativity, innovation, and the strategic utilization of intellectual property. Through the application of the Fuzzy Set QCA methodology, this research has not only identified specific configurations of factors that notably influence campaign outcomes but has also provided a nuanced understanding of the complex investor decision-making landscape. Key insights reveal the critical roles played by the perceived radicalness of the project, the creativity embodied by the team, and the presence of intellectual property rights, such as patents and trademarks, as foundational elements that collectively shape the viability and attractiveness of crowdfunding endeavors.

The investigation underscores the dual significance of patents as both indicators of radical innovation and as quality signals to investors. This dual role illustrates the necessity for a nuanced approach to managing intellectual property that extends beyond legal protection to encompass a strategic facet of the crowdfunding narrative. The study's revelations regarding the differential impact of patents and trademarks-predicated on the innovation's nature and sector specificity-suggest a strategic calibration of intellectual property strategies to align with investor expectations and project objectives. However, it's the nuanced and indirect role of creativity that adds a layer of complexity to understanding how crowdfunding campaigns succeed. While creativity is undeniably at the heart of innovation, its role in equity crowdfunding is not as direct or observable as one might assume.

Instead, creativity enriches the project narrative, indirectly affecting investor perception and engagement. This indirect influence suggests that the mere presence of creative ideas is insufficient; these ideas must be effectively communicated and strategically positioned within the broader context of the campaign to resonate with potential investors. In conclusion, the research advocates for a holistic strategy in equity crowdfunding endeavors, where innovation and creativity are seamlessly integrated with a pragmatic approach to intellectual property management. This nuanced understanding encourages startups and emerging businesses to present their ideas in a manner that balances innovative potential with strategic considerations, thereby aligning more closely with investor expectations and enhancing the likelihood of funding success. As the landscape of equity crowdfunding evolves, these insights offer valuable guidance for navigating its challenges, contributing to a more dynamic and robust ecosystem for fostering innovation.

7. Limitations

Our study, while offering insights into equity crowdfunding success in Italy through 43 observations, acknowledges its limitations in generalizability. An expanded sample across various countries could shed light on the cultural and regulatory nuances affecting crowdfunding.

The methodological choice of fuzzy-set Qualitative Comparative Analysis, though insightful, may not fully capture the intricate effects of individual variables, suggesting a potential for future studies to adopt mixed-methods for a more comprehensive analysis.

Moreover, our focus on immediate success could benefit from longitudinal perspectives to understand the enduring impact of crowdfunding on venture growth, inviting further research into the long-term outcomes of crowdfunded projects.

8. Managerial implications

The managerial implications of our study highlight the importance of strategic approaches in equity crowdfunding campaigns. For entrepreneurs, understanding the role of intellectual property, particularly in signaling project value, can enhance appeal to potential investors.

Additionally, showcasing team creativity and innovation may positively influence funding outcomes. Managers should also consider long-term engagement strategies with investors, beyond the immediate crowdfunding campaign, to build sustainable venture growth.

For platforms, facilitating transparency and providing tools to better assess project potential could attract a broader investor base. These insights offer practical guidance for optimizing crowdfunding success.

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The role of private equity in financial distress situations: A bibliometric literature review

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Abstract

Frame of the research. *The goal of the research is to understand the role of private equity (PE) in addressing financial distress among companies. The study explores this by conducting a bibliometric literature review to examine the main trends, co-occurrence networks, co-citation patterns, publication frequencies, and authorship networks. The study seeks to fill a research gap in detailing how PE investors manage financial distress within their portfolio companies, with a focus on operational efficiency, financial restructuring, strategic repositioning, and management incentives.*

Purpose of the paper. *This research, following the steady growth of PE as an ownership structure, aims to raise awareness of the role that this institutional investor can take on in case of financial distress of target companies. The reasons for addressing this topic extend far beyond the immediate stakeholders and have profound implications for the broader economy, including the preservation of jobs and the stimulation of innovation. By effectively managing financial distress, PE investors can contribute to economic resilience and the growth of the corporate ecosystem.*

Methodology. *Our research seeks to address this gap by conducting a comprehensive bibliometric review of the literature, to uncover patterns and gaps in the field. We sourced articles from the Scopus repository, defining a set of keywords informed by established practices in systematic literature reviews (SLRs), as delineated by Tykvová (2011) and analyzing other private equity and financial distress studies (Wright et al. 2014; Toms et al. 2015; Hotchkiss et al. 2021) to identify key terms relevant to the scope of the work. The search was performed on December 1, 2023. We did not impose any restrictions on the time window, but we focused only on English articles. The selection of articles was limited to those concerning the research area of "Business, Management and Accounting", "Economics, Econometrics and Finance" and "Social Sciences", for a comprehensive sample of 151 papers.*

Results. *From extant literature, it emerges that a consistent group of studies underscore PE's role in reducing agency costs and improving cash flow management in a distressed condition, leading to better corporate performance without wealth redistribution from other parties (Jensen 1989; Wright et al 2009; Meuleman et al 2009; Meuleman et al 2022). Additionally, it suggests further research on PE's behaviour with distressed companies, the characteristics of General Partners affecting distress management, and the potential for PE ownership to facilitate organizational change and effective turnarounds. Despite the higher leverage used in private equity (PE)-backed companies potentially increasing financial distress risks, evidence indicates these companies are not more likely to default than comparable leveraged firms without PE involvement. PE-backed companies, when facing financial distress, tend to restructure out of court more efficiently and have higher survival rates as independent entities than similar distressed firms without PE support. However, contrasting findings from another study show that companies undergoing leveraged buyouts (LBOs) have a greater chance of bankruptcy compared to a control group.*

Research limitations. *The present study is based on data collected from the Scopus repository, which might limit the scope to journals and publications indexed in that source.*

Managerial implications. *Considering the steady growth of PE, understanding its role in managing a firm's financial distress is highly important for both entrepreneurs and policymakers, as corporate crises can have spillover effects on other stakeholders, such as employees, clients, taxpayers, and lenders.*

Originality of the paper. *The originality of the article lies in the comprehensive bibliometric analysis of the role of private equity (PE) in situations of financial distress, a topic underdeveloped in the literature, providing a systematic exploration of PE's multiple contributions. The analysis highlights the importance of PE beyond the provision of financial capital, including managerial and strategic skills crucial to the turnaround of distressed companies. By identifying a gap in the detailed understanding of how PE investors manage financial distress within portfolio companies, focusing on operational efficiency, financial restructuring, strategic repositioning, and management incentives, the study opens new avenues for future research. It also highlights the need for more detailed studies on the varied effects of PE under different buyout scenarios and regulatory frameworks, calling for legislation that recognizes the beneficial impact of PE on corporate restructuring. This bibliometric review not only sheds light on the complexities of PE's role in managing financial distress, but also highlights its potential as a rich line of inquiry, marking a significant contribution to the field.*

Key words: *financial distress; private equity; corporate crises; restructuring; turnaround*

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1. Introduction

Private equity has become increasingly significant in the global financial ecosystem, reflecting its relevance to various stakeholders. Recent years have seen substantial growth in this area, with an increase in assets under management, invested funds, and fundraising activities[5].

The private equity industry is placing an increasing emphasis on crucial issues such as growth, innovation, internationalization, environmental, social, and governance (ESG) issues, and risk management (e.g. Amess *et al.* 2016; Gompers *et al.* 2022; Liang *et al.* 2023; Lerner at al. 2011; Krueger et al 2020; Herrera-Echeverri *et al.* 2022). This focus reflects an evolution in the way private equity funds approach investments, with a broader attention on the business model and performance of portfolio companies (Gompers *et al.* 2016; Krysta and Kanbach 2022).

PE is defined as a professional investment activity in unquoted companies conducted by financial intermediaries (PE investors or General Partners (GPs), which raise capital from different sources, including pension funds, banks, foundations, endowments, insurance companies, and family offices, collectively referred to as Limited Partners (LPs) (Wood and Wright, 2009; Gervasoni and Sattin, 2020). These funds are then used to acquire stakes in both listed and unlisted companies (Lerner *et al.* 2011), to advance the value creation of their portfolio firms (Meuleman *et al.*, 2009), and then realize a capital gain after some years by selling their stakes at much higher valuations (Gilligan and Wright, 2020; Gervasoni and Sattin, 2020; Gompers *et al.* 2016).

Numerous valuable research in the field of Private Equity (PE) recently focuses on assessing the impact of these investments on target companies. It examines how PE intervention influences company performance by implementing targeted investment strategies(e.g. Collewaert *et al.* 2023; Matanova *et al.* 2022; Croce and Martì 2016).) This strategic approach to leadership and investment underscores the dynamic role of private equity in driving business success and resilience. From this perspective, academic research offers numerous studies on private equity activities across different investment phases, from the company selection stage to the period when the target company enters the investor's portfolio (Gohil, 2016). Specifically, there are various studies examining the different strategies adopted as value creation drivers (Bernstein *et al.* 2019), as well as the support and role that PE plays in management within target companies (Kortum and Lerner, 2000; Gorman and Sahlman, 1989).

The acquisition of target firms is mainly realized through a leveraged buyout (LBO) scheme, which implies a substantial use of debt to finance the purchase price and a takeover of the majority or all of the company's outstanding shares. This strategic use of debt aims to optimize the return on equity and the internal rate of return for LPs (Achleitner *et al.* 2011; Guo *et al.*2011; Kaplan and Stromberg, 2009; Cumming *et al.*, 2007) through financial engineering, while encouraging management to use the available cash flows of the company in a prudent and effective manner (Jensen, 1989). The selection of target companies for LBOs is crucial, focusing on firms that are not only less financially distressed but also have the capacity to manage the high levels of debt used for their acquisition and to repay the debt used for acquisitions (Tykvovà and Borell, 2012).

In other words, leveraged buyouts represent a complex interplay of financial strategy, risk management, and corporate governance (Cumming *et al.* 2007). Critics of private equity often point out that LBO acquisitions involve sharp changes in capital structure, which could increase the risk of bankruptcy and lead to higher financial distress and default rates for portfolio companies (Merton, 1974). This, in turn, can have spillover effects on other stakeholders, such as employees, clients, taxpayers, and lenders.

Furthermore, PE are known as active investors for their "hands-on" approach to the management of their portfolio companies. By taking active roles, often through board representation, PE investors implement rigorous monitoring and control and can realize a closer alignment of interests between owners and management (Jensen, 1989), fostering a more agile decision-making process. Firms

[5] Private Equity cumulative assets under management equal to €4.500 bln in 2022, compared to €1.350 bln in 2010. In Europe the amount invested was 43.6 billion of euros in 2010 and reached 138.0 (+217%) in 2021, while the amount of fund raised was 25.9 billion of euros in 2010 and 118.0 (+356%). Source: Preqin and Invest Europe.

backed by private equity are more highly leveraged and efficiently managed than other forms of ownership. The private equity ownership model has been subject to academic and policy debate regarding its impact on the actual risk of financial crisis for portfolio firms and their ability to effectively manage financial distress and turnaround companies (e.g. Tykvovà & Borell, 2012; Hotchkiss et al 2021; Ayash and Rastad, 2021).

This research, following the steady growth of PE as an ownership structure, aims to raise awareness of the role that this institutional investor can take on in case of financial distress of target companies. The reasons for addressing this topic extend far beyond the immediate stakeholders and have profound implications for the broader economy, including the preservation of jobs and the stimulation of innovation. By effectively managing financial distress, PE investors can contribute to economic resilience and the growth of the corporate ecosystem.

However, it is also clear that our learning on the role and the effectiveness of PE in managing the heightened risk of default and resolving financial distress situations is far from complete.

Our research seeks to address this gap by conducting a comprehensive bibliometric review of the literature, to uncover patterns and gaps in the field. Through this analysis, we seek to provide a more grounded understanding of the PE model's implications for financial stability and the governance mechanisms through which PE investors contribute to or mitigate financial distress within their portfolio companies.

The specific research questions of the study that would be developed are as follows:

RQ1: What are the publication patterns in the field of private equity and financial distress situations?

RQ2: What are the main affiliations that work on this research topic?

RQ3: What are the most cited papers and the prolific contributors in this field?

RQ4: What are the foundational themes in the fields of private equity and financial distress, and what are the ways forward for the fields?

This retrospective look at the role of PE in financial distress also offers some ideas for looking ahead. Three specific ideas are discussed in Section 4 and previewed here: corporate governance mechanism; financing and reputational mechanism. Firstly, the alignment of interests between management and ownership makes a positive contribution to bankruptcy avoidance through closer supervision and effective managerial support, also in selecting board members. Secondly, Private equity firms injecting capital as firms approach distress is positively correlated with the success of the restructuring. Thirdly, GPs might suffer from reputational concerns with lenders, LPs, and other stakeholders that might prevent them from raising subsequent funds, thus being particularly averse to the event of a target's corporate default. The remain of the paper is organized as follows: Section 2 outlines the methodology and research techniques used in the study. Section 3 presents the results and descriptive analysis obtained from the use of the Vos Viewer[6] software. Section 4 outlines the main research streams explored in the literature. Finally, Section 5 focuses on the conclusions by acknowledging the limitations of the study and highlighting future research directions.

2. Methodology

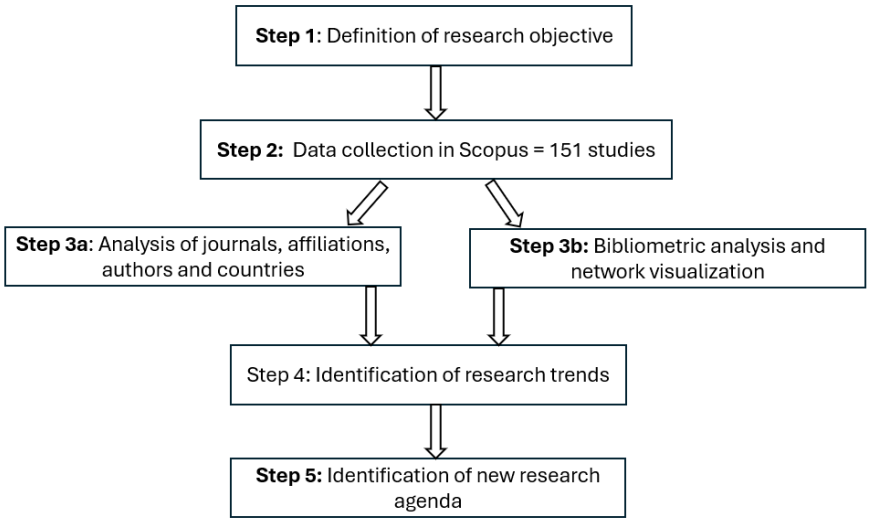
Over the last years, bibliometric studies have been widely used by scholars to better explore research trends and identify future lines of research (Paltrinieri *et al.* 2020; Donthu *et al.*, 2021; Khan *et al.*, 2021; Choijil *et al.*, 2022).

Bibliometric analysis allows to avoid the risk of selection bias compared to traditional systematic reviews, can handle large volumes of data, and helps to identify novel research avenues by conducting an objective examination of prior studies (Paltrinieri & Paul, 2021; Galletta *et al.* 2022; Naciti *et al.*

[6] Https://www.vosviewer.com/

2022). We chose to use this methodology to comprehensively understand the role of PE in financial distress situations and identify a new research agenda (Figure 1).

Fig. 1: Methodological process



Source: Our elaboration

Table 1 shows our research objective and article collection process. Firstly, we decided the parameters of our research by selecting and refining keywords, and specifying the time frame, document types, and language preferences. We sourced articles from the Scopus repository, renowned for its extensive coverage of peer-reviewed literature. We defined a set of keywords informed by established practices in systematic literature reviews (SLRs), as delineated by Tykvová (2011) and analyzing other private equity and financial distress studies (Wright *et al.* 2014; Toms *et al.* 2015; Hotchkiss *et al.* 2021) to identify key terms relevant to the scope of the work. The search was performed on December 1, 2023.

We did not impose any restrictions on the time window, but we focused only on English articles.

The selection of articles was limited to those concerning the research area of "Business, Management and Accounting", "Economics, Econometrics and Finance" and "Social Sciences".

We yielded a comprehensive dataset comprising 151 papers.

Tab. 1: Sample criterion

Objective	The paper studies the role of Private Equity in financial distress situations
Design of the research	Bibliometric analysis to conduct an objective and rigorous analysis of the literature
Publication time frame	All years
Language	English
Search strategy	We conducted our search exclusively within title, abstract, and keyword fields, selecting the following code: "firm*" OR "compan*" OR "enterprise*" OR "business" OR "corporate*" AND "financial distress" OR "economic distress" OR "turnaround" OR "restructuring" OR "debt restructuring" AND "private equity" OR "institutional investor*" OR "financial owner*".
Sample	Results: 151 articles

Source: Our elaboration

Subsequently, we conducted a bibliographic network analysis by employing the VosViewer software to disclose key network features and article clusters, exploring citation network, keywords analysis, and co-authorship interconnections, as advocated by Donthu *et al.* (2021).

Indeed, this methodological framework provides valuable insights into the current state of research within a given field and serves as a potent tool for identifying emerging trends and potential directions for future research.

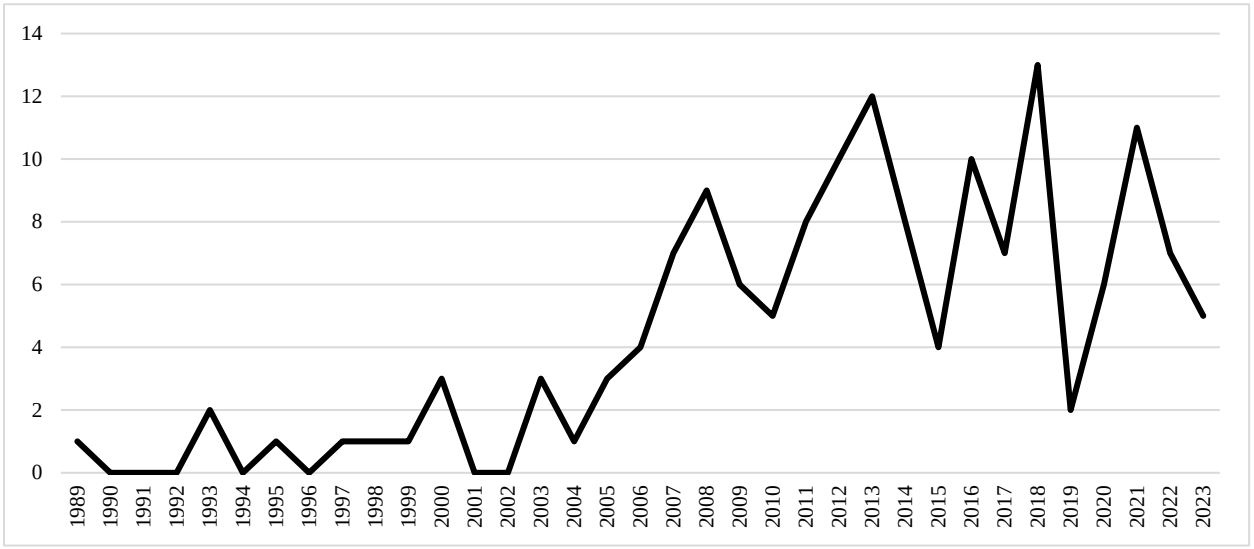
3. Results and analysis

3.1 Descriptive analysis

Figure 2 clearly shows the number of publications on the topic of financial distress and private equity, for a total of 151 articles. The number of published articles has increased from 1989 to 2023, while researchers have steadily intensified their interest in this interconnection with significant growth since 2004. In detail, during the early years (1989-2003), there were very few publications on this topic, with sporadic increases in certain years. This could indicate a relatively low level of academic interest or research activity focused on the interconnection between private equity and financial distress during this period. Starting around 2004, there has been a noticeable increase in the number of publications on this topic.

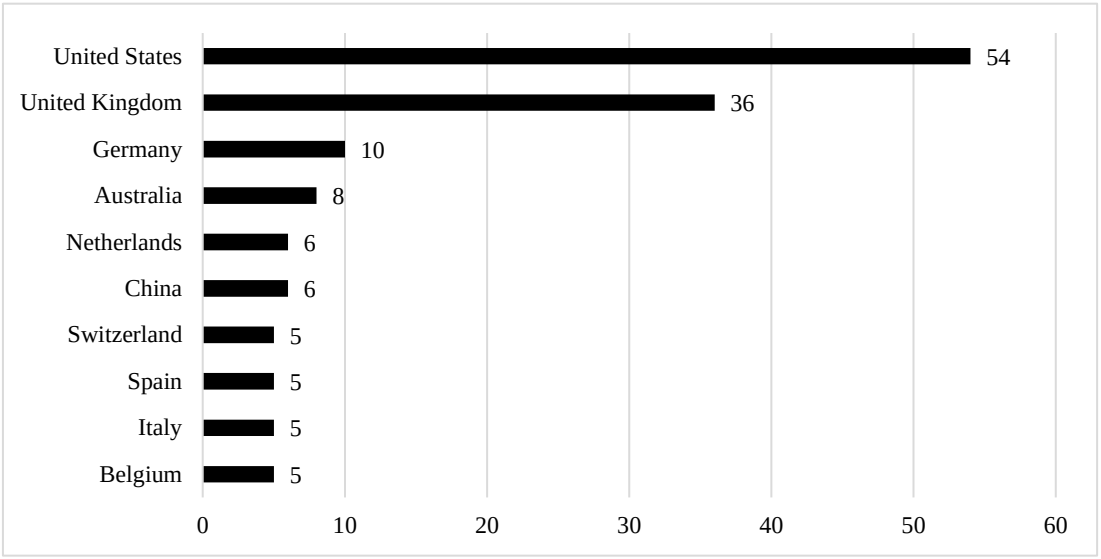
This could be attributed to several factors, including the growing prominence of private equity as an investment strategy, increased corporate restructuring activities and heightened interest in financial distress following events such as the dot-com bubble burst and the Enron scandal. The peak in 2008 may be related to the global financial crisis that began in that year. This crisis led to widespread financial distress among companies, prompting researchers to investigate also the role of private equity in distressed situations and its implications for corporate governance, restructuring, and financial markets strategies.

Fig. 2: Publication trend per year



Source: Our elaboration

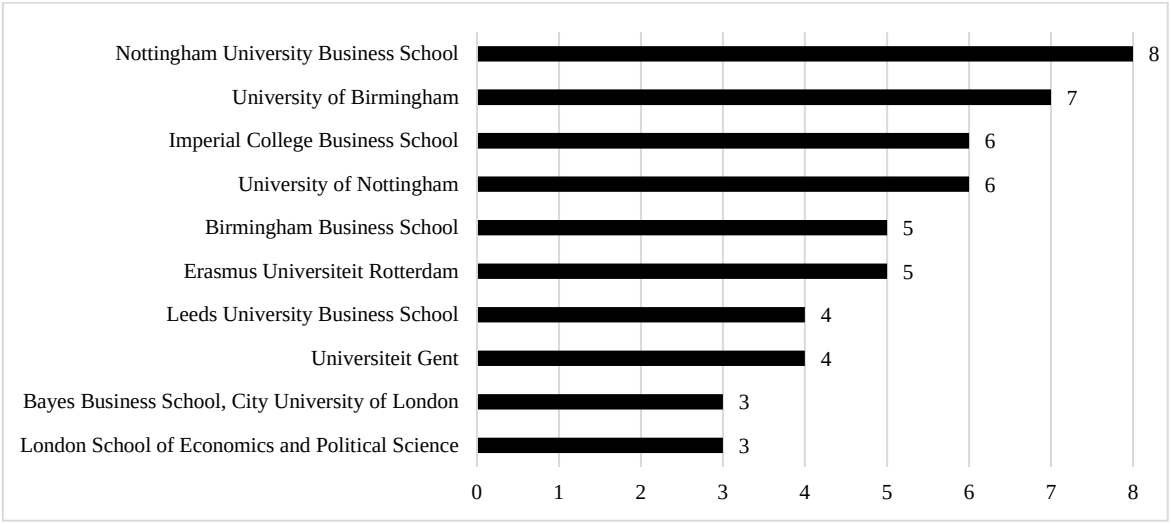
Fig. 3: Top 10 influential countries by paper production



Source: Our elaboration

Figure 3 shows the top ten countries with the largest number of published contributions examining the intersection of private equity and financial distress conditions. According to the graph above, the top two contributions are the United States and the United Kingdom, with 54 and 36 publications respectively. It is also interesting to note that the remaining publications from other countries (Germany, Australia, Netherlands, China, Switzerland, Spain, Italy, and Belgium) provide fewer academic contributions on the research topic. This could be due to the overall lower diffusion of private equity in these geographical areas compared to the most developed Anglo-Saxon markets.

Fig. 4: Top 10 affiliations by paper production



Source: Our elaboration

Figure 4 displays the top ten research institutions that have published the highest number of articles on the topic under investigation.

In contrast to Figure 3, which lists the top ten countries, American institutions are not included despite having a greater number of articles. The reason is that each American research institution has only two articles at maximum. The top ten affiliations contribute with 51 articles, which equals 34% of the total number of publications (151). Many research institutions with the highest number of publications are located in the United Kingdom such as Nottingham University and Birmingham

University. Additionally, European institutions (University of Rotterdam, Universiteit Gent) collectively contribute with 9 publications.

3.2 Network analysis

This section presents the bibliometric literature results on the role of private equity in financial distress situations. The research employed the VosViewer software to develop the network analysis, designed for constructing and visualizing the bibliometric network.

It enables the creation of maps depicting relationships among articles, journals, or authors based on co-citation data, as well as maps illustrating keyword associations using co-occurrence data, and co-authorship visualization (Donthu, 2021).

3.2.1 Co-occurrence network analysis

The aim of conducting keyword co-occurrence network analysis is to identify the terms frequently referenced across multiple papers within this study, which maps all the keywords based on their occurrence in our sample (De Silva. 2024), providing also valuable insights about the association (Laudano *et al.* 2018) for researchers, by revealing prevalent topics and subjects that have captured the attention of scholars.

Employing VosViewer, this examination generates a graphical representation illustrating the diverse array of keywords and subjects captivating researchers within the private equity and financial distress realm. Through the visualization of keyword occurrences, this investigation enables a more profound comprehension of the fundamental themes, subjects, and challenges propelling research within this field (Van Eck *et al.* 2010).

Figure 5 shows the co-occurrences of the author's keywords in the field of private equity in financial distress conditions. The minimum threshold for keyword occurrences was set at 3. Out of the total 606 keywords, 32 met this criterion. The visual representation reveals numerous interconnected keywords linked by various lines. These lines signify instances where these keywords co-appeared in multiple papers within the dataset (Galletta *et al.* 2022). The most frequently utilized terms denote areas where extensive research has been conducted, as detailed in Table 2.

Tab. 2

Top ten keywords occurrence

Rank	Keywords	Occurrence	Link Strength
1	Private Equity	31	57
2	Corporate governance	20	30
3	Financial distress	16	21
4	Institutional Investors	13	15
5	Bankruptcy	11	18
6	Restructuring	9	14
7	Investments	8	11
8	Corporate restructuring	6	10
9	Corporate strategy	6	21
10	Equity	5	20

Source: Our elaboration

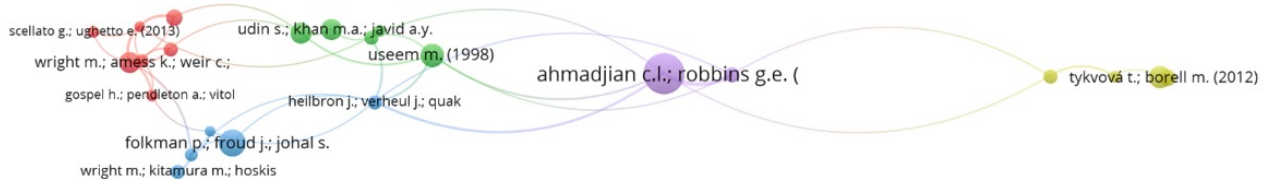
In this regard, table 2 displays the frequency of occurrences denoted by the first number, arranged in descending order, followed by the total link strength represented by the second number. The most frequent keyword is "Private Equity" in the top ten with 31 occurrences and a total link strength of 57. It is noteworthy that the term "turnaround" is not among the top ten keywords. This is because in the literature related to private equity, words such as "financial distress" and "corporate restructuring"

are much more commonly used than “turnaround”. This reflects the limited number of studies on this research topic that are unexplored by scholars.

3.2.2 Bibliographic Coupling network analysis

Bibliographic coupling network analysis is a bibliometric technique used to identify and analyze the relationships between academic documents based on their shared references. The basic idea is that if two documents cite a common third document, they are bibliographically coupled. This approach stands in contrast to co-citation analysis (Galletta *et al.* 2022), which we will analyze in the following paragraphs. By examining these connections among documents, bibliographic coupling analysis reveals patterns of intellectual influence, topical similarity, and research collaborations, currently being investigated in a scholarly field.

Fig. 6: Bibliographic coupling network visualization



Source: Source: Our elaboration using VosViewer

Specifically, bibliographic coupling network analysis contributes to providing a comprehensive overview of cited papers by visually indicating clusters with different colors, as depicted in Figure 6. The different shades of nodes denote unique themes that have emerged in the literature on private equity within financial distress situations. The dimensions of the nodes correlate with the total citations received by each article. Additionally, the proximity of nodes in the network indicates the degree of bibliographic coupling between studies. For instance, articles that are closely positioned share a considerable number of references (Marchiori and Franco, 2020).

Tab. 3: Top three cited papers

Rank	Document	Total link strength	Cluster	Research topic
1	Wright, M. *et al.* (2009) ‘Private equity and corporate governance: Retrospect and prospect’, *Corporate Governance: An International Review*, 17(3), pp. 353-375. doi:10.1111/j.1467-8683.2009.00744.x.	18	Red	The role of Private Equity in corporate restructuring
2	Ahmadjian, C.L. and Robbins, G.E. (2005) ‘A clash of capitalisms: Foreign shareholders and corporate restructuring in 1990s Japan’, *American Sociological Review*, 70(3), pp. 451-471. doi:10.1177/000312240507000305.	15	Violet	The influence of institutional investors in corporate restructuring governance systems
3	Tykvová, T. and Borell, M. (2012) ‘Do private equity owners increase risk of financial distress and bankruptcy?’, *Journal of Corporate Finance*, 18(1), pp. 138-150. doi:10.1016/j.jcorpfin.2011.11.004.	10	Yellow	The involvement of private equity firms in managing the risk of financial distress difficulties

Source: Our elaboration

Table 3 shows the top three cited articles according to the total link strength of bibliographic coupling analysis, represented by a positive number in the column “cluster”. The overall strength of the linkages in an article refers to how robust the connections are, with greater values indicating stronger links (Galletta *et al.* 2022).

In the red cluster, the study of Wright *et al.* (2009) is crucial in improving corporate governance and tackling financial issues within companies. By participating in businesses, PE firms introduce measures to reduce problems related to agency costs and cash flow issues, thereby increasing the efficiency of corporate control markets. These interventions result in improved company

performance, without simply redistributing wealth from other parties. The study points out that the effects of PE differ among various buyout scenarios and regulatory environments, indicating a need for a more detailed investigation into its diverse consequences. It also argues lawmakers to acknowledge the beneficial aspects of PE in the restructuring of corporations, underscoring the significance of comprehending its complex effects for proper regulation.

In the violet cluster, the study of Ahmadjian *et al.* (2005) analyzes data from Japanese companies to examine how the increase in foreign institutional investment affected distressed corporate practices, such as downsizing and divestment of assets. The authors find that foreign institutional investors have led to more shareholder-oriented practices, especially in less incorporated firms contributing to the debate on institutional change and corporate governance systems. Additionally, the research conducted by Toms et al (2012) in the orange cluster, provides a detailed exploration of private equity's influence on the corporate restructuring environment in the UK from 1945 to 2010. It delineates the development of PE into three distinct stages: initial efforts to leverage venture capital and engage in speculative acquisitions before 1980, the swift rise and early dominance of PE and management buy-outs after 1980, and the evolution and broadening of PE approach up to the 2007-2008 financial crisis. By utilizing case studies and data analysis, the paper investigates PE's effect on corporate governance, investment approaches, and organizational outcomes across these periods, underscoring the shift towards more dynamic, equity market-oriented financial strategies under PE's influence, mirroring wider shifts in global financial and corporate governance paradigms. Finally, in the yellow cluster emerges the study developed by Tykvová, T. *et al.* (2015), which explores the risk of financial distress for European businesses surrounding the event of a buyout. Their findings reveal that private equity investors tend to choose firms that are in a stronger financial position than their non-buyout counterparts, yet the risk of financial distress escalates following the buyout. However, despite this uptick in risk, companies with PE backing do not show a higher likelihood of bankruptcy than similar companies without such backing. Notably, companies supported by seasoned PE funds exhibit even lower rates of bankruptcy. This suggests that investors with more experience are more adept at navigating financial distress risks than less experienced investors, contributing to the revitalization of companies, as we will delve deeper in Chapter 4. In fact, in the last chapter, we will highlight the main streams that emerged from a systematic analysis of the most important articles published in leading journals of economics and finance fields, which did not emerge clearly in this current analysis.

3.2.3 Co-authorship analysis - Country

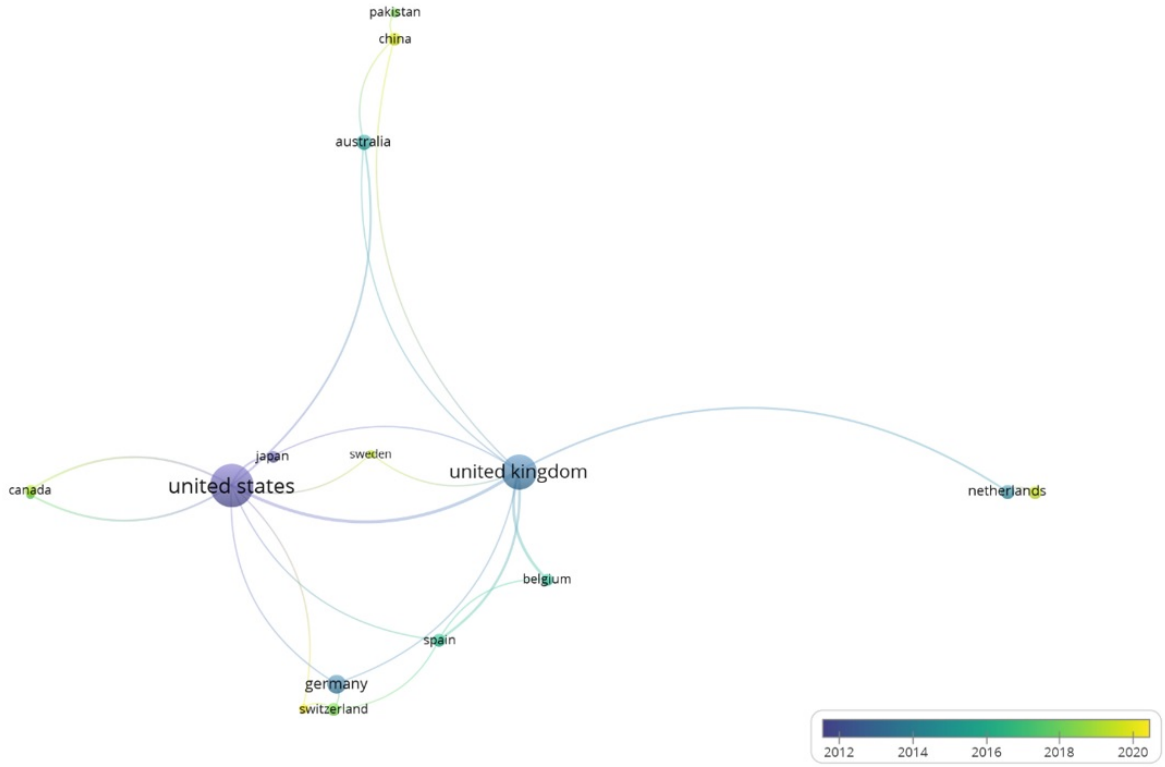
This section explores the cross-country co-authorship network analysis, shedding light on the nationalities of authors who collaborated with the most authors from other countries. Figure 7 presents an international co-authorship network map, revealing insights into the collaborative patterns among authors from different nations. In total, the analysis encompassed 16 countries of interest.

As can be seen, the authors from the United States, the United Kingdom, Germany, Canada, and Australia emerged as having more co-authors from other countries, indicating extensive international collaboration. Meanwhile, a significant concentration of authors was observed in other nations (Netherlands, Spain, Belgium, China). The analysis suggests that co-authorships are primarily concentrated among developed countries, whereas such collaborations are less prevalent in developing countries like Pakistan and other countries like Sweden, Italy and Switzerland.

Moreover, analyzing the temporal overlay reveals that countries with more intensive collaboration among authors tend to have an average publication year that is not recent such as the United States (2011), the United Kingdom (2013), and Germany (2013). This suggests that the most consolidated and active collaborations may be rooted in older publications. Several factors may contribute to the lower co-authorship rates among the other considered countries. This could stem from the lack of in-depth research on the topic and financial data, thus reducing the interest and experience of academics and practitioners in conducting research in this field. Additionally, it may reflect a reduced

willingness among researchers to engage in comparative studies within the private equity and turnaround strategies sector.

Fig. 7: Co-authorship analysis - Country

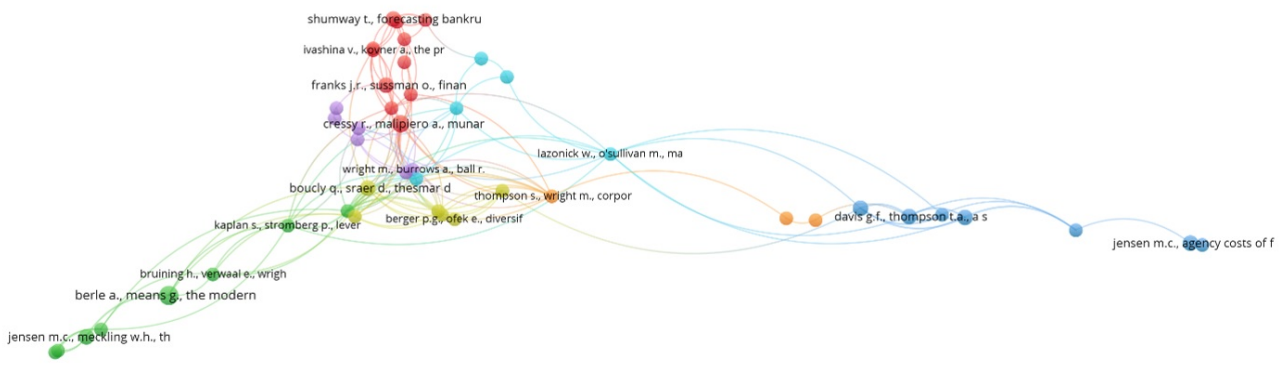


Source: Source: Our elaboration using VosViewer

3.2.4 Co-citation analysis

As already mentioned in paragraph 3.2.2, the co-citation analysis is the opposite of the bibliographic coupling network analysis, because it defines the situation where a third paper references two distinct publications together. This approach signifies that when two documents are co-cited within another paper's bibliography, it points to their mutual relevance or conceptual linkage (Small, 1973). Used to delineate the academic landscape, this strategy assumes that frequently co-cited papers imply a hidden commonality of topics among authors based on their publications, helping to delineate the academic framework and major themes of inquiry within a specific field (Surwase *et al.*2011; Feng *et al.* 2017; Paltrinieri *et al.* 2019).

Fig. 8: Co-citations analysis map

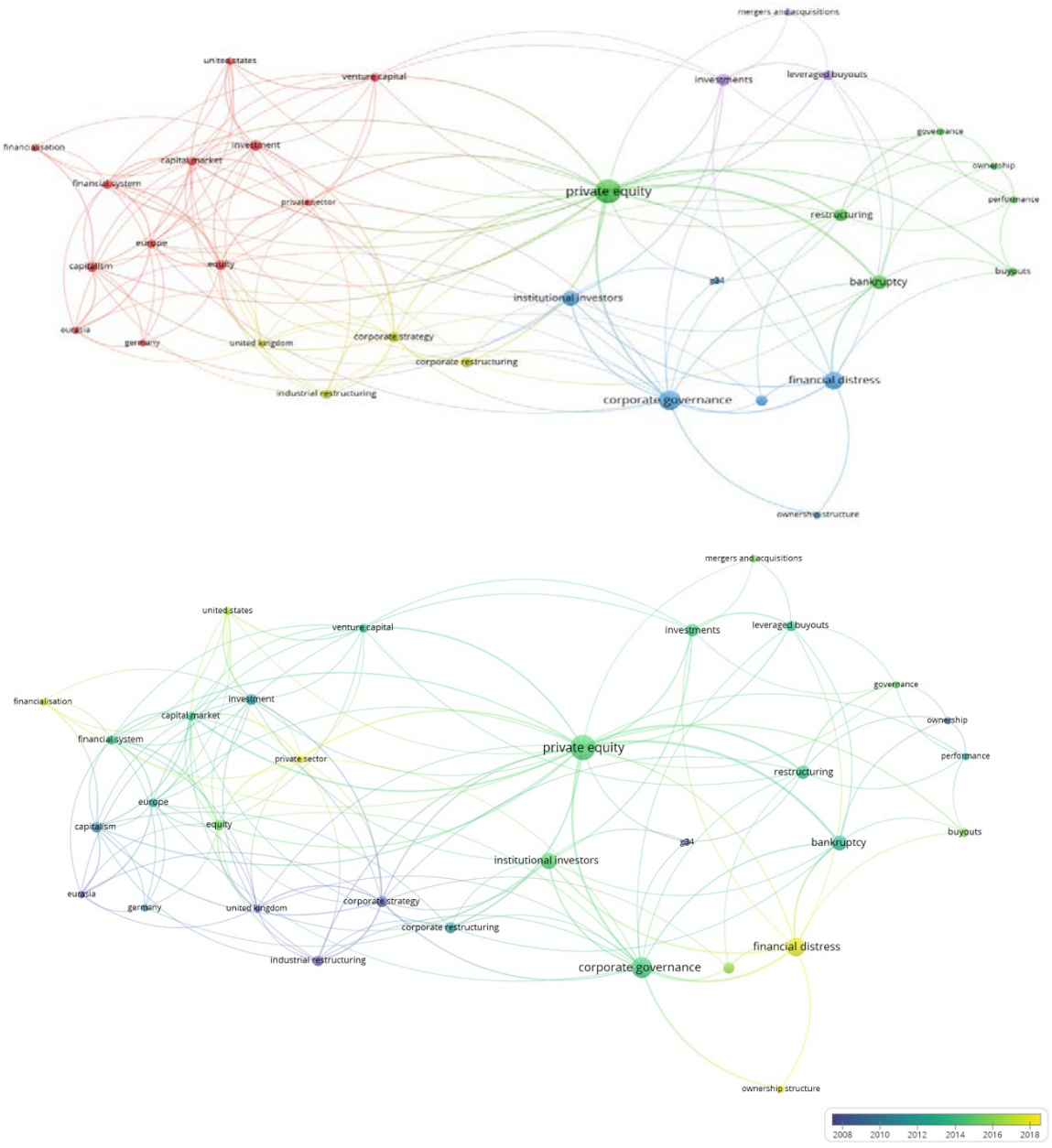


Source: Our elaboration using VosViewer

Seven distinct color clusters can be identified, all closely linked, as shown by figure 8. Notably, the yellow cluster merges into the green, red, purple, orange, and blue clusters, serving as a pivotal connection among the main clusters and forming the core of the thematic analysis. The yellow cluster contains pioneering studies related to the role of private equity as a new form of value creation (Boucly Q. *et al.* 2011), agency theory in a corporate governance structure (Jensen M.C *et al.* 1976) and risk diversification effect on firm value (Berger P.C *et al.* 1995).

Concerning the three primary clusters, the green one encompasses research on the innovative form of ownership within the corporate governance framework, including in firms undergoing bankruptcy (Daily C.M.*et al.* 1994; Berle A. *et al.* 1990). Another theme emerging from this cluster is undoubtedly the examination of private equity's role in leveraged buyout operations (Bruining H. *et al.* 2005), linking to the yellow cluster that focuses on private equity topics. Meanwhile, the red cluster connects with the other groups as it explores issues of financial distress and bankruptcy, delving into the benefits of private equity in managing corporate crises (Ivashina V. *et al.* 2011; Cressy R., *et al.* 2007; Tykvovà T. *et al.* 2011).

Fig. 5: Keyword co-occurrence network



Source: Our elaboration using VosViewer

Moreover, the keyword co-occurrence network map (Fig. 5) illustrates five primary clusters distinguished by their colors: red, green, yellow, violet and blue. While these clusters are closely interconnected with overlapping themes, some distinct study strands emerge, aligning with our research intersection: private capital (red), private equity and restructuring (green), and corporate governance (blue). Notably the most frequently occurring word, represented by the largest node, is green cluster with private equity (31), followed by bankruptcy (11), restructuring (9), governance, ownership, and performance (3).

Thus, private equity stands out as the most prominent keyword. As evidenced by the overlay visualizations graph (second one), the primary keywords (private equity, corporate governance, restructuring, bankruptcy, institutional investors, financial distress) emerged predominantly between 2012 and 2018, coinciding with the hype in publications on this topic. This indicates a considerable interest among researchers and scholars in studying the relationship between the two topics. Indeed, the role of private equity within distressed companies has undergone significant evolution over time yet remains relatively unexplored, suggesting anyway little attention to this topic in recent years.

4. The main research streams

Several works studied if PE-backed firms could suffer higher risk of default due to the use of high amount of leverage. Controlling for leverage, PE-backed firms are no more likely to default than comparable leveraged non-buyout companies (Hotchkiss *et al.* 2021; Tykvovà & Borell, 2012). Moreover, Wilson & Wright (2013) acknowledged that high leverage is not only exclusive to PE-backed companies. When accounting for factors such as size, age, sector, and macro-economic conditions, they found that PE-backed buyouts do not have a higher risk of insolvency compared to other forms of management buy-ins or non-buyouts. Another stream of research, instead, find We find that the probability of bankruptcy increases by approximately 18% for companies undertaking a LBO compared to a control sample (Ayash & Rastad, 2021).

When defaults do occur, PE owners are also more likely to retain control of the firm following the restructuring (Hotchkiss, 2021) and PE-backed portfolio companies have mechanisms in place even before the crisis which can optimize recovery rates in case of insolvency (Wright *et al.*2014). Recovery rates of PE buyouts are around twice those of publicly owned companies (Cressy *et al.* 2012) and PE-backed firms restructure more often out of court and faster (the median PE-backed firm restructures 4.2 months (35%) faster than a distressed non PE-backed firm). Since both direct and indirect costs increase with the time spent in distress, this suggests that financial distress is less costly for PE-backed firms (Hotchkiss *et al.* 2021). Creditors are about twice as likely to get repaid in distressed buyout situations as with distressed publicly owned companies, as PE investors have a better monitoring of loan performance, take more decisive action if distress is imminent and better restructuring of debt (Cressy *et al.* 2012).

The reasons that allow PE to mitigate the risk and outcome of financial distress of their portfolio companies, compared to non-acquired companies, have been extensively studied by other researchers.

Firstly, as highlighted in both the co-occurrence analysis and in the other network analyses, corporate governance mechanisms based on active ownership and involvement in portfolio companies have been highlighted as an element helping PE to deal better and in a timelier manner with trading difficulties through closer supervision and effective managerial support (Wilson & Wright, 2013; Wright *et al.* 2014). The alignment of interests between management and ownership makes a positive contribution to bankruptcy avoidance (Davis *et al.* 2014), even in public-to-private transactions (Sudarsanam *et al.*2011).

Marini *et al.* (2022) report that, while there might not be significant differences in corporate governance features between targets and non-acquired companies, PE investors demonstrate great capability in selecting corporate governance members. This skill is particularly crucial in enhancing risk mitigation, especially in scenarios where boards are more compact, consist of directors who are

industry experts with extensive commitments, and where the execution mandate is distributed among a greater number of managers.

This perspective is further supported by literature that emphasizes the role of governance structures in influencing organizational performance and resilience, suggesting that the decisions made by PE investors in this regard are grounded in a deep understanding of the interplay between governance, risk, and performance (Borsa *et al.* 2023).

Secondly, GPs usually have cash reserves ("dry powder") which might be deployed to recapitalize portfolio companies during periods of financial distress. This financial availability allows PE to support their investments in challenging times. However, the propensity for PE owners to infuse capital as firms approach distress is positively related to measures of the success of the restructuring (Hotchkiss *et al.* 2021).

Thirdly, GPs might suffer from reputational concerns with lenders, LPs, and other stakeholders that might prevent them from raising subsequent funds, thus being particularly averse to the event of a target's corporate default (Meuleman *et al.* 2022). In conclusion, PE investors act as agents toward their investors and to secure future fundraising have more incentives to keep distressed portfolio companies as a going concern. PE investors managing a first-time fund or involved in fundraising activities are less likely to have bankruptcies following financial distress.

5. Implications and conclusion

The research provides a comprehensive bibliometric literature review on the role of private equity in financial distress situations, highlighting valuable insights into the complexity and importance of private equity in providing not only financial capital but also managerial and strategic expertise to guide the turnaround of companies in crisis. In this context, it identifies a gap in research regarding the detailed understanding of how PE investors manage financial distress within their portfolio companies, specifically focusing on operational efficiency, financial restructuring, strategic repositioning, and the management incentives in these scenarios.

As highlighted in bibliometric network analyses, the role of private equity is crucial in managing difficult financial situations. Specifically, some studies underscore PE's role in reducing agency costs and improving cash flow management in a distressed condition, leading to better corporate performance without wealth redistribution from other parties (Jensen 1989; Wright et al 2009; Meuleman et al 2009; Meuleman et al 2022). The analyses also highlight how the role of institutional investors is critical in the corporate governance of distressed companies that have a very high probability of failure. Moreover, it stresses the need for detailed research on PE's varied effects across different buyout scenarios and regulatory frameworks, advocating for legislation that recognizes PE's beneficial impact on corporate restructuring.

While the use of substantial leverage can elevate the risk of financial distress of PE-backed companies, evidence shows that the latter are not at a higher risk of default compared to similarly leveraged companies that have not undergone a buyout. Indeed, when PE-backed firms do become financially distressed, they are more likely to restructure out of court, take less time to complete restructuring and are more likely to survive as independent enterprises, compared to their financially distressed peers that are not supported by a PE investor (Hotchkiss *et al.* 2021). At the same time, other research suggests that companies that undertook a LBO show a higher probability of bankruptcy compared to a control sample (Ayash & Rastad, 2021).

General Partners in private equity firms demonstrate remarkable efficiency in resolving financial distress situations within their portfolio companies. This adeptness is intrinsically linked to their core expertise in managing high debt levels, which is a critical component of their investment strategy. The foundation of this capability lies in their investment model, which is predicated on active ownership. This model not only allows them to implement operational and strategic enhancements but also positions them to mobilize the necessary resources for recapitalizing companies in distress.

Furthermore, GPs are motivated to prevent corporate default due to the potential reputational damage, driving them to employ their skills and resources proactively. Consequently, the synergy between their ability to efficiently manage distressed situations and their expertise in handling high debt levels, underscores the effectiveness of their overall investment approach, ensuring both the stability and the growth of the portfolio companies under their stewardship.

In conclusion, this bibliometric study allows us to identify potential new avenues of research that we shortly summarize thereafter.

Further research could investigate if PE investors behave differently across different types of targets and which characteristics of the GPs improve or worsen the management of financial distress (Marini *et al.*, 2021). Moreover, it should be investigated whether PE investors need to spend more time with distressed companies to facilitate a turnaround compared to other portfolio companies and what are the internal organizational consequences for GPs (Meuleman *et al.*, 2022). Levers of intervention actually adopted by GPs (e.g. operation efficiency, focus on financial restructuring, repositioning of the strategy, etc.) are another strand of potential research. Furthermore, Cuny and Talmor (2006) made a theoretical study on the advantages of PE ownership in enabling organizational change, potentially leading to a more effective turnaround. Sudarsanam *et al.* (2011) suggest that PE investors are willing to target companies experiencing financial crises, as they see the potential turnaround to realize substantial upside gains. However, no specific study is focused on GPs specifically targeting these investments.

Finally, it would also be interesting to study the exit strategies used by PE firms and what impact they have on the long-term performance of restructured companies, once they return to profitability. In summary, the findings from this study not only shed light on the complexities of this research strand but also underscore its potential as a rich vein of inquiry.

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Exploring the Third Mission of Universities: a Scientometric Approach using Bibliometrix

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Abstract

Frame of the research. *In the dynamic landscape of higher education, universities are undergoing a profound transformation, expanding their roles beyond traditional teaching and research to embrace the "third mission". This mission involves active engagement with society through social innovation, technology transfer, and sustainable development.*

Purpose of the paper. *This paper aims to provide a comprehensive understanding of the evolution, academic structures, and future trends related to the third mission of universities. Through a bibliometric analysis of 364 articles from Scopus, we seek to quantify the growth, identify critical knowledge nodes, and visualise the relationships within this evolving field.*

Methodology. *Employing bibliometric analysis, we analysed the corpus of 364 scientific articles. By utilising keywords 'third mission' and 'university' on the Scopus scientific database, we identified relevant contributions and applied bibliometric techniques to unveil conceptual, social, and intellectual structures characterising the literature.*

Results. *Our analysis reveals a consistent upward trajectory in the academic discourse on the third mission over the past two decades. We observe a shift from traditional roles to an increased focus on innovation and socio-economic development. Additionally, our study uncovers key structures, including conceptual, intellectual, and social dimensions, that shape the discourse in this field.*

Research limitations. *While our study provides valuable insights, it is not without limitations. The scope is limited to articles available on the Scopus platform using specific keywords. Certain nuances of the third mission may not be fully captured, and variations across different academic disciplines and socio-cultural contexts may exist.*

Managerial implications. *Recognizing the evolving role of universities' third mission, our findings have implications for academic leaders and policymakers. The identified structures and trends can stimulate the reconfiguration and renovation of academic organisational and governance structures, foster strategic partnerships, and inform the evaluation of university activities.*

Originality of the paper. *This paper contributes to the scholarly debate by adopting a bibliometric analysis approach, offering a quantitative overview of the research landscape. Unlike traditional systematic literature reviews, our approach allows for a broad and efficient mapping of the field, revealing patterns of collaboration and scholarly influence.*

Key words: *third mission; university; bibliometric analysis; social innovation; knowledge transfer*

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1. Introduction

In modern societies, deeply marked by the advancement of knowledge and the need to respond to complex global challenges, universities play an increasingly central and diverse role (Kromydas, 2017; Esposito De Falco, 2021; Mele *et al.*, 2024).

In addition to the traditional pillars of teaching and research, these institutions are called upon to expand their engagement through the so-called "third mission": an activity that extends to social innovation, knowledge dissemination, technology transfer and support for sustainable development at local, regional and global levels (Pinheiro *et al.*, 2017; Compagnucci and Spigarelli, 2020). This expansion of university functions reflects a significant evolution in the relationship between academia and society, emphasising the importance of universities' active engagement with their communities and territories of reference (Jongbloed *et al.*, 2008; Benneworth, 2012; Schuetze, 2012; Kagan and Diamond, 2019).

The concept of the third mission emphasises the responsibility of universities to contribute directly to the social, economic and cultural well-being of the societies in which they are embedded (Grau *et al.*, 2017; Altintas and Kutlu, 2021; Petersen *et al.*, 2022).

The international definition of the third mission, expressed as "a system of knowledge exchange and cooperation (KEC) between universities and society", highlights the importance of mutual interaction between academic institutions and communities. In this context, KEC is not limited to the simple unidirectional transfer of knowledge from the university to society, but also includes learning from the experiences and needs of society itself to guide university research and teaching. This approach emphasises an integrated and comprehensive view of higher education, recognising the importance of proactively responding to social, economic and environmental challenges through collaboration and innovation. This definition is based on the growing awareness of the crucial role that universities can play in sustainable development and in solving complex global problems (Price *et al.*, 2021; Agusdinata, 2022).

The third mission changes the role of universities: by becoming key players in promoting social innovation and economic development, and by facilitating dialogue and understanding between the academic community and the wider public, universities play a crucial role. This role, with particular reference to the direct social and economic impact on the territory and the community, is also valued by national ministerial bodies. In Italy, for example, ANVUR (the Italian National Agency for the Evaluation of the University System and Research) has introduced specific indicators to measure the third mission activities of universities and has officially recognised their value in the higher education evaluation system during the periodic evaluation exercise (VQR). Similarly, in other European countries and internationally, the importance of the third mission is recognised by various research funding bodies and organisations.

Therefore, the changes underway and the transition to a fully integrated university model with the third mission present several challenges and opportunities (Trencher *et al.*, 2014).

Challenges include the need to reconfigure academic organisational structures to support new forms of collaboration with external stakeholders, the search for diversified funding to support innovative initiatives, and the adaptation of academic excellence evaluation criteria to include the social and cultural impact of university activities (Laredo, 2007; Cosenz, 2022; Ruggiero *et al.*, 2022).

At the same time, the opportunities are manifold: from the creation of strategic partnerships with the public and private sectors, to the development of educational programmes that prepare students to become active citizens and social entrepreneurs, to the possibility of making a significant contribution to solving global problems such as environmental sustainability, social inequality and public health (Abramo and D'Angelo, 2022; Fia *et al.*, 2023).

There are several studies in the literature analysing specific aspects of the third mission of universities, such as spin-offs (Chiesa and Piccaluga, 2000; Clarysse *et al.*, 2011), measurement indicators in terms of human, structural and relational capital (Secundo *et al.*, 2017; Schmid *et al.*, 2018) and intellectual property (Naranjo-Africano *et al.*, 2023).

Currently, the only systematic review (Compagnucci and Spigarelli, 2020) on the topic analyses 134 peer-reviewed articles published between 2004 and May 2019 to explore the third mission of universities, highlighting its evolution from a simple concept to a concrete practice. The research highlights the growing emphasis on knowledge transfer, social innovation, civic engagement and interaction with the economic and social fabric, emphasising the importance of entrepreneurial practices and partnerships with the private sector.

Given the vast attention of scholars on the topic, as evidenced by the large number of papers, it was deemed particularly appropriate to adopt the bibliometric methodology.

The present study aims to use bibliometric analysis as it represents an innovative and strategic approach compared to the traditional systematic literature review for several reasons. Firstly, it provides a quantitative overview of the field of study, allowing relationships between research papers, time trends and critical knowledge nodes to be identified and visualised in a more efficient and systematic way. This approach can handle large amounts of bibliographic data, providing a comprehensive mapping of publications, citations, and collaborations between authors and institutions (Cuccurullo *et al.*, 2016). In addition, through techniques such as co-citation and social network analysis, bibliometric analysis reveals patterns of collaboration and scholarly influence that may not be captured by a systematic literature review that focuses primarily on qualitative synthesis of the content of selected papers. This makes it possible not only to highlight emerging themes and gaps in the literature, but also to trace the evolution of research over time, thus providing a solid empirical basis for defining future research directions (Brika *et al.*, 2021). Thus, while systematic reviews remain crucial for an in-depth understanding of specific topics, bibliometric analysis stands out for its ability to provide a broad and quantitative overview of the research landscape, which is particularly useful in broad and multidisciplinary fields such as the university's third mission.

In the light of these aspects, this scientific paper aims to answer the following research questions:

RQ1: *How has the literature on the third mission developed to date?*

RQ2: *How are the conceptual, social and intellectual structures characterised in the literature insisting on the third mission of universities?*

RQ3: *What are the future trends in research on the third mission of universities?*

To answer the research questions, we carried out a bibliometric analysis based on a corpus of 364 scientific articles identified through a systematic search on the Scopus platform. The research focused on using the keywords 'third mission' and 'university' to identify the most relevant contributions in the field (Compagnucci and Spigarelli, 2020). Bibliometric software was used to analyse the social, conceptual and intellectual structure that characterises the literature on the 'third mission' of universities.

The performance analysis showed that the academic debate on the third mission of universities, which started two decades ago, has followed an upward trajectory. This path has evolved from a simple extension of traditional roles towards innovation and socio-economic development, through the complexities of commercialisation, to the recognition of the importance of university incubators in fostering student entrepreneurship. Reflecting on this evolution confirms a shift in the role of universities towards a more interactive and dynamic model of education, balancing innovation and civic engagement.

On the other hand, scientific mapping makes it possible to identify the structures (conceptual, intellectual and social) that define the topic under study. It can also show how interactions between researchers and the formation of networks influence the development and dissemination of knowledge, providing a deeper understanding of the social dynamics underlying scientific production. This is crucial for understanding how ideas spread within and between disciplines, and for identifying the key actors and institutions that drive progress in a field of study.

Anticipating future trends in university research on the third mission opens a window on possible future developments, suggesting innovative areas of study and open questions that promise to further enrich debate and practice in the field. Our findings point to a significant ongoing transformation of the role of academic institutions ranging from industry to innovation, technology, entrepreneurship

and sustainability. Although some countries show little interest or collaboration, there is potential for enrichment through cultural exchange. For the future, it is important to explore governance, social welfare and efficiency in the third mission scenario, integrating the principles of sustainability. This requires a global vision of higher education, positioning universities as agents of social change.

In this sense, our work aims to contribute to the scholarly debate by suggesting new directions and highlighting the contribution of universities to social and economic well-being.

The findings and evidence that have emerged from our study not only outline the conceptual, intellectual and social structures that characterise the field, but also go further to reveal the unexplored potential and new directions that can be taken. Through our analysis, we have been able to identify emerging areas of interest and highlight the dynamic interplay between academic research and society, and how these intersections can be enhanced to address contemporary challenges.

These findings are not only a mapping of the current state of the third mission, but also a catalyst for an in-depth dialogue on its future development.

In doing so, this article aims to provide researchers and policymakers with a useful insight for navigating the complexities of this area and for fostering the development of universities that are increasingly responsible, innovative and committed to building a better society.

The rest of the paper is structured into three sections. The following section discusses the methodology and tools used in our research. Then we present the performance analysis and science mapping results. The final section discusses the results and concludes by indicating the academic and policy implications, limitations, and future lines of research in the field.

2. Method

A bibliometric analysis was carried out, using performance analysis and scientific mapping techniques through the use of RStudio software (Allaire, 2012), a tool widely used in the scientific community to carry out statistical analyses. Bibliometrics is a branch of informetrics that focuses on assessing the impact of scientific publications and quantifying their ability to disseminate knowledge through the use of statistical methods (Merigó *et al.*, 2015). From this perspective, it offers scholars the opportunity to explore a greater volume of information than can be analysed by traditional systematic reviews, while ensuring high standards of accuracy, scientific reliability, clarity and the possibility of replicating studies (Dada, 2018; Forliano *et al.*, 2021).

Bibliometrix (Aria and Cuccurullo, 2017) is by far the most popular R package and is used in a growing number of publications (Linnenluecke *et al.*, 2019). Bibliometrix allows researchers to import a bibliography database from SCOPUS or the Web of Science, stored as either a Bibtex (.bib), Comma Separated Value (.csv) or plain text (.txt) file. The package has simple functions that allow descriptive analyses, such as the most relevant authors by number of publications, or the most cited documents.

According to Zupic and Čater (2015), the use of bibliometric studies in the field of business and management introduces “measured objectivity to the evaluation of scientific literature”, increasing the rigour of such studies and reducing the bias of reviews. Additionally, bibliometric analysis can avoid data selection biases because it focuses on quantitative analysis, which could help researchers focus on important and relevant papers (De Bem Machado *et al.*, 2022).

2.1 Data Collection and Extraction

The analysis presented here preferred to use Scopus for the bibliometric research, choosing the keywords “third mission” and “university*” in order to focus exclusively on publications related to the third mission in the university context. The choice of these specific keywords was motivated by their well-established diffusion and recognition in the academic sphere (as done by Compagnucci and Spigarelli, 2020). These terms are now considered to be in common and unambiguous use, ensuring that research is focused and relevant. The decision to adopt two keywords is based on their

effectiveness in capturing the wide range of work on the topic of the third mission, confirming the importance of a focused and evidence-based approach to fully explore the topic in question.

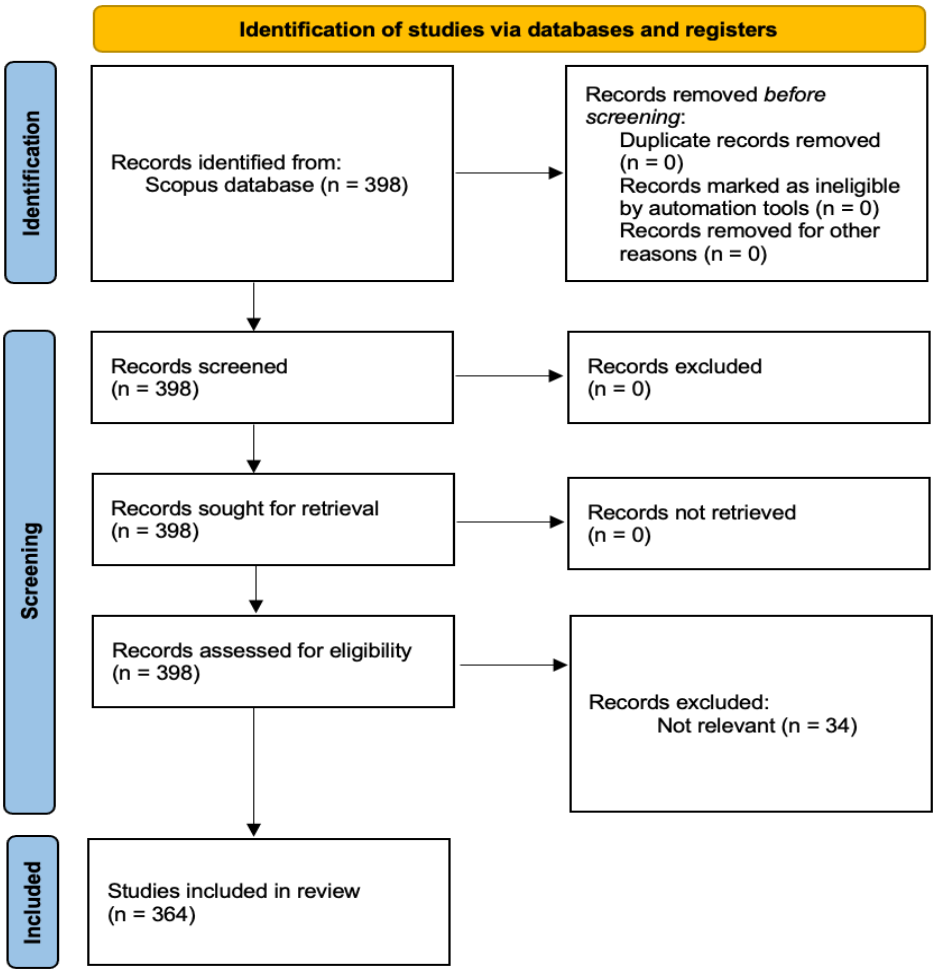
This approach initially yielded 398 records. The dataset was then refined to 364 records through careful selection based on relevance to the topic of the study. This filtering process ensured that only studies closely related to the university's third mission were included in the analysis.

The criteria for including and excluding articles in the bibliometric analysis were carefully defined to ensure the relevance and validity of the sample. Articles were excluded from the sample for a variety of specific reasons, reflecting a methodical and selective approach to the composition of the study corpus. In particular, the excluded articles had characteristics such as: examining the impact of university entrepreneurial activities on aspects not directly related to the third mission; focusing on specific curriculum design processes without a clear link to the third mission; discussing the influence of external political or financial pressures without a direct link to the main topic; and exploring university entrepreneurial intentions without an explicit link to the third mission.

These criteria made it possible to isolate studies that were strictly relevant to the university's third mission, while excluding those that, although related to the university's academic or entrepreneurial context, did not contribute directly to understanding the third mission per se. The aim was to focus on works that offered direct and significant insights into the third mission, ensuring that the bibliometric analysis did not include publications irrelevant to the topic of interest and was as focused and informative as possible.

Fig. 1 illustrates the workflow (Page *et al.*, 2021) used to collect and select the sample of papers to be included in the subsequent bibliometric analysis.

Fig. 1: PRISMA flow diagram



Source: our elaboration

2.2 Bibliometric Analysis

The final sample was subjected to a bibliometric analysis in order to unveil the dynamics and trends of third mission research in universities. The decision to carry out an analysis of the conceptual, social and intellectual structure was dictated by the desire to comprehensively explore the dynamics and trends that characterise third mission research in universities. This approach makes it possible not only to identify the content and topics covered, but also to understand the collaborative networks and theoretical underpinnings of studies in this field.
More in detail:

1) The conceptual structure has been analysed in order to trace the evolution of the main themes over time and to show how the focus of university research on the third mission has evolved and differentiated. This analysis makes it possible to identify the main thematic areas and their interrelationships, providing a conceptual map of the research. The output of this analysis consists of thematic maps and thematic evolution, tools that visualise the main lines of research and how they have evolved and diversified over time. Through these maps, it is possible to observe the emergence of new topics of study and the transformation of research interests within the third mission.
2) The social structure will be studied to understand the networks of collaboration between researchers and institutions, and how these interactions influence the scientific production of the third mission. The social structure analysis consists of identifying networks of co-authorship and institutional collaboration, revealing the main research centres and key researchers in the field. This approach provides an insight into the scientific community contributing to the study of the third mission, highlighting the links between different authors and institutions and how these relationships facilitate knowledge exchange and influence research directions.
3) The intellectual structure is analysed to identify the theoretical foundations and bibliographic sources that form the basis of third mission research. This analysis makes it possible to identify seminal works, influential authors and key publications that have helped to shape the field of study. The output of this analysis is the construction of citation networks and the identification of bibliographic clusters, which help to understand how theories and concepts have spread and been adopted by the academic community. This provides an intellectual map of the field, highlighting the theoretical influences and relationships between different sources of knowledge.

In light of the analysis of conceptual, social and intellectual structures, the paper not only provides a detailed picture of the current state of the field, but also goes further by suggesting future directions for further investigation and development. This perspective is crucial in guiding future research into less explored or emerging areas, thus offering new opportunities for investigation and intervention. The proposed future directions are based on emerging trends observed in thematic maps and content developments.

3. Results

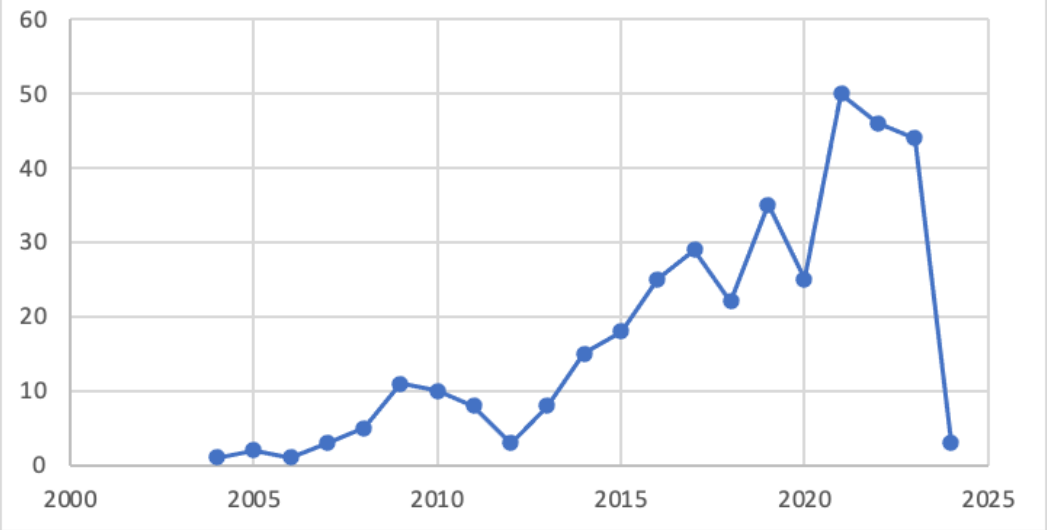
3.1 Performance Analysis

In order to inquire into RQ1, a series of indicators were used, such as: i) the prolificacy of authors (Tab. 1) and of scientific journals (Tab. 2) in the field; ii) the relevance of articles through the number of citations (Tab. 3), which reflects the incidence and significance within the scientific community; and iii) an overview of key articles that outline both traditional and the most recent conceptualisation of third mission.

The analysis shows (Fig. 2) a relatively low initial phase of activity in the publication of articles on the third mission from the year 2004 to 2012. This period of low activity is probably influenced by factors such as a lower political emphasis in terms of evaluation on third mission activity or simply

a lower priority assigned to this mission compared to the other two (research and teaching). From 2012 onwards, there is an exponential increase in the production of articles, peaking in 2021. This upward trend shows a renewed interest in and recognition of the importance of the third mission in universities and academic research.

Fig. 2: Number of articles



Source: our elaboration

The most prolific authors in our study sample, based on the total number of published articles and having set the minimum inclusion limit at 4, are listed in Tab. 1.

Tab. 1: Most prolific authors

Authors	**Articles**
Secundo G	7
Nelles J	5
Pinheiro R	5
Vorley T	5
Benneworth P	4
Cavicchi A	4
De La Torre Em	4
Dumay J	4
Edvardsson Ir	4
Fitjar Rd	4
Göransson B	4
Kitagawa F	4
Rinaldi C	4
Rossi F	4
Sánchez-Barrioluengo M	4

Source: our elaboration

Tab. 1 shows that Secundo G., from the University of Salento (Italy), appears to be the most prolific and among the most cited (see Tab. 3). The analysis of the journals (see Tab. 2) revealed that, with regard to the fields to which the articles analysed belong, 40% of the sample falls into the Business, Management and Accounting subject area. 30% of the articles belong to the social sciences, while the remaining 30% are distributed over other areas.

Tab. 2: Most prolific journals with subject area

Sources	Subject area	Articles
Science And Public Policy	Environmental Science (Management, Monitoring, Policy and Law) Social Sciences (Geography, Planning and Development Public Administration)	28
Industry And Higher Education	Business, Management and Accounting (Business and International Management) Social Sciences (Education)	22
Journal Of Technology Transfer	Business, Management and Accounting (Accounting, Business and International Management) Engineering (Engineering (miscellaneous)	20
Technological Forecasting And Social Change	Business, Management and Accounting (Business and International Management, Management of Technology and Innovation); Psychology (Applied Psychology)	14
Sustainability (Switzerland)	Computer Science (Computer Networks and Communications Hardware and Architecture) Energy (Energy Engineering and Power Technology Renewable Energy, Sustainability and the Environment) Environmental Science (Environmental Science (miscellaneous) Management, Monitoring, Policy and Law) Social Sciences (Geography, Planning and Development)	13
European Journal Of Higher Education	Social Sciences (Education)	10
Studies In Higher Education	Social Sciences (Education)	10
Higher Education Policy	Social Sciences (Education Sociology and Political Science)	8
Tertiary Education And Management	Business, Management and Accounting (Organizational Behavior and Human Resource Management) Social Sciences (Education)	8
Journal Of Intellectual Capital	Business, Management and Accounting (Business, Management and Accounting (miscellaneous) Social Sciences (Education)	7
Scientometrics	Computer Science (Computer Science Applications) Social Sciences (Library and Information Sciences Social Sciences (miscellaneous)	7
Research Evaluation	Social Sciences (Education Library and Information Sciences)	6
Higher Education	Social Sciences (Education Law)	5
Higher Education Quarterly	Social Sciences (Education)	4
International Journal Of Sustainability In Higher Education	Social Sciences (Education Human Factors and Ergonomics)	4
Journal Of The Knowledge Economy	Economics, Econometrics and Finance (Economics and Econometrics)	4
Management Decision	Business, Management and Accounting (Business, Management and Accounting (miscellaneous) Decision Sciences (Management Science and Operations Research)	4
Technovation	Business, Management and Accounting (Management of Technology and Innovation) Engineering (Engineering (miscellaneous)	4

Source: our elaboration

The selection of 10 most cited papers in this field (Tab. 3) represents not only an indicator of the academic relevance and impact these papers exert in the field, but also serves as a viewpoint on the different dimensions and approaches that characterise the concept of third mission in higher education.

Tab. 3: Most influential articles in the sample

Author(s)	Title	Journal	Year	Total Citations	Normalised Total Citations
Jongbloed *et al.*	Higher education and its communities: Interconnections, interdependencies and a research agenda	Higher education	2008	534	3,64
Laredo	Revisiting the third mission of Universities: Toward a Renewed Categorization of University Activities?	Higher education policy	2007	363	2,79
Philpott *et al.*	The entrepreneurial university: Examining the underlying academic tensions	Technovation	2011	330	6,13
Trencher *et al.*	Beyond the third mission: Exploring the emerging university function of co-creation for sustainability	Science and Public Policy	2014	311	5,55
Leal Filho *et al.*	Sustainable Development Goals and sustainability teaching at universities: Falling behind or getting ahead of the pack?	Journal of Cleaner Production	2019	296	9,23
Compagnucci and Spigarelli	The third mission of the university: A systematic literature review on potentials and constraints	Technological Forecasting and Social Change	2020	185	8,56
Sam and Van Der Sijde	Understanding the concept of the entrepreneurial university from the perspective of higher education models	High education	2014	176	3,14
Huyghe and Knockaert	The influence of organisational culture and climate on entrepreneurial intentions among research scientists	The journal of technology transfer	2015	133	4,60
Secundo *et al.*	An Intellectual Capital framework to measure universities' third mission activities	Technological Forecasting and Social Change	2017	132	4,22
Brown	Mission impossible? Entrepreneurial universities and peripheral regional innovation systems	Industry and innovation	2016	112	2,98

Source: our elaboration

Since the beginning of the new millennium, the literature on the third mission of universities has charted a course of increasing understanding and appreciation of this key aspect of the academic institution. Beginning with the pioneering studies of Vakkuri (2004), which highlighted the expansion of traditional tasks towards innovation and socio-economic development, there has been a deepening phase, where the need to effectively integrate this mission with teaching and research is emphasised (Jongbloed *et al.*, 2008). In parallel, the exploration of the third mission of universities highlights its essential role in the university environment and its evolution in response to the challenges posed by the other missions. This approach suggests a transition from the traditional three university missions (teaching, research, and third mission) to three main functions: mass tertiary education, specialised and professional higher education, and academic research and training. This evolution emphasises

the distinction of each institution through a unique mix of functions, shaped as much by historical factors as by active strategic choices. This new perspective aims at a more accurate definition of university activities, responding better to the changing needs of society and the labour market, and emphasises the importance of universities' adaptability and specialisation to meet current and future challenges (Laredo, 2007).

Philpott *et al.* (2011) identified commercialisation as a crucial aspect of the university's evolution towards an entrepreneurial model. They outlined how commercialisation activities and academic entrepreneurship have become central to the university's mission in the global context. This path has subsequently found a new direction. The authors discuss the concept of the 'entrepreneurial university', an institution that aims to contribute to regional/national development through entrepreneurial initiatives. These initiatives include creating technology parks and corporate spin-offs, patenting and licensing, contract research, and industrial training. These activities are described as existing on a spectrum of 'soft and hard initiatives', where 'hard' activities such as patenting, licensing and spin-off formation are seen as tangible outputs of mature entrepreneurial universities, while 'soft' initiatives, such as academic publication and contract research, are better aligned with traditional academic culture.

In the context of a constant evolution towards an increasingly entrepreneurial university model, the work of Trencher *et al.* (2014) emerges, which points to a paradigm shift in the role of universities: from institutions focused on technology transfer and contribution to economic development, to active players in the co-creation of solutions for sustainability.

In contrast to the previous unidirectional mission of technology transfer, co-creation is a collaborative process involving different stakeholders, including academia, industry, government and civil society, to jointly develop strategies, technologies, policies and practices to solve environmental, social and economic problems in a sustainable manner. This approach recognises that sustainability challenges are complex and interconnected, and that effective solutions require the sharing of knowledge, expertise and resources across different sectors and disciplines. Co-creation is distinguished by its engagement in an open and inclusive dialogue, where scientific and technological knowledge meets local knowledge and lived experience, creating fertile ground for sustainable innovation. This process is guided by principles of fairness, transparency, and respect for diversity of opinion and expertise, recognising that each participant brings added value to the co-creation table.

However, some authors, including Brown (2016), have questioned the capacity of universities to meet political expectations. They argue that the approach may not be universal and that in peripheral regional contexts, the effectiveness of this mission may be less evident. Brown argues that expectations of universities as key players in commercialising research and supporting local economic growth are exaggerated. The author's analysis centres on the regional innovation system in Scotland. It highlights that despite significant investment in innovation support programmes, the results have been disappointing, particularly in the growth of university spin-off companies. The author also criticises the persistence of policies that overestimate the role of universities, failing to consider the needs and capabilities of local SMEs. The work by Compagnucci and Spigarelli (2020) analysis highlights a criticism of current policies that overestimate the role of universities, neglecting the needs and intrinsic capacities of local small and medium-sized enterprises (SMEs). This dynamic can result in 'institutional capture', where universities dominate the political agenda, hindering the pursuit of a truly inclusive and diverse approach to innovation. Institutional capture reveals a significant gap between the ideal of open and participatory innovation and the operational reality, where universities monopolise innovation discussions and policies, to the detriment of SMEs.

This situation raises fundamental questions about the effectiveness of implementing the third mission of universities, which aims to extend their social and innovative impact beyond the boundaries of traditional education and research. The challenges of harmonising the interests and capabilities of a wide range of actors, including universities and SMEs, highlight the contrast between the ideal vision of a collaborative innovation system and its practicability in diverse contexts. However, achieving this ideal is difficult in practice. The Triple Helix approach advocates for universities to move towards an entrepreneurial and commercial dimension while also serving

political and governmental interests. However, there is a growing movement advocating for universities to shift their focus towards serving the public good, particularly through transdisciplinary sustainability research. It is argued that the commercialisation of scientific knowledge, which is often associated with the third mission of universities, conflicts with the principles of science and interdisciplinarity that are necessary for achieving a sustainable transition (Scholz, 2020).

In recent years, there has been an increased emphasis on promoting entrepreneurship and creating incubators. For example, Mele *et al.* (2024) analysed the strategies and mechanisms adopted by universities to support student entrepreneurship, with a focus on the role of University Business Idea Incubators as part of their 'third mission'. This shift towards entrepreneurship marks a turning point in the social and economic function of universities. This orientation not only expands the traditional academic mandate of teaching and research, but also actively integrates the concept of entrepreneurship as a fundamental pillar for both personal and collective development. Initiatives that act as pre-incubators or pre-accelerators are crucial in this process. They offer university students from diverse cultural backgrounds the opportunity to interact in an environment that fosters the confidence and creativity necessary for the maturation of their business ideas.

This approach represents the third mission as it moves away from purely theoretical learning towards a more dynamic and applied model. The development of intellectual capital and entrepreneurial skills takes centre stage. The objective of this task is twofold. Firstly, it aims to encourage the generation of new, concrete ideas that can be transformed into successful entrepreneurial initiatives. Secondly, it aims to provide students with innovative learning methods that expose them to real challenges, thereby preparing them to become future leaders in the world of work and innovation.

In this context, universities no longer limit their mission to passive knowledge transfer. Instead, they become active players in promoting entrepreneurship as a tool for individual empowerment and socio-economic development. Universities directly contribute to the entrepreneurial ecosystem through these initiatives, supporting the creation of new businesses and stimulating economic growth. At the same time, they strengthen the link between higher education and the world of work, ensuring that students acquire not only theoretical but also practical skills that are essential for successfully navigating contemporary society.

The progression of these studies reflects not only an evolution in academic thinking but also the transformation of the role of universities in contemporary society, marking a transition towards a more dynamic and interactive model of higher education.

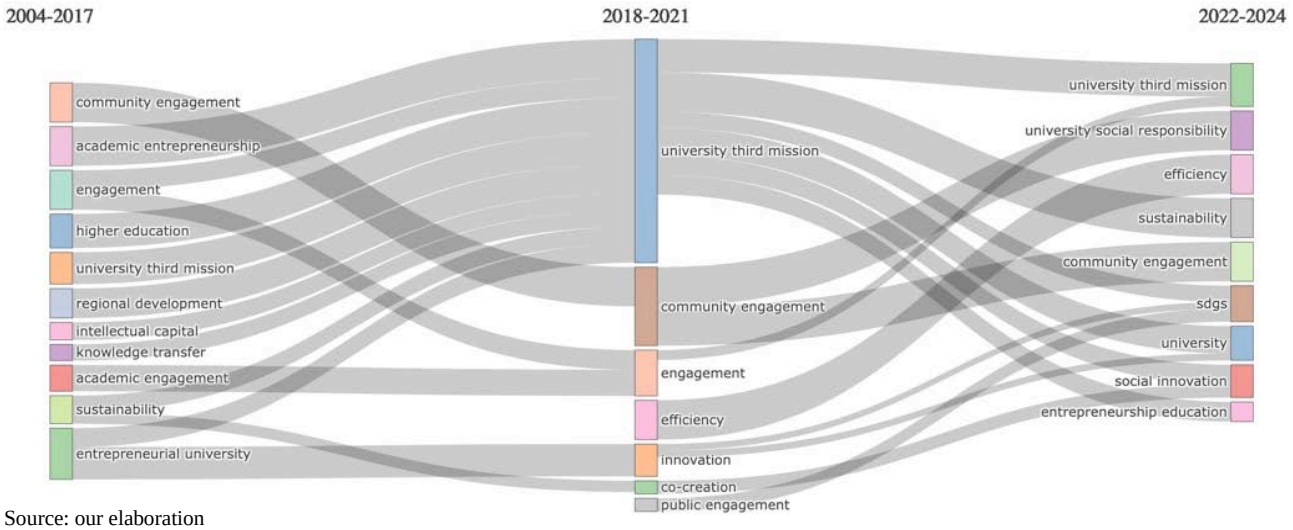
3.2 Conceptual Structure

To answer RQ2 we preliminary analysed the conceptual structure of our sample of papers. A thematic evolution of the topic is depicted in Fig. 4, considering two cut-off points in 2017 and 2021. It is interesting to note from the figure how the great thematic variability characterising the first period (2004-2017) converges in the middle period (2018-2021) into a few themes that become numerically significant. In fact, there is a conceptual centralisation on the theme of the 'university third mission', which simplifies the scenario of the conceptual structure of the academic literature in that period. Finally, it is significant to note that the 26% of more recent papers published in the last period (2022-2024) have made a substantial turnaround, pushing in the direction of a renewed complexity of the concept of the third mission, from which new themes, such as 'SDGs' and 'social innovation' are now blossoming.

Fig. 5 shows the thematic maps for each sub-period taken into consideration. Thematic maps are useful representations of the evolution of a topic and its subtopics in four quadrants, based on their centrality and density. The concept of centrality quantifies the degree of inter-cluster interactions, signifying the extent to which a particular topic is interconnected with other topics, thereby asserting its importance within a specific domain. Conversely, density quantifies the level of intra-cluster

cohesion, indicating the degree to which the keywords within a specific cluster are interconnected, thereby forming a coherent theme. In this context, the upper right quadrant encompasses themes that exhibit both high centrality and density, indicating themes that are not only influential within the research field but also well-established. The lower right quadrant displays themes that are cross-disciplinary, possessing the ability to influence other themes (i.e., they exhibit high centrality) but are internally underdeveloped (i.e., they exhibit low density). The lower left quadrant underscores themes that are either nascent or fading, as they exhibit both low centrality and density. In contrast, the upper left quadrant comprises niche topics among scholars that are internally well-developed (high density) but lack the ability to influence other topics (low centrality).

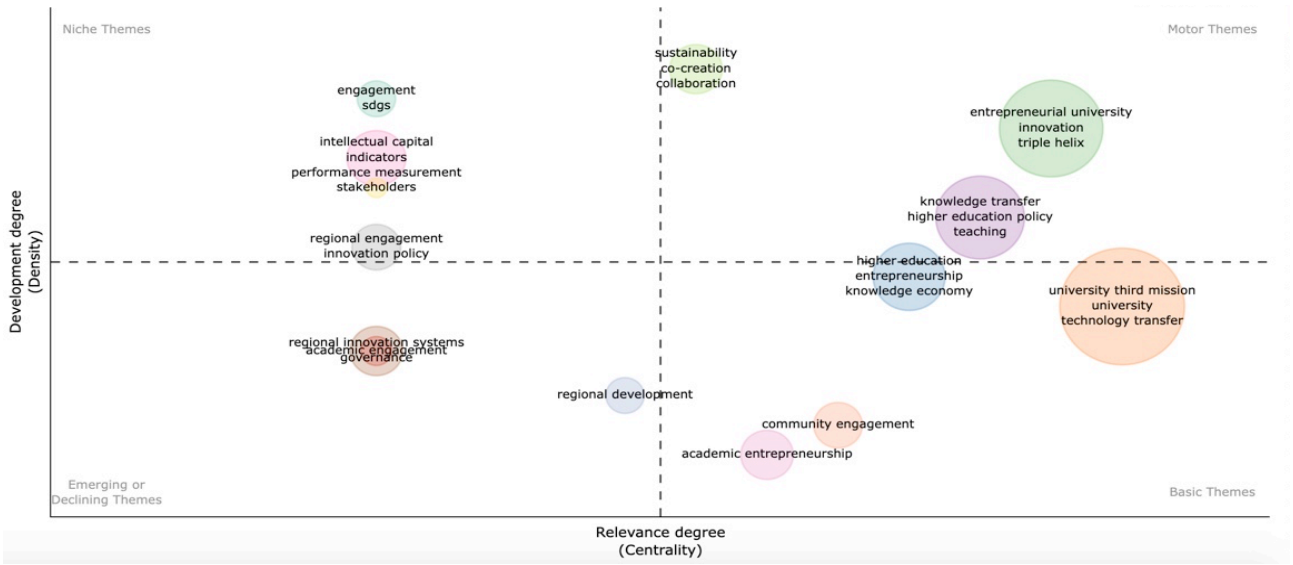
Fig. 4: Thematic evolution



Source: our elaboration

Fig. 5: Thematic maps in three sub-periods

2004-2017

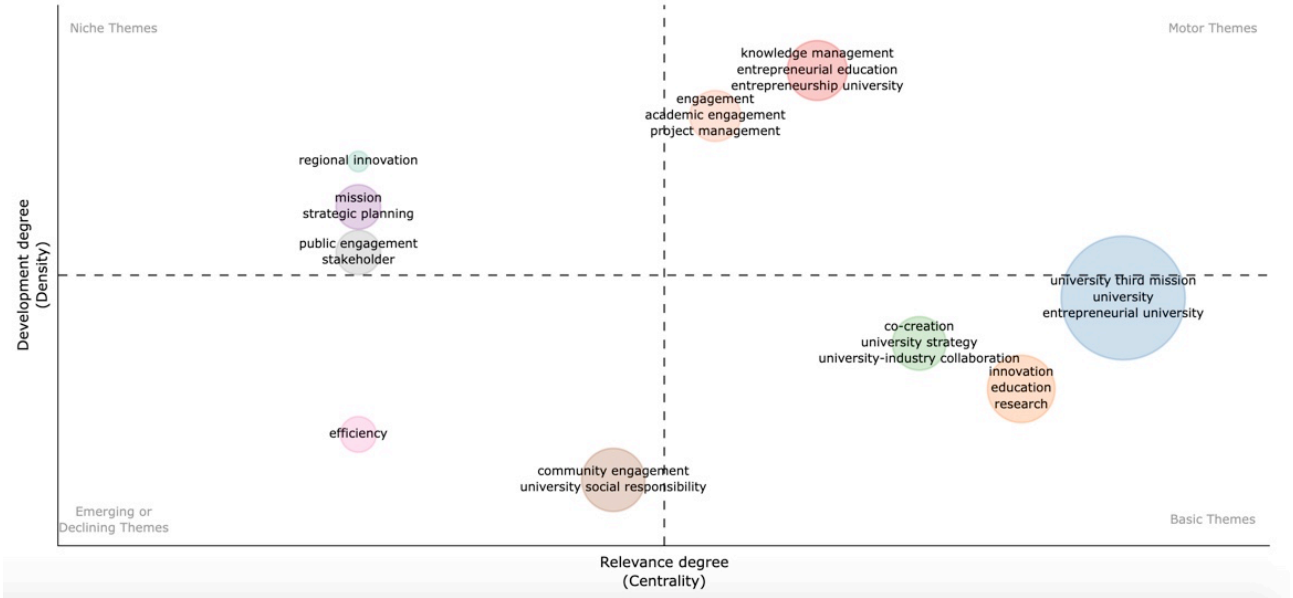


The thematic map for the sub-period 2004-2017 illustrates the increasing relevance of certain themes in the university's third mission scientific literature. The themes of 'entrepreneurial university', 'innovation' and 'triple helix' are located in the top right quadrant, indicating their centrality, development, and influence in research. In contrast, the terms 'university third mission', 'technology transfer', 'community involvement', and 'academic entrepreneurship' are located in the bottom right quadrant, indicating that they are influential themes but require further internal

development. Additionally, themes like ‘regional innovation systems’, ‘academic engagement’, and ‘governance’ are situated in the bottom left quadrant, suggesting that these themes may be emerging or declining in terms of development and centrality. Furthermore, in the first period, performance-related themes, such as ‘performance measurement’ and ‘indicators’, are considered niche topics, which are well developed internally, but have not achieved a sufficient degree of diffusion in the literature to allow them to influence other topics.

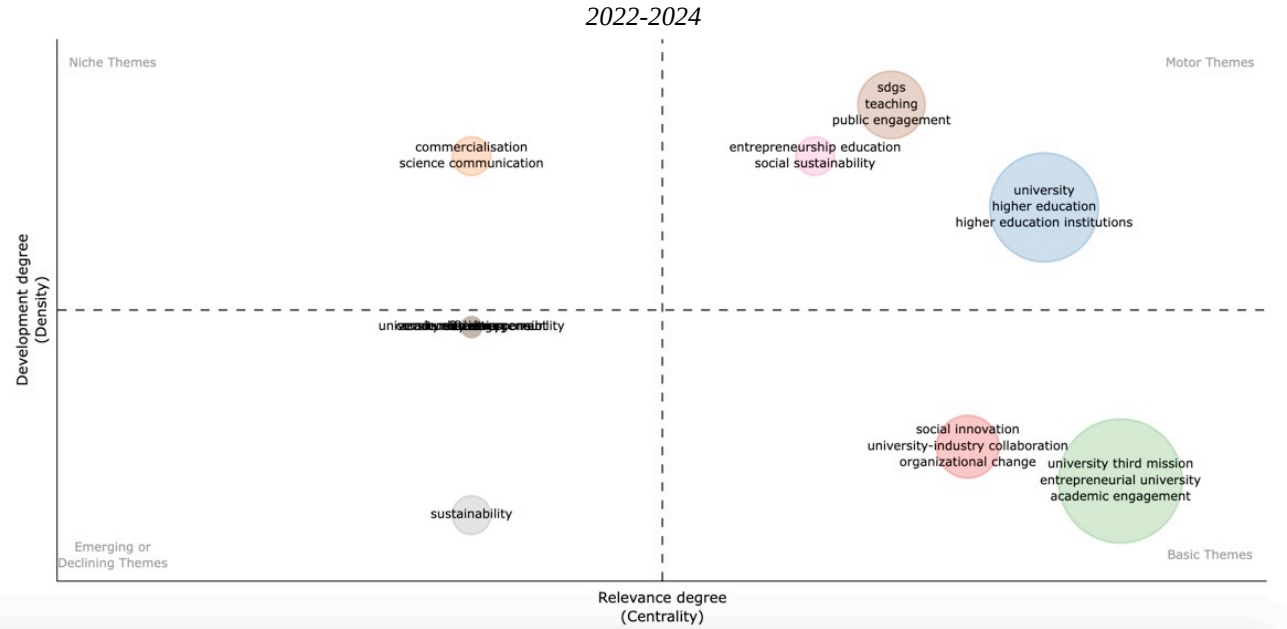
The centrality of themes such as ‘entrepreneurial university’ and ‘innovation’ confirms a different role of universities in the socio-economic scenario of a territory. Through the promotion of entrepreneurship and the encouragement of innovation, universities take an active role in contributing to the economic dynamic of the territory, facilitating the creation of start-ups, technology transfer, and the training of advanced skills. In this way, they contribute directly to the competitiveness and sustainability of local economies, demonstrating their value and importance far beyond the traditional academic sphere. At the same time, niche themes such as engagement towards the SDGs indicate a growing recognition of the importance of universities’ contribution to global sustainability goals (Paletta and Bonoli, 2019). Finally, the thematic map highlights an interesting dynamic in the quadrant of emerging or declining themes: in particular, the theme of ‘governance’, while emerging, does not reach the degree of maturity necessary for its evolution into a niche or motor theme in later periods. In fact, it is a theme that although it has also been presided over also in later periods (Giusepponi and Tavoletti, 2018; Sziegat, 2022; Dévora Quintero and León-Serrano, 2023) has been overpowered in numerical terms by more mainstream and centralising themes, such as ‘university third mission’. However, this is a relevant topic that deserves more space in future research efforts on the third mission. A different fate is that of the topics related to regional innovation, which positioned itself among the emerging topics in the early period and then actually managed to find a niche of interest in the later period. This reflects a growing interest in the interaction between universities and the local context, underlining the importance of adapting innovation strategies to territorial specificities.

2018-2021



The thematic map for the sub-period 2018-2021 shows that the third mission theme has consolidated its position in the basic quadrant, indicating its maturity and centrality in the research field. Its position suggests that activities related to this theme are recognised as vital to the identity and strategy of universities, which now see innovation, education and research as an integral part of their contribution to society. Other themes, such as ‘co-creation’, ‘university strategy’, and ‘university-industry collaboration’, demonstrate solid development and significant relevance.

However, ‘efficiency’ is positioned as an emerging theme, suggesting a need for further development. Several authors have discussed the efficiency of university spin-offs, highlighting how knowledge transfer increases their productivity and competitiveness (Stefanelli *et al.*, 2020; Loganathan *et al.*, 2022). Furthermore, the efficiency of universities is explored, showing that the efficient use of financial and human resources contributes positively to the outputs of teaching, research, and third mission activities (Letti *et al.*, 2022). However, as can be seen in the thematic map for the next sub-period, this theme does not really emerge, since as happened with the theme of ‘governance’, it is numerically outweighed by other more centralising themes of academic contributions. At the same time, the positioning of ‘regional innovation’, ‘mission’, ‘strategic planning’ and ‘public engagement’ in niche themes indicates a moderate interest in customising third mission activities to suit specific local contexts and to integrate universities into the fabric of regional planning and development. The rise of topics such as ‘knowledge management’, ‘entrepreneurial education’ and ‘entrepreneurship university’ in the motor themes suggests a strengthening of the link between academic innovation and the business world. Universities seem to have more fully embraced their role as incubators of practical knowledge and entrepreneurial skills, which are essential for a knowledge-based economy. Compared to the previous time interval, this phase shows a mature adoption and enhancement of the third mission as an inseparable part of the overall mission of universities.



Source: our elaboration

For the sub-period 2022-2024, the thematic map indicates a focus on ‘social innovation’ and ‘university-industry collaboration’, ‘organisational change’, ‘university third mission’, ‘entrepreneurial university’, and ‘academic engagement’ as basic but well-established themes in the research field, exhibiting high centrality. This suggests that these themes are considered foundational and have developed strong external influence on the literature. The third mission is now widely recognised as an essential element of university identity and operations, emphasising the importance of organisational adaptation and collaboration between different sectors to address complex social problems. The motor themes are ‘university’, ‘higher education’, and ‘higher education institutions’, indicating that the essence of the university institution has become a focal point of discussions and initiatives. On the other hand, ‘commercialisation’ and ‘science communication’ appear as niche themes, suggesting that while they are well-developed within their own domains, they may not have widespread influence across the broader field of university third mission. They represent areas of innovation and specialisation that could be the focus of new strategies to promote knowledge transfer and engage the wider public. The authors suggest that although these areas are still in the early stages

of development, they could provide significant opportunities for universities looking to differentiate themselves and make a social impact through new channels. The theme of 'sustainability' appears declining, hinting at its evolving significance in current academic discourse. While the concept remains a global imperative, universities are in a period of transition as to how best to integrate sustainability into their third mission activities, and that sustainability has become such a complex concept that it is being incorporated into other sub-themes (e.g. 'sdgs' and 'social sustainability'), rather than remaining a separate theme. This phase represents a period of deep introspection and strategic realignment for universities, where education and training are viewed as tools to tackle global challenges. This implies a period of consolidation and deepening of the third mission, with universities grappling with their identity and role in a rapidly evolving society. Higher education institutions are expected to renew and strengthen their commitment to social innovation and cross-sectoral collaboration as an integral part of their mission to serve and transform society.

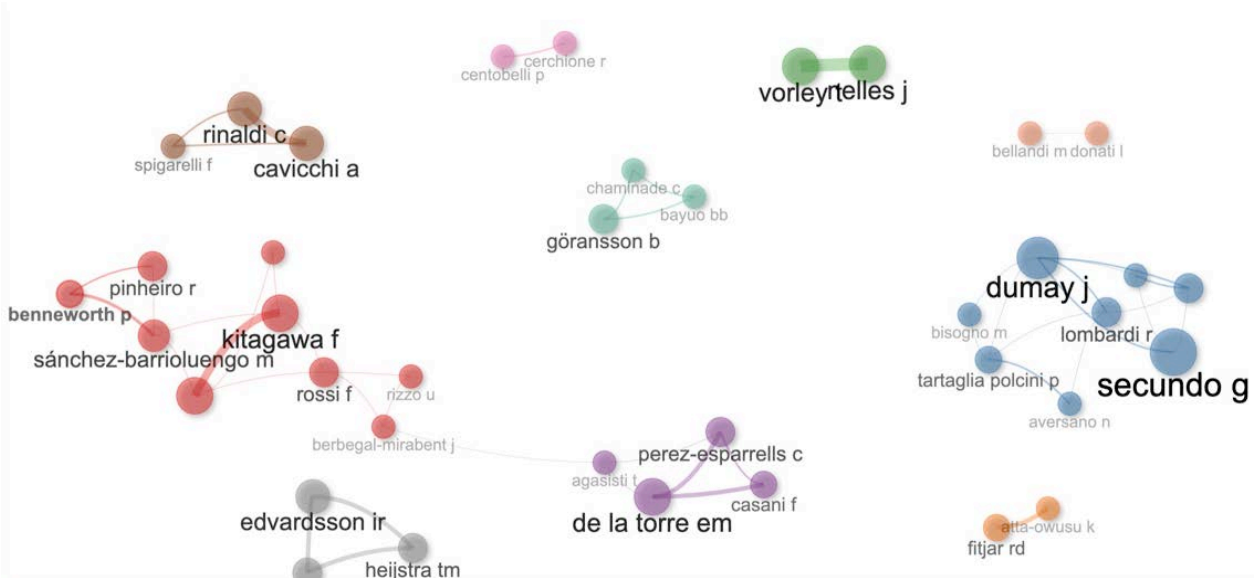
3.3 Social Structure

Fig. 6 shows the social structure of collaboration between authors in bibliometric research. Ten collaboration clusters are observed, each with various dimensions, indicating groups of authors who worked together frequently.

Some nodes, represented by author names, such as Secundo, Vorley, and Dumay, are larger, indicating greater prolificacy or centrality in these collaborations.

The network appears dispersed in various clusters connected mainly by single nodes, suggesting the presence of sub-networks or research communities within the broader field studied that do not collaborate with each other. With the exception of a faint connection between red and purple clusters, through Berbegal-Mirabent and Agasisti, who carried out a cross-country analysis on the efficiency of higher education institutions' in allocating internal resources, also with reference to third mission activities (Agasisti and Berbegal-Mirabent, 2021). Following this example, more collaboration among authors is desirable so that the literature on the third mission is enriched in terms of multi-country and multi-university analyses.

Fig. 6: Co-authorship network



Source: our elaboration

Fig. 7 representing the 'Countries' Collaboration World Map' shows a network of collaboration between countries. We can see that there are some countries that have a denser network of connections, indicating strong collaboration. These central hubs of research activity are the countries

with the largest contributions or centrality in the international scientific community e.g. Italy and the United Kingdom.

The lines connecting countries vary in thickness, suggesting that the volume of collaboration between nations differs significantly. Some connections are very thick, indicating a large number of joint collaborations, e.g. Canada, the UK, Spain, Italy and Australia are connected both directly and indirectly by collaborative relationships. While others are more subtle, suggesting less intense collaborative relationships: e.g. Brazil, China, India and South Africa show weak international collaborative ties.

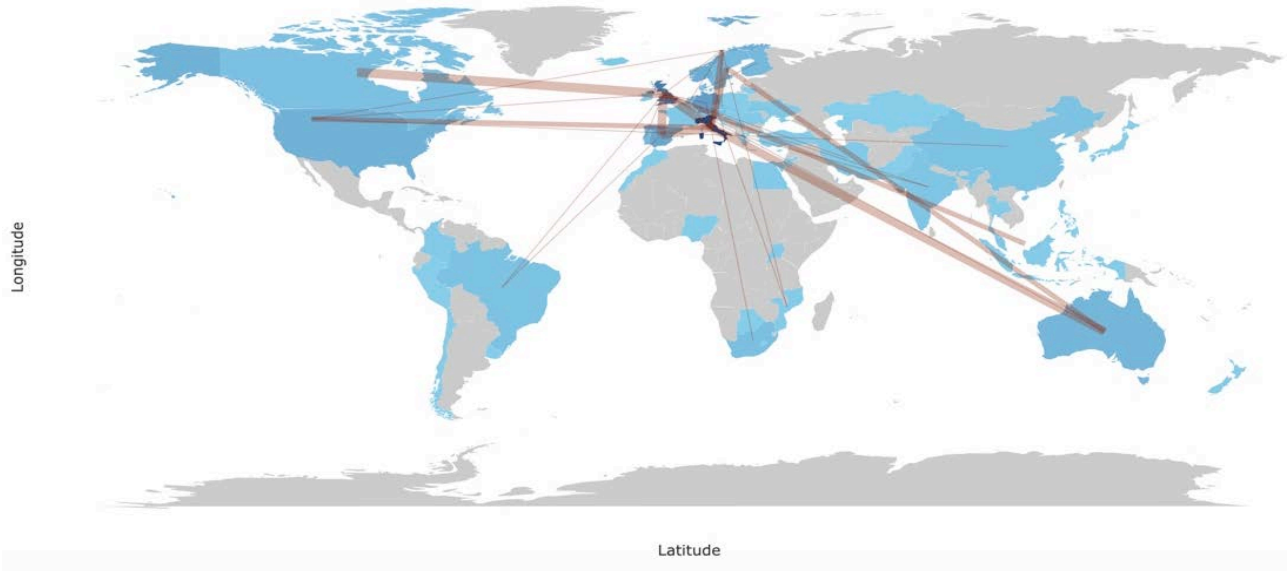
Then there are countries that show no international collaboration links at all, such as Peru, Colombia, Kazakhstan, Japan and New Zealand.

The distribution of academic collaboration is influenced by well-known socio-economic, political and historical factors. For instance, regions with denser networks of collaboration, such as Europe and North America, often benefit from well-funded education and research systems and policies favourable to international collaboration. Such factors position them at the centre of the global scientific community, allowing them to actively explore and promote the third mission of universities.

In contrast, other less connected regions (e.g. Peru and Colombia) face challenges such as limited research funding, inadequate infrastructure and political instability. These factors may reduce the ability or willingness of these regions to engage in the university third mission, which is essential to address complex societal problems through innovation and knowledge transfer (Ubfal and Maffioli, 2011). Surprisingly, the analysis of the map shows that countries, such as Russia, with a strong commitment and interest in entrepreneurship education (Shirokova *et al.*, 2017, 2022) not only show a total absence of collaboration at the international level, but also seem disinterested in the topic itself.

At the institutional level, this implies the need to develop targeted strategies to promote equity in global research and development collaborations, recognising and supporting the potential of all regions to contribute to and benefit from the university third mission.

Fig. 7: Countries collaboration map



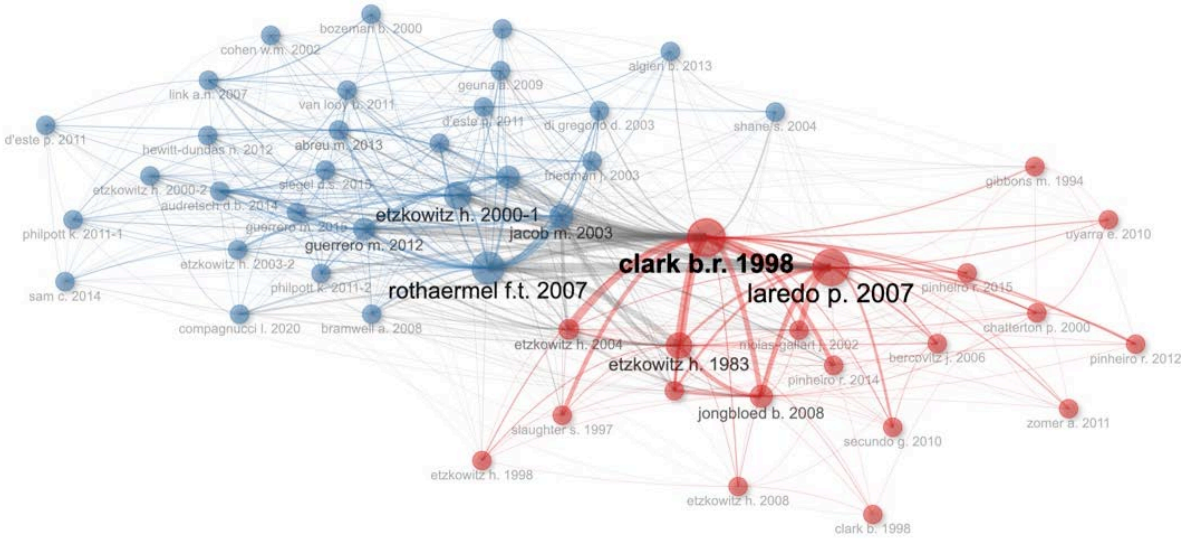
Source: our elaboration

3.4 Intellectual Structure

Figure 8 shows a co-citation network, which visually represents the relationships between academic papers based on how often they have been cited together in other research papers. This type of analysis is commonly used in bibliometrics to analyse and visualise the intellectual structure of a field of study.

Each node in the graph represents an article, and the arcs connecting the nodes indicate that two papers have been cited together. The size and colour of the nodes indicate the centrality and importance of the articles within the network. Darker or larger nodes represent papers that are more frequently cited or considered more influential in the field of study.

Fig. 8: Co-citation network



Source: our elaboration

The network is divided into two sets of nodes, one coloured blue and the other red, representing two distinct clusters of research subfields.

The red cluster is denser and the nodes have thicker connections, suggesting that these works are central to the third mission literature and represent the most influential works. It could be argued that such a node represents a well-defined school of thought.

Among these, some nodes (Etzkowitz, 1983; Clark, 1998) appear to be prominent and of particular importance. In fact, these are seminal contributions on the entrepreneurial university, which seem to have inspired the subsequent debate on the third mission carried out by the authors of the 364 papers that populate our sample. Etzkowitz (1983) examines the role of American scientists and universities in adopting an entrepreneurial approach to academic science, highlighting how innovation and entrepreneurship had already become an integral part of the academic fabric by 1983. Clark (1998), on the other hand, outlines the process by which universities can transform themselves into entrepreneurial institutions, highlighting five key elements for the success of this transformation, including an entrepreneurial culture and a strengthened management core. The work by Laredo (2007), on the other hand, although it comes from a more recent period, when the concept of the third mission of universities was already present in the academic literature, can still be considered a pioneering contribution, since a literature review on the third mission carried out in 2007 would have yielded only 7 results. The author examines how higher education institutions are expanding their roles beyond teaching and research to include active involvement in social, economic and cultural issues of society.

In other words, the majority of contributions in the red cluster can be attributed to the role of ‘fathers’, who provided the initial impetus for the subsequent development of the debate on the third mission.

The blue cluster, on the other hand, contains, on average, more recent contributions which, while insisting on the same themes as those in the red cluster, take on the role of ‘sons’, enriching and complexifying the scientific debate in a progression from the general to the particular. In fact, these works (Etzkowitz and Leydesdorff, 2000; Jacob *et al.*, 2003; Rothaermel *et al.*, 2007) offer more

verticalised perspectives that have stimulated the current development of the literature on the third mission. In particular, Etzkowitz and Leydesdorff (2000) discuss the dynamics of university innovation and entrepreneurship through the theoretical lens of the triple helix model of university-industry-government relations, emphasising how these interactions can foster innovation and economic development. Jacob *et al.* (2003), on the other hand, analyse a case study in the Swedish context and argue that both macro (policy vision) and micro (university organisation) level interventions are needed to transform the university environment. Rothaermel *et al.* (2007), finally, based on more than 25 years of accumulated scientific knowledge on the entrepreneurial university, offer one of the first taxonomies of the literature that insists on the field.

Finally, we can imagine the contributions in the co-citation network in Figure 8 as the 'common ancestors' of the papers that populate our sample and that have inspired and continue to animate the current academic debate on the third mission of universities.

4. Discussion and conclusion

This bibliometric analysis of the third mission of the university has revealed a significant change in the role of academic institutions in society. The results of the analysis show that the literature on this topic has undergone a remarkable evolution (RQ1), moving from an initial phase focused on collaboration with industry and society (Vakkuri, 2004; Laredo, 2007; Jongbloed *et al.*, 2008) to a more mature one focused on innovation, entrepreneurship and sustainability (Brown, 2017; Scholz, 2020; Mele *et al.*, 2024).

To answer the second research question (RQ2), the results were analysed from a conceptual, social and intellectual perspective. The detailed examination of the conceptual structure revealed a dynamism of themes over the years analysed. In particular, some themes remained basic (e.g. 'third mission of universities'), while others underwent profound changes (e.g. 'regional innovation systems'). For example, the topic of SDGs went from a niche to a driving force, highlighting the topicality of the issue even in university contexts. More specifically, while the issue of sustainability has always had a prominent place in academic debates, this change in topics shows how the emphasis has shifted to more specific and complex issues, such as social sustainability and the Sustainable Development Goals (SDGs).

From a social structure point of view, we observed an unexpected phenomenon: nations such as Russia, despite having extensively explored concepts such as the entrepreneurial university in the literature, are characterised by a marked lack of international collaboration with authors from other countries on the topic of the third mission. Even more surprising is the observation that some countries seem to show no interest in considering the third mission as a priority research topic. This situation raises important considerations in terms of scientific integration and knowledge exchange at a global level. The lack of collaboration and interest limits the possibilities of sharing best practices, innovative solutions and multidisciplinary approaches that could enrich the knowledge of the third mission of universities and make it more effective in responding to current challenges. Moreover, this trend may indicate a more isolationist outlook or a different set of national priorities that do not align these countries with global trends in higher education and social innovation.

The analysis of the intellectual structure shows that the most influential works focus on the concept of the entrepreneurial university. In particular, the older publications (Etzkowitz, 1983) laid the foundations for the development of the literature on this topic and had a significant impact on subsequent studies dedicated to the third mission. Furthermore, it is observed that the intellectual structure has evolved as the relatively more recent works (Etzkowitz and Leydesdorff, 2000) have further enriched the current knowledge and debate on the third mission. This analysis implies that the concept of the entrepreneurial university and the third mission are deeply intertwined, with a constant flow of ideas and theoretical approaches influencing each other over time. The ability of more recent contributions to build on and enrich earlier ones is indicative of a mature field of study, where each new discovery contributes to the construction of a complex and multifaceted picture.

In order to answer our third and final research question, and to extend the results obtained so far, our work identifies some epistemological trajectories that we believe may influence the future debate on the third mission theme.

At a conceptual level, the work has first of all highlighted a number of topics that have become more or less central to the debate over the years. In the future, we believe that topics such as governance (understood in organisational terms), the contribution to social welfare and the efficiency of third mission activities may be important areas to which more attention needs to be paid. For example, with regard to the governance of the third mission (Bellandi *et al.*, 2021), it appears to be of considerable importance, as 'good governance' in terms of administrative and organisational apparatus is fundamental to harmonising academic objectives with the needs of society and the market. The adoption of innovative organisational models and management strategies oriented towards the third mission could facilitate the integration of these activities into the strategic core of universities, promoting a cultural imprint of innovation and sustainable social engagement. Only recently have universities equipped themselves with ad hoc organisational structures whose task is to facilitate and promote third mission activities. However, these organisational requirements require careful analysis, both in terms of organisational/structural aspects and in terms of the management of the economic and financial resources available to universities. If the third mission is indeed to be oriented towards greater involvement of third parties (stakeholders), it would also be useful to imagine management (or audit) bodies within which the presence of such external actors is guaranteed. More academic research from this point of view could further facilitate the knowledge of management practices in universities, both nationally and internationally. Another topic of particular interest is that of the SDGs and ESG criteria, which are strongly linked to the governance of third mission activities, as these activities should condition administrative action according to sustainability principles. For example, in the context of research, the adoption of ESG criteria can guide the development of projects that not only pursue scientific excellence, but are also environmentally sustainable, ethically sound and socially inclusive. The link between the SDGs, ESGs and the governance of third mission activities is manifested through the integration of sustainability principles into institutional strategies, thus influencing the planning, implementation and evaluation of these initiatives. In terms of evaluation, this study should encourage decision-makers to adapt the evaluation schemes of third mission projects to reflect and monitor their actual sustainability inclination. Institutional decision-makers should also implement differentiated reward systems that act as incentives for Third Mission projects that achieve a significant impact in terms of environmental, social and governance sustainability.

In addition, social well-being, understood as a concept encompassing the quality of life and the satisfaction of basic human needs in the university environment (Cicognani *et al.*, 2008), should become more central to the study of the third mission. Indeed, the third mission is a powerful vehicle for social change, capable of generating benefits both internally and externally to the academic institution. Internally, key actors such as professors and researchers are in a unique position to promote a culture of well-being, using their educational and training role to instil values of social responsibility and sustainability. This involves not only encouraging active participation in research projects and initiatives aimed at social improvement, but also creating a working environment that supports personal and professional development, interdisciplinary collaboration and respect for diversity and inclusion. Externally, universities' commitment to the third mission enables them to extend their social impact far beyond academic boundaries, directly touching the lives of local and global communities. The resulting initiatives, such as educational programmes in prisons or development projects in disadvantaged areas, demonstrate how universities can be key players in promoting equity, justice and improved living conditions. These efforts contribute not only to tangible economic impacts, but also to profound social benefits, strengthening the link between the academic institution and society. Therefore, placing social well-being at the heart of third mission studies underlines the importance of a comprehensive view of higher education, which sees universities not only as centres of academic excellence, but also as pillars of society, actively engaged in building a

more just and sustainable future. This perspective requires a concrete commitment to recognising and enhancing the transformative potential of higher education by promoting greater integration between research, teaching and social engagement.

Finally, with regard to the concept of efficiency, it is also crucial to reconsider this aspect not only as a prudent use of financial resources, but also as an optimisation of the impact of third mission activities. Future research should aim to identify how universities can increase the efficiency of their third mission initiatives, ensuring that each resource is used to maximise the social, economic and environmental value generated, with a view to long-term sustainability.

At the level of the social structure, the cultural contamination resulting from the collaboration between authors from different countries, even those that do not seem to be interested in the third mission debate (e.g. Russia), could lead to both a practical and theoretical evolution of the literature in this field. On a practical level, such a comparison could allow the definition of common guidelines and best practices. On a theoretical level, collaboration could lead to an enrichment of the concept of third mission, possibly leading to a re-conceptualisation that takes into account the social, cultural, economic and regulatory differences of different countries. Moreover, for countries with less developed third mission systems, collaboration represents a valuable opportunity to accelerate their own development and to contribute to greater equity in the global higher education landscape.

The present study is not without limitations. Firstly, it is based on results from a single scholarly database, Scopus, and its scope is limited to articles and reviews in terms of document type. Future research could explore and analyse papers indexed in other databases and include conference proceedings. Secondly, the choice of keywords used to search the database is rather narrow and focused. Future research could explore the topic further to assess the possibility of including additional search terms. Thirdly, the bibliometric analysis may not be sufficient to examine in depth a single strand of research, which may not receive the attention it deserves in the visualisations and representations obtained from the software. Future research could build on our findings to systematically explore some of the niche or emerging themes we have outlined.

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Track 2
Innovation & Technology Management

Innovation and Creativity from Remote: Do Women Innovate Differently from Men, and Why?[1]

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Abstract

Frame of the research. *The study considers how social isolation and work-home relate to Innovative Work Behavior (IWB) and creativity, by considering the impact of these domestic variables on remote working through a gendered perspective.*

Purpose of the paper. *The paper aims to explore the effects of social isolation and work-home conflict on the relationship between IWB and creativity, with a specific focus on gender differences. The research contributes to understand how remote working conditions influence creativity and IWB, offering insights into gender dynamics in domestic work contexts.*

Methodology. *We collected primary data through surveys sent to remote working employees from four Italian corporations between April and May 2020. 803 valid responses were analysed through IBM SPSS Statistics.*

Results. *Hierarchical regression analyses, split by gender, reveal a positive association between IWB and creativity in remote work for both genders. Instead, work-home conflict and social isolation show a negative correlation with creativity, although asymmetrically across gender lines.*

Research limitations. *The paper's limitations include its cross-sectional design, which limits its ability to assess causality, and the reliance on self-reported data, potentially introducing bias. Additionally, the incremental variance explained by the moderation model is limited.*

Managerial implications. *The findings offer valuable insights for organisations and collaborative managerial leaders, who are encouraged to adopt gender-tailored policies supporting employees' well-being and performance. This includes creating open communication channels, training programs, occasions for collective innovation and flexible job arrangements.*

Originality of the paper. *The main contribution of this study consists in the integration of a gendered perspective to examine the impacts of social isolation and work-home conflict on the nexus between IWB and creativity in remote working contexts. It highlights the asymmetrical impacts of these domestic variables across genders and suggests that the shift to remote work conditions may differently influence men's and women's creativity.*

Key words: *creativity, Innovative Work Behaviour, gender, social isolation, work-home conflict*

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1. Introduction

The shift to hybrid working conditions has become an increasingly important trend over the last years. Therefore, employees also engage in innovative and creative activities from their domestic environments. This tendency assisted in a sudden acceleration due to the COVID-19 pandemic, making remote working necessary for firms' survival.

Indeed, the COVID-19 pandemic induced a paradigm shift in workplace dynamics globally, propelling the transition towards remote working practices across several sectors. On the one hand, this unforeseen shift eased the continuity of business operations amid stringent lockdown and social distancing protocols. On the other hand, remote working concurrently engendered several challenges and prospects for Innovative Work Behaviour (IWB) and creativity (Yang *et al.*, 2022). As creativity and innovation are considered as results of collective efforts occurring at job places, the shift to domestic work settings is worth considering as a contextual factor affecting innovative practices and creative outputs. The imposition of social isolation and the reconfiguration of working conditions provided new reference settings to analyse innovation and creativity within the workforce closely.

Remote working arrangements enable the prosecution of business activities within domestic environments. Recent literature also shows that the shift to remote working is associated with higher stress levels due to the likelihood of conflating professional obligations and family responsibilities and because of the urgent adoption of technological solutions for remote working practices (Carroll and Conboy, 2020). Work-home conflict and social isolation are considered relevant situational variables emerging from a wide body of literature on remote working (Gajendran and Harrison, 2007; Larson *et al.*, 2020).

Academic research suggests that men and women approach remote working differently. The pertinence of including a gendered lens in this discourse is underscored by preliminary evidence indicating a divergent impact of work-home conflict and social isolation on job performances for men and women, potentially reflective of different roles in domestic obligations and societal expectations (Nomaguchi, 2012). This perspective is complemented by other studies documenting the asymmetrical effect of social isolation and work-home conflict on female and male creative performance, underscoring the need to delve into gender differences on these aspects (Wiersma, 1990). Remote working appears particularly relevant due to its potentially ambivalent impact on employees' productivity and job performance (Prodanova and Kocarev, 2021).

This study intends to explore the impacts of social isolation and work-home conflict on the nexus between IWB and creativity, by highlighting gender differences on these dimensions. In other words, we aim to investigate the relationship between IWB and creativity for male and female employees by specifically considering the moderation role of two variables which appear relevant in the context of remote working, i.e. social isolation and work-home conflict. In this paper, we refer to the recursive approach between IWB and creativity, which advocates for the reciprocal, bi-directional nature between the two variables rather than the linear one linking creativity to IWB (Rosing *et al.*, 2018; Škerlavaj *et al.*, 2016; Garlatti Costa *et al.*, 2022).

Therefore, we argue that higher levels of IWB in normal times correspond to higher levels of creativity in remote working but that social isolation and work-home conflict impact this relationship differently for men and women. Based on the conservation of resources (COR) theory, we claim that these two situational variables related to the domestic environment affect the creative behaviour of men and women employees working from home asymmetrically (Hobfoll, 1989; Naveed *et al.*, 2021). More specifically, we advocate that work-home conflict has a major negative impact on the IWB-creativity nexus for female employees compared to male ones. Conversely, we hypothesise that men are more likely to suffer from social isolation than work-home conflict and that the former negatively affects male individuals' creativity from remote.

Therefore, in the present paper we conceive and empirically investigate the interplay among IWB, work-home conflict and social isolation in remote contexts, examining their impact on the creative contributions of male and female employees. Thanks to the analysis of empirical data collected from some Italian companies during the first lockdown period, our research aims at unveiling the

multifaceted relationship between IWB, creativity, and dimensions related to the unique working conditions imposed by the pandemic, thereby enriching with a gendered lens the scholarly dialogue on innovation and creativity in remote contexts.

The main contribution of the paper consists in the consideration of a gendered perspective in relation to the impact of social isolation and work-home conflict on individuals from remote job contexts, specifically during the first lockdown in Italy. Our findings reveal a gender-based asymmetrical impact of these factors on the main relationship between IWB and creativity. By providing additional evidence on the complexity perspective on IWB in remote working contexts, we confirm and reinforce the validity of a recursive relationship between these two variables.

This study aims to inform organisational and managerial practices and policies to promote innovation and creativity in contemporary remote work settings, accounting for the diversified experiences of employees across gender lines.

The paper is structured as follows. In Section 2, we build up the theoretical background and develop the main hypotheses. In Section 3, we outline the methodology used and the main constructs of the survey submitted to the employees of four Italian firms during the pandemic. The results are then analysed in Section 4, which also includes a discussion on the study implications, to conclude with a summary and wrap up of the research in Section 5.

2. Literature review and hypotheses development: Innovative Work Behaviour and creativity through gendered lenses

Innovative Work Behaviour (IWB) refers to the activities and behaviours employees engage in to promote the generation, introduction, and application of new ideas, processes, products, or procedures (De Jong and Den Hartog, 2010). It includes practices that intentionally seek to introduce and apply new actions to the benefit of the role, group, or organisational performance (Janssen, 2000). Therefore, scholars have emphasised the importance of individual and collective contributions in the path towards innovation within organisations, positing the importance of the social environment where IWB takes place (Amabile, 1983; Anderson *et al.*, 2014).

Creativity is conceptualised in various ways across different research disciplines, with creative ideas typically defined as innovative, original, and suitable to the task at hand (Cooper and Kurland, 2002). It encompasses abilities like imagination, innovation, originality, and the capacity for novel problem-solving (Kaufman and Sternberg, 2007). The definition of creative work entails workers' opportunities to learn new things, solve problems, enhance their skills, and engage in creative tasks (Schieman and Young, 2010).

The relationship between IWB and creativity is well-established in the literature, suggesting that engagement in innovative behaviours is positively related to the generation of creative outcomes (Scott and Bruce, 1994). However, academic research has significantly re-examined and expanded this relationship in remote working contexts. The unprecedented challenges and disruptions brought about by the COVID-19 pandemic underscored the importance of the rapid ideation, adaptation, and implementation of new solutions to navigate the complexities of remote work, health care, education, and daily life under restrictions (Karwowski *et al.*, 2021). Therefore, some scholars re-conceptualised creativity as a dynamic and multifaceted process enabling resilience, adaptation and innovation of new and existing responses to crises, with the emergence of novel products, services, and methods addressing the unique needs and opportunities presented by the pandemic environment (Tang *et al.*, 2021).

Previous scholars adopted a sequential view between the creativity and innovation implementation process, with the former considered as a forerunner to IWB (King, 1992). However, the traditional linear perspective has recently been challenged (Rosing *et al.*, 2017; Schroeder *et al.*, 1989) by the complexity perspective on IWB, which posits that individual creativity and implementation activities are cyclical, in a recursive dynamic process proceeding back and forth between the two concepts

(Rosing *et al.*, 2018; Škerlavaj *et al.*, 2016). This perspective seems more suitable to describe the relationship between IWB and creativity in remote job contexts (Mann and Holdsworth, 2003).

In the present paper, we consider gender as significant variable influencing the relationship between IWB and creativity. Previous research suggests that gender differences in these areas can be attributed to different socialisation processes, organisational structures, and gender stereotypes, which affect men's and women's experiences and expressions of creativity in the workplace (Baer, 2012). Some scholars highlight that women often adopt different approaches to innovation and creativity, valuing collaborative and participatory methods differently than men (Alessa and Durugbo, 2022).

However, many empirical studies offer mixed findings on gender differences in creativity and IWB. On the one hand, some researchers indicate that while men and women are equally capable of innovative behaviour and creative thinking, organisational and societal biases may affect the recognition and development of these traits (Proudfoot *et al.*, 2015). Gender disparities in creativity and IWB are also due to differences in access to resources, networks, and support within organisations, as well as varying degrees of self-efficacy and risk aversion (Shalley *et al.*, 2004). For instance, some scholars detect that women usually face greater challenges in accessing informal networks that are crucial for innovation, which may affect their capacity to engage in creative efforts (Greguletz *et al.*, 2018).

On the other hand, other researchers highlight the presence of similarities in innovative behaviours and creativity across genders. For instance, a meta-analysis by Baer (2012) suggests that gender differences in creativity are small and inconsistent, pointing to the importance of context in understanding these variations. In addition, both men and women are reported to exhibit a strong desire for mastery, self-expression, and autonomy, all key drivers of creativity and innovation (Ryan and Deci, 2000).

To sum up, in line with the complexity perspective on IWB, we posit that remote working influences the interplay between IWB and creativity, affecting both the temporal and spatial context of their relationship. In addition, given the previously mixed results on gender differences regarding the relationship between IWB and creativity, we postulate a positive relationship exists between IWB and creativity in remote working contexts, both for men and women. Hence, we expect the following:

H1: In the context of remote work, there is a positive correlation between IWB and individual creativity for both men and women.

2.1 Gender asymmetries: work-home conflict and social isolation impacts on IWB and creativity from remote contexts

As creativity is influenced by a broad array of contextual factors, the shift to remote work is worth considering as a potentially significant barrier to creative job performance (Amabile *et al.*, 1996; Woodman *et al.*, 1993). Literature, indeed, highlights a complex interplay between environmental variables and creativity, emphasising the need for strategies that mitigate the negative impacts of remote work on creative processes (Golden *et al.*, 2008; Wang *et al.*, 2021).

Remote working limits collective exchanges and spontaneous interactions which are pivotal for creativity (Brucks and Levav, 2022; Knight *et al.*, 2022). Therefore, in remote job contexts, social isolation emerges as a potentially significant impediment to creative endeavours. In addition, working from domestic contexts may give rise to conflicts between family duties and professional responsibilities, which impact the work-home relationship. Previous research documents that work-home conflict and its complementary aspect, family-to-work conflict, can potentially impair employees' productivity and creative capacities (Larson *et al.*, 2020).

Several scholars started exploring the role played by these domestic variables on individuals' well-being and job performances with the compulsory shift to remote working during the COVID-19 pandemic (Mahomed *et al.*, 2022). While offering flexibility and autonomy, the transition to remote contexts underscores significant challenges related to social isolation and work-home conflict

impacting both men and women, albeit in nuanced ways. As a result, these variables can either positively or negatively affect the relationship between IWB and creativity. On one hand, favourable consequences may emerge when employees successfully handle personal well-being, work and family responsibilities, without compromising their innovative capabilities. On the other hand, social isolation and work-home conflict may have detrimental effects on personal and domestic equilibria, thus substantially undermining individuals' creative potential (Kossek and Lautsch, 2017).

2.2 Social isolation and remote working under a gendered perspective

Social isolation is defined as the measurable deficiencies in individuals' social connections, gauged by the size, diversity, or contact frequency within his/her social networks (Cooper and Kurland, 2002). Literature indicates that social isolation can be distinguished according to social and institutional aspects, or in relation to formal and informal groups (Eckhard, 2022; Smith and Colasanti, 2005). This study broadens the concept of social isolation, specifically emphasising the repercussions of physical absence from workplaces (Golden *et al.*, 2008).

Social isolation covers both physical and psychological aspects, affecting employees' sense of belonging and connection with their organisations and colleagues. Moreover, in line with social capital theory, it is not only dependent on the quantity, but also on the quality of social networks (Cloutier-Fisher and Kobayashi, 2009).

Social interactions and the quality of relations within working teams impact job creativity (Pirola-Merlo and Mann, 2004). In addition, the social and material contextual conditions play a key role, as people working from remote are reported as experiencing less creativity compared to employees collaborating in presence (Tønnessen and Flåten, 2023).

In a context of changing job conditions, the duration of remote work, the lack of direct interactions and the use of communication technologies contribute to exacerbate social isolation issues (Kannan and Veazie, 2023; Venkatesh and Speier, 2000). Golden *et al.* (2008) observe that remote employees often feel neglected and disconnected from their professional settings. Scholars further demonstrate that, although remote work can increase job autonomy, it can also lead to feelings of isolation which may impinge on individuals' capacities for innovative behaviours and creative efforts. As creativity thrives on knowledge exchange and open communication, lack of in-person contact prevents individuals from leveraging collective social resources useful to generate new solutions, gain fresh perspectives and reshape existing ideas (Reiter-Palmon and & Illies, 2004).

Conformingly to the conservation of resources (COR) theory, we posit that intense feelings of social isolation deplete essential resources, creating a stressful scenario marked by discontent and adverse psychological outcomes (Hobfoll, 1989). Social isolation adversely affects mental health and productivity, impairing innovation and creativity at workplaces. Therefore, creative activities are considered a coping mechanism against stress and anxiety deriving from social isolation. The type and extent of creative activities may vary across genders, reflecting different coping strategies between men and women (Elisondo and Melgar, 2021).

In remote working contexts, current research reports that men and women experience and respond to social isolation differently, due to their diverse socialisation patterns and network structures (Smith and Colasanti, 2005). Indeed, women are more likely to cultivate more high-quality social relations among family members, friends and colleagues (Vandervoort, 2000). Women also report higher involvement in social networks than men (Reevy and Maslach, 2001). Consequently, disparities in the activation of social connectedness and support mechanisms across genders are attested (Yang *et al.*, 2020).

Apart from a quantitative difference, literature reports qualitative divergencies across genders. In fact, women tend to rely more on friends and show preference for closer relations which provide higher emotional support. Conversely, men trust more their fiancées as confidantes of emotional needs and prefer more social relationships in quantitative terms (Vandervoort, 2000). Overall, a wide body of literature documents that men are more likely than women to suffer from social isolation.

Nevertheless, despite evidence on women's general lower levels of social isolation, scholars reveal that female employees may feel like outsiders and tokens whose efforts are undervalued by teams. These feelings, in turn, negatively affect their workplace commitment and their perceived job performance impact (Smith and Colasanti, 2005). This is also dependent on the geographical contexts and the cultural identities under examination, due to the diverse collective relevance assigned to social isolation (Cloutier-Fisher and & Kobayashi, 2009; Yang *et al.*, 2020).

Moreover, social isolation can negatively affect mental health, with mixed results along gender lines. Although women are generally more liable to depression symptoms, evidence shows that men are also negatively affected by social isolation through different mechanisms (Liu *et al.*, 2019). These effects, in turn, can affect individual creativity, potentially inhibiting creative expressions for those feeling more isolated (Robb *et al.*, 2020). However, research results are not conclusive, as individuals with specific personality profiles may also experience a boost in creativity due to social isolation, independently from gender. This suggests that the relationship between social isolation and creativity is complex and mediated by individual differences (Michinov and Michinov, 2021).

Apart from individual differences, gender stereotypes impact on feelings of social isolation and, in turn, on creative and innovative contributions. Systemic barriers often hinder women's access to professional networks, limiting their exposure to new information and resources vital for innovation (Ibarra, 1993). Moreover, gender biases within organisations may contribute to the under evaluation of women's creative contributions (Eagly and Carli, 2003).

Overall, in line with the prevalent research results in the field, we advocate that the negative impact of social isolation on creative efforts in remote working contexts is stronger for male than female employees, thus asymmetrically affecting the main relationship between IWB and individuals' creativity. Therefore, we formulate the following hypothesis:

H2. In remote working contexts, the moderation effect of social isolation on the relationship between IWB and individual is asymmetrical: it holds for male but not for female employees.

2.2 Work-home conflict and remote working differences across genders

The situation of overlap of work and family life in remote working conditions often leads to work-home or work-family conflict, a state where work and family obligations clash (Bailey and Kurland, 2002). Kahn *et al.* (1964) describe how fulfilling responsibilities in one domain can complicate adherence to the other. In the context of domestic job contexts, the blurring of boundaries between professional and personal lives generally intensifies work-home conflict, affecting employees' abilities to leverage their time management skills effectively and maximise their job performances (Gajendran and Harrison, 2007).

The academic community remains divided on how remote working conditions act on work-home conflict. Some scholars report it might alleviate domestic struggles by allowing better management of work and family needs, while others argue it might heighten family expectations due to workers' constant presences at home (Delanoeije *et al.*, 2019; Gillet *et al.*, 2022). Moreover, prior research has suggested that flexible working arrangements impact both work-family conflict and its complementary, family-work conflict (Yucel and Chung, 2023).

Adopting a conflict perspective, we acknowledge the challenges posed by the shift to home-based work by considering that several houses lack office-like facilities and resources enhancing concentration, thereby negatively affecting employees' performance levels (Standen *et al.*, 1999; Wang *et al.*, 2021). This elimination of the physical separation between job and family domains heightens possibilities of conflict, thereby reducing work engagement and leaving less time, energy, and motivation for creative outputs (Grandey and Cropanzano, 1999; Amstad *et al.*, 2011).

Situations of work-home conflict are generally linked to a decrease in creativity (Xie and Li, 2022), although the evidence is not conclusive. Creativity is also associated with lower work-home conflict and stressful thoughts related to the workplace (Schieman and Young, 2010). Zhang *et al.* (2020) also found that work-family conflict could unexpectedly enhance creative performance through job

crafting. Conversely, our study departs from a negative correlation between work-home conflict and both IWB and creativity, as we advocate those high levels of stress hinder both creative processes and innovative behaviours (Akinola *et al.*, 2019; De Vries *et al.*, 2021). Conversely, a low level of work-home conflict ensures the availability of time, energy, and a stress-free environment conducive to engagement in creative ideation, potentially leading to greater creativity from remote job contexts (Karwowski *et al.*, 2021).

Current literature suggests that remote working conditions intensify work-home conflict for both men and women, yet the contributing factors are differently. In line with work-family border and work-home resource theories, we remark that the escalation of work-home conflict in remote settings arises from the blurring of boundaries between professional and personal spaces, complicating the segregation of roles and responsibilities (Schnettier *et al.*, 2024; Van der Lippe and Lippényi, 2018).

Based on social role theory, it can be expected that women assign higher priority to domestic and men to job responsibilities, with the former ones reporting more 'work-home spillover' effects overall (Powell and Greenhaus, 2010; Van Veldhoven and Beijer, 2012). Although the strength of this relationship also depends on gender role attitudes and the conformity of male and female individuals to traditional social role models, suggesting that each person's values affect feelings of work-home conflict, women still bear the majority of household duties (Yucel and Chung, 2023).

Consequently, female workers may find the professional and domestic workloads especially heavy, with potential repercussions on their creative and innovative outputs. Some studies report that remote working conditions intensify women's domestic burden, engendering role conflict and congestion of housework duties among female labour force (Shockley *et al.*, 2021). Moreover, work-home conflict has been found to positively correlate with the high blood pressure, depression, and anxiety symptoms among working women, underlining the heightened psychological distress faced by women who need to balance work and family roles (Pfefferbaum and North, 2020).

Beyond simplistic gender-based explanations, differences in the levels of domestic conflict can also be accounted for by different levels of demands and resources in the work and family domains (Nomaguchi, 2012). Work-home conflict intensifies among managerial and professional women, as well as those working full time, by also bringing about higher levels of anxiety and irritability which do not match with creative results (Schieman *et al.*, 2006).

Evidence of gender differences in work-home conflict levels is mixed. Emslie *et al.* (2004) observe no significant gender differences in work-home conflict perceptions among remote workers, along with other scholars providing evidence supportive of similar levels of struggle among women and men (Reimann *et al.*, 2022). Gender-specific predictors of work-home conflict, however, differ across sexes. For women, having children and occupying senior corporate positions are closely associated to work-home conflict, whereas for men, working unsociable hours plays a more significant role (Allen and Finkelstein, 2014).

In addition, in line with the job demand-control model, some scholars demonstrate that employees' task independence and limited work requirements are two impactful conditions on the perceived level of work-family conflict and distress (Groenlund, 2007). This suggests that that the psychological impact of work-home conflict on creativity and innovation is mediated by individual coping strategies and resilience. Establishing under what conditions the so-called work-family multitasking (Schieman and Young, 2010) impacts negatively on employees' performance and creativity is yet to be defined.

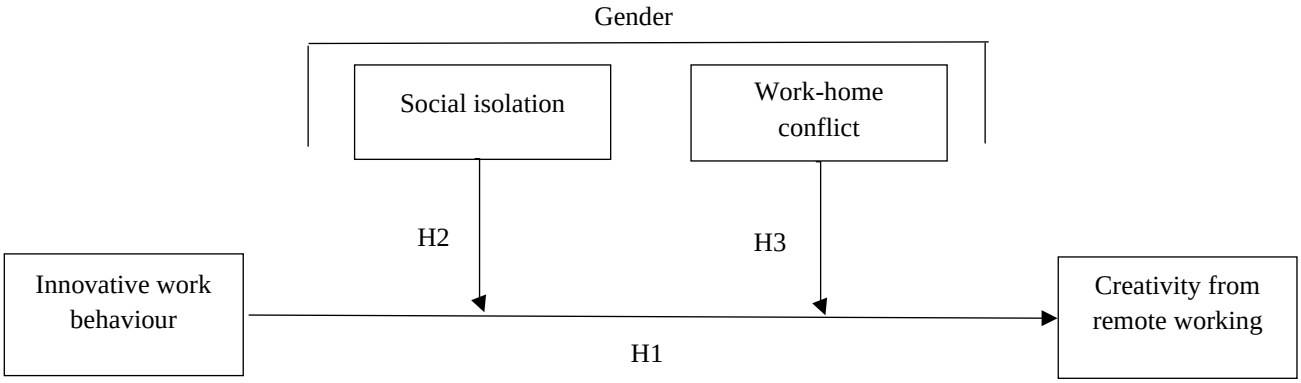
Apart from individual factors, Ely and Meyerson (2000) provide a critical perspective on organisational cultures' role in reinforcing traditional gender roles that exacerbate work-home conflict. They argue that organisational practices and norms often implicitly prioritise work over family, placing undue pressure on individuals-especially women-who seek to balance these two spheres. Such environments can stifle creative thinking and innovative behaviours, by enhancing unfavourable conditions to creative processes. To this end, current literature reports the importance of normative and cultural environments promoting gender equal work and domestic responsibilities (Hagqvist *et al.*, 2016).

Current research underscores the multifaceted impact of remote working on work-home conflict, with gender playing a significant role. While the shift to remote job conditions offers some degree of flexibility, scholars report new challenges in balancing work and family responsibilities, particularly for women. Contextual conditions of struggle, in turn, affect creativity outputs to asymmetrical extents between male and female employees, showing overall less favourable perspectives for working women. Thus, we elaborate the following hypothesis:

H3. In remote working contexts, the moderation effect of work-home conflict on the relationship between IWB and individual is asymmetrical: it holds for females but not for male employees.

3. Methodology

Fig. 1: Research Model



Source: Authors' elaboration

Data were collected between April and May 2020 from employees working at four multinational corporations located in Italy. Convenience non-probability sampling was used for the selection of these firms, active in the engineering, shipbuilding, frozen food, and automotive sectors. An online survey was e-mailed to the employees with the most creative job positions through their HR managers, all engaged in remote working at the time of the survey.

As we could not collect all available information from these companies, on the groundings of our data we approximated an average response rate of 87%. Following the removal of incomplete questionnaires, i.e. those missing more than 10% of their data, 803 valid responses were left for the subsequent analysis.

The survey text was initially developed in English and subsequently translated into Italian through a back-to-back translation procedure to ensure linguistic and conceptual reliability (Brislin, 1986). The survey design, conceived as part of a broader questionnaire, aimed to minimise potential biases in respondents' answers and included rigorous attention checks, including reverse-coded items and an instructional manipulation check to ensure data integrity (Oppenheimer *et al.*, 2009). Participants were assigned unique alphanumeric identifiers, to ease tracking and data management. Participants self-reported their answers thanks to five-point Likert scales questions, expressing either the frequency or their (dis)agreement with the provided sentences.

To mitigate the risk of common method bias, IWB was assessed both by employees and their direct supervisors, through separate instruments for each category (Podsakoff *et al.*, 2012). The significant correlation between the IWB measures of the two categories of respondents ($r = 0.407$, $p < 0.01$) underscores the low risk of common method bias, substantiating the decision to analyse the dataset of respondents overall (n=803).

The dependent variable, creativity in remote working, was evaluated using George and Zhou's adapted version of the scale (2001). IWB, the main independent variable, was measured using

Janssen's (2000) scale, where both constructs were subject to rigorous validation processes to minimise the presence of common method bias. The preliminary tests confirmed the validity of the scales, thus confirming and enhancing the overall research method.

Work-home conflict and social isolation during the pandemic were assessed using the scales from Ayyagari *et al.* (2011) and Golden *et al.* (2008), respectively, both adapted to the pandemic situation. All the measurement scales used were previously checked for internal consistency. All their Cronbach's α values exceeded the 0.70 sufficiency threshold, thus ensuring their reliability (Hair *et al.*, 2010).

Control variables, such as age, education level, and caregiving responsibilities, were included to ensure a comprehensive evaluation of how personal circumstances and demographic factors may intersect with and potentially affect performance-related outcomes.

4. Results

*Tab. 1-2. Regression results for women (on the left, N=331) and men (on the right, N=471). *** stands for p < 0.001; ** for p < 0.01 and * for p < 0.05.*

Female employees (N=331)	**Model 1**	**Model 2**	**Model 3**	**Male employees (N=471)**	**Model 1**	**Model 2**	**Model 3**
Intercept	3.68 (0.38)***	3.15 (0.35)***	2.63 (0.51)	**Intercept**	3.950 (0.24)***	2.98 (0.35)***	3.37 (0.47)
Age	-0.05 (0.09)	-0.07 (0.08)	-0.07 (0.08)	**Age**	-0.06 (0.05)	-0.07 (0.04)	-0.07 (0.04)
Education	0.04 (0.09)	0.01 (0.08)	-0.01 (0.07)	**Education**	-0.04 (0.05)	-0.09 (0.04)*	-0.09 (0.04)**
Care for children	-0.07 (0.11)	-0.01 (0.09)	0.02 (0.09)	**Care for children**	-0.06 (0.08)	-0.03 (0.06)	-0.03 (0.06)
Innovative work behaviour (IWB)		0.47 (0.05)***	0.8 (0.13)***	**Innovative work behaviour (IWB)**		0.54 (0.04)***	0.62 (0.11)***
Social isolation		-0.28 (0.04)***	-0.5 (0.14)*	**Social isolation**		-0.20 (0.03)***	-0.88 (0.17)
Work–home conflict (WHC)		-0.07 (0.05)	0.16 (0.19)	**Work–home conflict (WHC)**		-0.18 2 (0.04)***	-0.04 (0.17)***
Moderation effects							
IWB x Social isolation			0.01 (0.04)	**IWB x Social isolation**			0.43 (0.04)*
IWB x WHC			-0.60 (0.05)**	**IWB x WHC**			-0.52 (0.05)**
WHC x Social isolation			0.40 (0.04)	**WHC x Social isolation**			0.56 (0.03)**
R	0.1	0.55	0.58	***R***	0.08	0.66	0.68
R^2	0.01	0.30	0.33	R^2	0.01	0.44	0.45
Adjusted R^2	0.00	0.29	0.31	**Adjusted R^2**	0.01	0.43	0.44
F	0.98	21.69	16.56	**F**	0.91	55.99	40.29
p	0.40	<0.001	<0.001	***p***	0.44	<0.001	<0.001

Source: authors' elaboration

The analyses were performed through the IBM SPSS Statistics software on a sample of 803 employees, 471 of which are males. Most respondents (53%) are between 40 and 54 years old and have an educational level equal to middle/high school diploma (54.6%), followed by those holding a bachelor's or master's degree (37.7% of all interviewees). Almost 60% of the respondents have

children and most are employees. The majority of the participants work for the engineering firm (N=367), followed by the frozen food one (N=253), for the company in the automotive sector and, lastly, the one on shipbuilding (respectively, 103 and 79 respondents).

4.1 Regression analysis

To examine our hypotheses, we firstly split our dataset according to gender (0=male, 1=female). Then, we conducted hierarchical regression analyses for both separate datasets, with the results outlined above. To minimize undue multicollinearity, the independent variables were grand mean centred (Aiken *et al.*, 1991). Model 1 incorporated all control variables (age, education and care). Then, Model 2 included the primary independent variables (IWB, social isolation and work-home conflict). The regression analysis on Model 2 highlights a positive association between IWB and creativity from remote working for both male and female employees (β=0.54 for men and β=0.47 for women, $p<0.001$), thereby supporting Hypothesis 1. Specifically, a unit increase in IWB is associated to around half a unit increase in creativity. Conversely, in Model 2 both work-home conflict (β= -0.18 and β= -0.07 for male and female, respectively) and social isolation (β= -0.2 for men and β=-0.28 for women, $p< 0.001$) exhibit a negative correlation with creativity from remote contexts. All coefficients are significant at 0.001 but work-home conflict for women ($p>0.05$).

Model 3 introduced the moderations, as shown by the interactions. The interaction between IWB and social isolation (IWB x social isolation, $\beta = 0.43$, $p < 0.05$) proved significant only for men, supporting Hypothesis 2, which posited an effect of social isolation on the IWB-creativity nexus for male employees. For female employees the impact of social isolation proved not significant ($\beta = 0.01$, $p = 0.98$). Conversely, work-home conflict had a negative and significant effect on the association between IWB and creativity for both genders. The interaction term between work-home conflict and IWB (IWB x work-home conflict) presented a negative impact of 0.52 and 0.6 units, respectively for women and men, on the relationship IWB - creativity, with $p < 0.01$ in both cases. Therefore, the third hypothesis (H3) was partially supported.

Having a look at the adjusted R^2 values for men and women, it is possible to notice that the data of male employees better fit all the 3 models. Model 3 explains around 44% and 31% of the variance in the data, respectively for men and women.

5. Discussion

Since the COVID-19 pandemic, remote working has become the norm for many companies and it is here to stay for the next years, complementing traditional job modes to the benefit of some categories of workers, such as parents (Bernhardt *et al.*, 2022). The findings of this paper provide support to the hypothesis that employees with higher levels of IWB show higher levels of creativity in remote working contexts, independently from gender. Nevertheless, such a relationship is affected by the domestic variables of social isolation and work-home conflict, which asymmetrically impact creative performances of male and female employees in remote working settings.

5.1 Theoretical implications

This investigation contributes to the managerial and organisational literature on multiple fronts. Firstly, it substantiates the positive correlation between IWB and creativity in remote working contexts, thereby reinforcing the empirical foundation of the ‘complexity’ perspective on IWB. This perspective posits that creativity and subsequent stages of IWB are intrinsically linked and evolve in a recursive process, and its validity for remote working settings has been confirmed by previous research, too (Rosing *et al.*, 2018; Schroeder *et al.*, 1989). The integration of a gendered perspective into the main relationship constitutes a unique contribution of the present paper, revealing a consistent linkage between innovation and creativity that goes beyond differences across genders. While prior

research in the field mainly suggested lower levels of creativity among women compared to men, things might be different due to remote working contexts. Specifically, the massive shift to hybrid and remote working conditions of employees might impact the creativity performance of employees differently, underscoring the necessity to consider contextual and individual factors, too.

Furthermore, this research advances the literature on organisational creativity by offering an overview of how individuals' perceptions of their domestic work environments may influence their creative capacities (Aleksić *et al.*, 2017). Creativity and innovation require personal, social and job balance, conditions which may be challenging to attain for individuals within their domestic spheres.

However, our empirical analysis reveals that the effects of the two domestic variables considered in our study are not uniform for men and women. Our findings, underscoring the asymmetrical impacts of social isolation and work-home conflict along gender lines, encourage a reconsideration of existing theories on work-life balance and the role of social dynamics in the workplace, suggesting the adoption of a nuanced perspective on gender differences.

Firstly, the common moderation effect of work-home conflict across genders enriches the discourse on the work-family interface, suggesting that the commonly held perspective on the pre-eminent impact of this variable for women may be overly simplistic. At the intersection of creativity studies and COR theory, our results highlight that work-home conflict represents an important obstacle to individual creativity and, in broader terms, to effective performances for both male and female employees in remote settings (Gajendran and Harrison, 2007). Posing that work and home domains can influence one another through both conflict and facilitation pathways, the unexpected finding that both men and women are affected by work-home conflict suggests that other complementary mechanisms are in place. On the one hand, women may report higher levels of work-home conflict due to the heavier workload stemming from both domestic and job roles in remote working contexts. On the other hand, men may document experiencing more work-home conflict as they are assumed as less used to matching family and job duties, even more so within remote job contexts (Greenhaus and Beutell, 1985). Therefore, in line with boundary theory, the looming limits between job and home domains in remote working contexts act negatively on both genders, although supposedly through different dynamics.

Secondly, the gender-specific moderation by social isolation on the IWB-creativity link introduces a critical dimension to understanding how social factors are linked to individual creativity in remote working settings. The differential impact of social isolation invites a reconsideration of the role of social interactions in the creative process for men and women. While prior research highlights the importance of collaboration and social support for creativity, the finding that social isolation hampers creativity for men but not for women suggests that the relationship between the two variables is complex and contingent on individual and social factors such as individual coping mechanisms, different socialisation patterns and social norms (Amabile, 1983; Perry-Smith and Shalley, 2003). Since literature reports that women usually present wider social networks than men, also due to higher femininity and care for others, a plausible explanation is that female feelings of social support may contribute to reduce their perceptions of isolation in remote working contexts. This also provides support, at least to some extent, to the body of literature accounting for the double-edged impact of social isolation on creativity, by remarking its potentially positive or null effects (Prodanova and Kocarev, 2021).

The insights of our analysis not only contribute to a deeper understanding of the dynamics between work-home conflict, social isolation, IWB and creativity but also highlight the necessity of incorporating a gendered perspective in research at the intersection of innovation management and organisations. By acknowledging and exploring the nuanced ways in which men and women experience and respond to these dynamics, this research adds valuable depth to theories of work-life balance, innovation, and social identity, offering a more comprehensive framework to the examination of the interplay among personal life, social dynamics, and workplace performance (Tajfel and Turner, 1979).

Overall, from a theoretical standpoint, the discussion underscores the critical role of contextual factors such as work-home conflict and social isolation in influencing innovative and creative processes within organisations, emphasising the importance of considering these dynamics through a gendered perspective.

4.2 Managerial implications

Remote working has established itself as a significant organisational trend in the contemporary job landscape over the last few years, especially since the COVID-19 pandemic (Camp *et al.*, 2022; Gillet *et al.*, 2022; Wang *et al.*, 2021). Although several scholars report that remote working is associated to lower IWB and creativity, fostering creativity and innovation is more imperative for firms to thrive in the long term. Therefore, firms need to accommodate male and female employees' exigencies and preferences for enhanced work-life balance through remote or hybrid working arrangements, on the one hand, while preserving corporate competitiveness, on the other.

The present paper provides insights particularly valuable for HR and R&D managers, inviting them to adopt a gender-oriented lens to improve working environments and foster corporate creativity and performance. Our study remarks that, for remote working to be effective, organisations should craft gender-tailored policies benefitting employees' well-being and performance (Mahomed *et al.*, 2022).

Firstly, managers should implement policies and practices that encourage the proliferation of perspectives and ideas also in remote working settings, recognising that creativity thrives when varied viewpoints are brought to the fore. This involves creating channels for open communication where all team members feel empowered to share their insights and feedback. Such an approach may effectively reduce social isolation as well as prejudices on gender differences, encouraging male and female contributions to a richer pool of ideas from which innovative solutions can emerge (Pearsall *et al.*, 2008).

Secondly, training programs fostering collective brainstorming and growth design can play a pivotal role in enhancing team cohesion and creativity in remote job contexts, too. Organisations can develop a more inclusive and open culture by educating employees on the value of collective innovation and team creativity. These programs should be designed to challenge existing prejudices and foster a deeper understanding and appreciation of different perspectives, ultimately enhancing collaborative efforts and creativity outputs beyond gender roles.

Moreover, promoting flexible work arrangements and supporting work-life balance are pivotal to mitigate gender differences on job performances. Adaptive measures within remote working contexts can accommodate the diverse needs of female and male team members, thereby reducing potential conflicts and stressors which can negatively impact on creativity (McElwain *et al.*, 2005). Flexibility and gender-tailored policies are particularly suitable to remote settings, where the blurring of work and home spheres can exacerbate existing disparities and hinder the creative process.

Managers are encouraged to carefully consider the domestic working environments and personal well-being of their team members, with a specific focus on gender-related differences. Given that women still hold most of the family burden and that men may be more sensitive to remote working contexts, it is key for companies to give equal opportunities to well-being and growth for all employees and independently from family contextual conditions, in the respect of their private and personal needs (Kinnunen *et al.*, 2004). Supportive practices such as flexible scheduling, access to office resources, and regular communication can help employees manage the demands of work and home spheres more effectively, thereby reducing conflicts and isolation (Van der Lippe and Lippényi, 2018). The strategic scheduling of in-office days also stands as an important measure to bolster workers' creativity and innovation capabilities. Employees, irrespective of gender, should have regular opportunities for in-person interactions with colleagues critical to their work. Such arrangements can mitigate the feelings of social isolation frequently associated with remote work and foster organisational commitment on innovation (Golden *et al.*, 2006). In light of our results, this is

thought of to be especially beneficial to men, who are more likely to experience these negative feelings.

This also means undertaking organisational measures fitting diverse employees' segments, such as adopting specific gender-tailored tools to support remote workers and ensuring adequate domestic working environments for all. Employees' segmentation regarding these initiatives would allow for proper accommodation of personal, work and family needs, thus leading to positive spillover effects in other contexts (Powell and Greenhaus, 2010). The balance between professional commitments with caregiving responsibilities, indeed, contributes to improve employees' well-being and positively impacts on their job performances overall.

Lastly, leadership plays a critical role in modelling inclusive behaviour and fostering corporate innovation culture (Zhang and Bartol, 2010). Leaders who demonstrate commitment to diversity and inclusion inspire their teams and convey the message that every individual's contribution is valued. This can encourage more open and authentic exchanges among team members, fostering an environment where creativity and innovation can thrive across gender differences (Mumford *et al.*, 2002).

To sum up, comprehensive corporate strategies addressing diversity, work-life balance and isolation feelings by also adopting a gendered perspective show high potential to improve team creativity and innovation. By integrating these measures, organisations can create a more inclusive, equitable, and productive remote working environment that acknowledges and addresses the unique challenges and needs of all employees, while also paying due attention to gender differences and strengthening a thriving culture of innovation and creativity.

6. Conclusions

The present paper sheds light on the contribution of social isolation and work-home conflict on creativity in a remote working context, underscoring their asymmetrical impact on both male and female employees. We contribute to current literature by deepening the relationship between IWB and creativity within remote working conditions, enhancing current understanding of gender differences on the impacts of social isolation and work-home conflict. We attest the presence of asymmetrical effects of work-home conflict and social isolation for male and female employees, outlining the theoretical and practical implications of our results.

While these domestic variables affect both men and women, gender disparities in the experiences and handling of social isolation and work-home conflict demonstrate the need for dedicated managerial strategies to support both employees' categories effectively. Organisational policies and practices that acknowledge and address these differences and work to accommodate them can play a pivotal role in fostering an environment conducive to innovation and creativity in the era of remote working.

The present paper is not without limitations. First, despite the constrained temporal framework, the cross-sectional nature of our data collection limits our capacity to ascertain causality. Therefore, we invite future studies to employ longitudinal designs to effectively address this issue.

Secondly, the reliance on self-reported data may introduce common method bias, particularly concerning the dependent variable of creativity in remote working. While self-reporting is a conventional method in research and is deemed suitable for assessing creativity (Amabile *et al.*, 2005) and despite the implementation of rigorous measures in our study, it is important to acknowledge that risk.

Thirdly, we mention the limited contribution to the amount of total variance explained by our Model 3, through the addition of the interaction terms between IWB and, respectively, social isolation and work-home conflict. Nevertheless, we remark the relevance of our contribution by highlighting the differences in the regression outputs along gender lines and highlight the different R^2 between the

two samples. The search for the underlying explanations of such remarkable differences between men and women is left to future research, too.

Lastly, the assessment of work-home conflict in the context of the widespread adoption of remote work was conducted using a three-item scale modified from Ayyagari *et al.* (2011) to suit the unique circumstances of the COVID-19 emergency. Given that we had to restrain the scope of the study and neglect the family-to-work conflict dimension, we recommend future inquiries to analyse the bidirectional relationship to enrich and advance our findings.

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Small Steps, Big Impact: Understanding University and Micro, Small and Medium Firms Collaborations for Future Growth.

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Abstract

Frame of the research. *The collaboration between universities and companies is widely regarded as mutually advantageous. Although Micro, Small, and Medium Enterprises (M&SMEs) are increasingly engaging with academic institutions, the majority of existing literature primarily focuses on large firms. Companies can achieve a competitive advantage through innovation, while universities can capitalize on research outcomes and refine their academic programs.*

Purpose of the paper. *This paper provides a systematic literature review on university-company collaborations, with a special focus on M&SMEs.*

Methodology. *The study adopts an integrated interpretative framework that examines four key perspectives: 1) who (the involved actors); 2) what (the inputs and outputs of the collaboration); 3) how (the modes of collaboration); and 4) why (the drivers, enabling factors, and barriers).*

Results. *A total of 69 Scopus-indexed journal articles published between 1987 and 2022 were selected and analyzed. Our analysis reveals a lack of a unified conceptualization of university-company collaboration, with limited use of theoretical frameworks.*

Originality of the paper. *The analysis identified a wide range of barriers and enabling factors, though their interdependencies are seldom explored. To guide future research, we propose 12 research avenues and discuss implications for academic managers, entrepreneurs, and policymakers.*

Key words: *Micro, Small, and Medium Enterprises; U-I collaboration; technology transfer*

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1. Introduction

The collaboration between universities and companies, commonly referred to as University-Industry collaboration (U-IC), has played a significant role in recent decades (El-Ferik and Al-Naser, 2021), leading to mutually beneficial outcomes (Pujotomo *et al.*, 2023). Such collaboration enables both actors to achieve their strategic aims and missions. For instance, companies can leverage unique technologies developed by universities, while universities can exploit research results and adapt curricula to meet firms' demands. University-industry collaboration (U-IC) also benefits the social and economic system, potentially boosting economic growth and sustainable development.

Albeit the U-IC may be implemented by every type of company, the extant literature is mainly focused on large firms (Parmentola *et al.*, 2021; Pereira and Franco, 2023). However, such companies are no longer the only ones to collaborate with universities (Rantala and Ukko, 2018). Although Micro and Small and Medium enterprises (M&SMEs) generally prefer to develop innovations through interactions with suppliers and providers (Garcia-Perez-de-Lema *et al.*, 2017), an increasing number of such firms are activating links with universities in order to create an adequate competitive advantage (Bishop *et al.*, 2011; Perkmann and Walsh, 2007). Focusing specifically on collaborations between universities and M&SMEs, rather than the broader spectrum of university-industry collaborations, can provide a more nuanced and comprehensive understanding of the issue for several reasons:

- M&SMEs often face different challenges compared to larger firms, such as limited financial resources and human resources to engage in collaboration (Lin and Yang, 2020); less formalized R&D processes, a greater need for external innovation, and often lack an adequate level of absorptive capacity (Cohen and Levinthal, 1990). Understanding these specific challenges can lead to more effective strategies for facilitating collaborations that address the unique needs of M&SMEs (Ranga *et al.*, 2008).
- M&SMEs may require different types of support from universities compared to larger companies. By focusing on this specific subset, researchers can develop tailored support mechanisms and frameworks that are better suited to the capacities and requirements of M&SMEs.
- M&SMEs are vital for local and regional economies, contributing significantly to job creation and economic diversification. Investigating their collaborations with universities can reveal insights into how these partnerships can drive regional economic development and innovation.
- The dynamics of collaboration between M&SMEs and universities can differ significantly from those involving larger firms. These dynamics include decision-making processes, relationship-building, and knowledge exchange practices. Understanding these distinct dynamics can help in designing better collaboration models.
- The barriers and enablers of successful collaboration may vary significantly between M&SMEs and larger companies. Focusing on M&SMEs allows for a detailed examination of these factors, leading to more specific and actionable recommendations for fostering successful partnerships.

Finally, Fransman (2008) states that the costs and benefits of U-IC are dependent on firms' size. Therefore, the collaboration between M&SMEs and universities emerges as a topic worth investigating as a specific focus within the broader field of study concerning U-IC. In this respect, recently, Pereira and Franco (2022) proposed a structured literature review aimed at investigating the characteristics of the collaboration between SMEs and universities. In so doing they analyzed 71 journal articles published only between 1995 and 2019. As recently pointed out by Bengoa *et al.* (2021) topics such as U-IC and technology transfer area are increasingly attracting the attention of scholars; therefore, "periodic literature reviews are necessary to recompile and synthesize the topics studied" (2021, p. 1542). Moreover, the analysis conducted by Pereira and Franco (2022) was mainly focused on bibliometric issues (e.g., most cited articles, most productive scholars) and offer a general description of the collaboration characteristics. Finally, it seems some of the selected sources refer to the more general U-IC phenomenon (see, for instance, Etzkowitz and Leydesdorff, 2000; Hewitt-Dundas, 2012; Lockett *et al.*, 2008).

Based on such evidence, a deeper and updated analysis of the extant literature on the relationship between Universities and M&SMEs is needed. Moreover, it should be based on an integrated explorative framework allowing the attention to be focused on the different issues characterizing such collaboration. In this respect, a useful approach is the one based on the 3W (Who, What, Why) and 1H (How) questions, which are often adopted to describe phenomena. More specifically, we suggest deepening the following research questions:

RQ1. Who are the actors involved in the collaboration between universities (e.g., public vs. private; regional vs. national vs. international) and M&SME (classified in terms of industries, size, etc.)?

RQ2. What contents are exchanged during the collaboration?

RQ3. How do universities and M&SMEs interact during the collaboration?

RQ4. Why do universities and M&SMES collaborate? Why may such collaboration result in either being effective or failing?

In order to answer these research questions, the rest of the paper is divided into four main sections, the first of which offers a detailed description of the methodology adopted to implement the structured literature review. The following section contains findings articulated according to the four research questions earlier described. After this, avenues for future research are proposed based on previous findings. Concluding remarks, implications and limitations are summarized in the last section.

2. Methodology

This paper aims to shed new light on the collaboration between M&SMEs and Universities according to the four different RQs earlier proposed. More specifically, to reach the paper's aims, the authors developed a systematic review of the extant literature (Fink, 2005) adopting the Seuring and Gold (2012) process model for content analysis which is articulated in four main steps. The first one - referred to as "material collection" - concerns documents to be analyzed in the following steps. In this regard, attention was focused on Scopus indexed articles published in academic journals, since such a dataset is recognized as one of the top databases (Greenwood, 2011). We considered journal articles published until 2022 and written in English, independently of the Scopus categories (e.g., Business and management, Humanities). Based on such an approach, 162 documents were found, of which 17 were duplications. Each co-author carefully analyzed the abstract, in order to include or exclude the single document. In the case of discordance, the entire text was read by all the authors and a common decision was taken based on the following exclusion criteria:

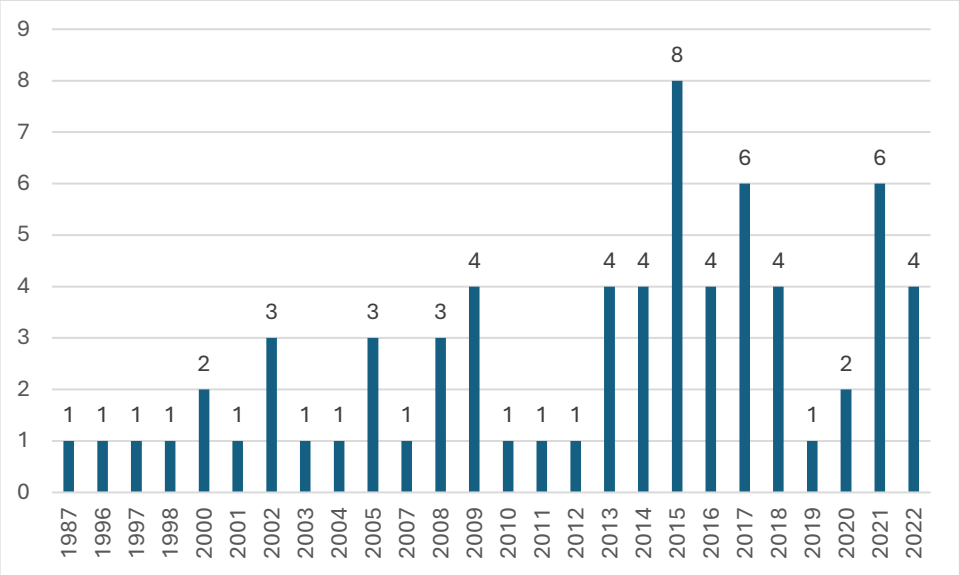
a) papers containing only a review of the extant literature (e.g., McCullogh, 2003; Pereira and Franco, 2022);
b) articles regarding research centers other than universities (e.g., Puglia *et al.*, 2020). Moreover, documents regarding both universities and other research centers were excluded if findings related to the academic side were not specifically available and mixed with the ones belonging to other research centers (e.g., Pinto *et al.*, 2015);
c) articles referring to both M&SMEs and large companies when findings were not split among the different sized categories (e.g., Pinto *et al.*, 2015; Serbanica *et al.*, 2015);
d) documents regarding collaborations where the relationships between the university and M&SMEs are "intermediated" by external actors (e.g., Battaglia and Neirotti, 2022; Foray and Woerter, 2021; Hassink, 1996; Kodama, 2008; Nishimura and Okamuro, 2011). However, direct relationships financed by third parties (e.g., national and regional governments) were included (e.g., Azzone and Maccarrone, 1997; Corsi *et al.*, 2022);

e) documents regarding technology transfer activities implemented through the creation of university spin-offs. However, collaborations with already established university spin-offs were included.

In adopting these criteria, 79 documents were excluded; at the same time, three more articles were included based on the snowball method (Wohlin *et al.*, 2022). The final list of documents included in the systematic literature review consisted of 69 documents published from 1987 to 2022 in 53 different journals. The time span is larger than the one earlier identified by Pereira and Franco (2022) which found documents only from 1995.

The second step of the Seuring and Gold (2012) process model concerns the "descriptive analysis". Therefore, the authors analyzed the formal characteristics of the selected documents. In this regard, the data summarized in Figure 1 show that the interest of scholars has considerably increased since 2013 (with the partial exception of 2019), confirming earlier findings by Pereira and Franco (2022).

Fig. 1 - Breakdown of sampled documents by year



Source: own elaboration

When considering the documents' source, only six out of the 53 sampled journals published more than one article in the considered time span (1987-2022) (Table 1). Moreover, journals belong to a large number of those in the Scopus Journal category; however, the two most relevant are the Social Science and Business, Management and Accounting ones. This finding is consistent with the ones previously proposed by Pereira and Franco (2022).

Tab. 1 - Breakdown of sampled documents by year

Journal	Number of documents
Industry and Higher Education	7
Technovation	6
European Journal of Innovation Management	4
Economics of Innovation and New Technology	3
Journal of Technology Transfer	3
Journal of Business and Industrial Marketing	2
Small Enterprise Research	2
Technological Forecasting and Social Change	2
Advanced Biomedical Engineering	1
ARPN Journal of Engineering and Applied Sciences	1
Asia Pacific Business Review	1
Asia Pacific Management Review	1
Asian Journal of Technology Innovation	1
British Journal of Management	1
Design Journal	1
Design Studies	1
Economic Development Quarterly	1
Education and Training	1
European Journal of Engineering Education	1
Frontiers of Business Research in China	1
Industrial and Commercial Training	1
Industrial Management and Data Systems	1
Industry and Innovation	1
International Journal of Manufacturing Technology and Management	1
International Journal of Advanced Manufacturing Technology	1
International Journal of Educational Management	1
International Journal of Entrepreneurship and Innovation	1
International Journal of Knowledge Management	1
International Journal of Management	1
International Journal of Technology, Knowledge and Society	1
Italian Economic Journal	1
Journal of Chinese Economic and Business Studies	1
Journal of Education and Work	1
Journal of Engineering Science and Technology Review	1
Journal of Food Engineering	1
Journal of Management and Organization	1
Journal of Regional Science	1
Journal of Rural Studies	1
Journal of Science and Technology Policy Management	1
Journal of Small Business and Enterprise Development	1
Journal of Technology Management and Innovation	1
Journal of the Knowledge Economy	1
Mediterranean Journal of Social Sciences	1
Prometheus (United Kingdom)	1
Quality - Access to Success	1
Science and Public Policy	1
Sustainability	1

Source: own elaboration

In terms of reference theories, the majority of sampled articles (42 out of 69) does not refer to any theoretical approach. Among the remaining 27 documents, 14 adopted a single theoretical framework, and 13 from two to four (Table 2). The most referred to framework is the Triple helix theory; however, in six out of eight documents it was integrated with other ones; in contrast, the Open innovation theoretical approach is mainly used as a single framework.

Tab. 2 - Breakdown of sampled documents by theoretical framework

Theoretical framework	Number of documents	Single framework	Multiple framework
Triple Helix Theory	8	2	6
Open Innovation	4	3	1
Absorptive capacity	4	2	2
Resource Based View	4		4
Design thinking	2	1	1
Innovation Systems	2	1	1
Institutional Theory	2	1	1
Competence-based Theory	1	1	
Knowledge-based (endogenous) economic growth theories	1	1	
Network analysis	1	1	
Social Capital Theory	1	1	
Adaptive Learning	1		1
Boundary Cross Concept	1		1
Co-design	1		1
Industrial Marketing & Purchasing	1		1
Innovation Management Perspective	1		1
Innovation theory	1		1
Knowledge-based view	1		1
Network-revised Uppsala Theory	1		1
New Product Development	1		1
Organizational learning perspective	1		1
Relational view	1		1
Semiotic Interaction Model	1		1
Transaction Cost Economy	1		1
Trust Theory	1		1

Source: own elaboration

In order to characterize the extant literature in terms of adopted research methodologies, a further analysis was developed showing that only two papers have a conceptual nature (Caputo *et al.*, 2002; Xu, 2013). Among the remaining articles, most of documents are based on qualitative methods, while mixed ones are very rarely adopted (Table 3). It is worth noting that these results are consistent with previous findings by Pujomoto *et al.* (2023) when they analyzed 176 articles referring to the university-industry collaboration topic, independently of the firms' size. Within the qualitative methods, single and multiple case studies were the most diffused, while the survey is the one most adopted among the quantitative ones.

Tab. 3 - Breakdown of sampled document by adopted research typology and methods

Research typology	Research methods	Number of documents
Qualitative	Single case Study	16
	Multiple case Study	11
	Interview	5
	Action research	1
	Desk research analysis + Documentary analysis	1
	Single case study + Action research	1
	Single case study + Auto ethnographic approach	1
	Total	*36*
Quantitative	Survey	16
	Secondary data	7
	Total	*23*
Conceptual	***Total***	*2*
Mixed methods	Survey + Interview	4
	Survey + Single case study	1
	Survey + Multiple case study	1
	Survey + Anecdotal evidence	1
	Survey + Single case study + Action research	1
	Total	*8*
Total		**69**

Source: own elaboration

A further useful insight emerges considering the time span of empirical analyses implemented in the extant literature. More specifically, only 13 out of the 67 empirical studies analyzed the phenomenon in at least a three-year period.

At the same time, Garcia-Alvarez-Coque *et al.* (2019) pointed out that universities relate differently from external actors on the basis of their nature (e.g., public vs. private ones) and the environment in which they are embedded. Therefore, further interesting evidence emerges when considering countries investigated in the 67 articles containing empirical analyses (Table 4). Differently from previous studies (Nsanzumuhire and Groot, 2020), scholars analyzed a differentiated set of countries (32), including some with a lower technological development. Moreover, investigated countries emerge as highly differentiated also in terms of the indicator "University-industry collaboration in R&D" (ranging from 1 to 7) reported by the World Economic Forum within "The Global Competitiveness Report". In Table 4 data for this indicator are reported for both the WEF 2014/2015 and WEF 2019 editions of the Report.

Tab. 4 - Breakdown of empirical sampled documents by country

Country	Number of documents	WEF 2014/15	WEF 2019	Δ 2014/15 -2019
UK	14	5.7	4.9	-0.8
Italy	9	3.7	3.7	0
Australia	6	4.8	4.3	-0.5
Japan	4	5	4.7	-0.3
Sweden	4	5.3	5.3	0
Taiwan	4	5.1	4.7	-0.4
Spain	3	3.8	3.6	-0.2
Austria	2	4.7	4.8	0.1
Croatia	2	3.4	3	-0.4
Denmark	2	4.9	5.2	0.3
Estonia	2	4.4	4.2	-0.2
Finland	2	6	5.3	-0.7
Germany	2	5.3	5.2	-0.1
Indonesia	2	4.5	4.6	0.1
USA	2	5.8	5.4	-0.4
Canada	1	4.9	4.8	-0.1
China	1	4.4	4.4	0
Colombia	1	3.9	3.7	-0.2
United Arab Emirates	1	4.7	4.8	0.1
France	1	4.6	4.5	-0.1
Hong Kong	1	4.6	4.9	0.3
Hungary	1	4.3	3.3	-1
Ireland	1	5.2	4.8	-0.4
Poland	1	3.5	3.2	-0.3
Romania	1	3.6	3.4	-0.2
Slovakia	1	3.4	3.6	0.2
Slovenia	1	4	4	0
South Africa	1	4.5	4.2	-0.3
Thailand	1	4	4.1	0.1
The Netherlands	1	5.4	5.4	0
Turkey	1	3.7	3.6	-0.1
Zimbabwe	1	2.8	3.2	0.4

Source: own elaboration on WEF data (WEF_GlobalCompetitivenessReport_2014-15.pdf (weforum.org); Global Competitiveness Report 2019 | World Economic Forum (weforum.org))

The choice of countries, however, seems not to be based on the percentage of M&SMEs on total firms, since it is generally more than 98% (European Commission, 2020). Finally, partially differently from Pereira and Franco (2022), the most investigated countries - after the UK are Italy, Australia, Japan, Taiwan and Sweden, while Spain has only two evidences. Moreover, differently from Pereira and Franco (2022), our data also show that scholars analyzed less developed regions, especially in

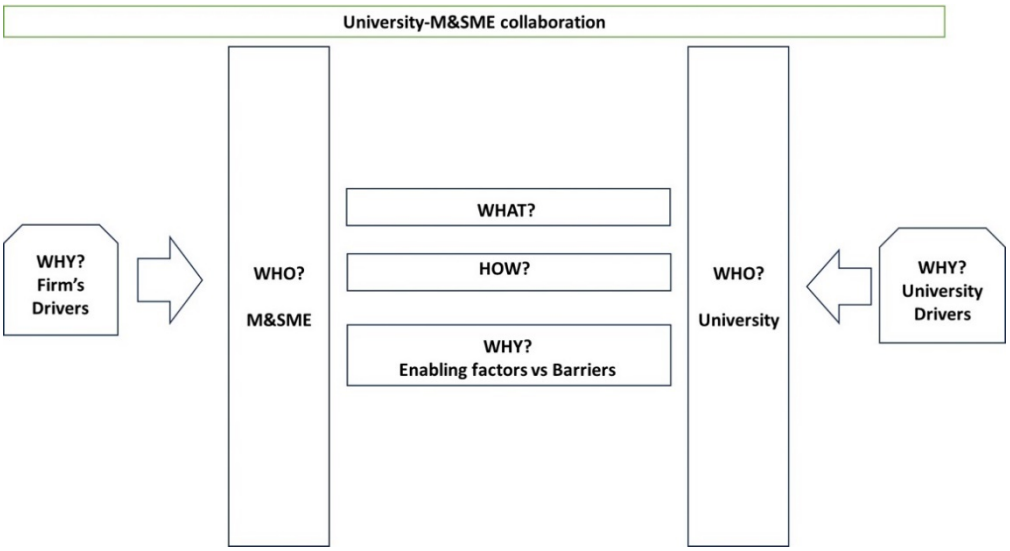
Asia. Finally, only four articles offer a comparison of the phenomenon among countries ranging from two to six.

A final characterization of the sampled articles is regarding the presence of definitions of the collaboration between universities and M&SMEs. The authors found that only seven out of the 69 chosen documents offer a clear definition of the investigated phenomenon. This finding is quite similar to the one reached by Bengoa *et al.* (2021) which investigated 3,218 journal articles analyzing the wider phenomenon of technology transfer, which includes the one investigated in this article. They explained such a limited result, stating the concept (technology transfer) is "a complex, difficult process that also needs time to evolve" (Bengoa *et al.*, 2021). Such an interpretation could also be adopted for the collaboration between M&SMEs and universities, since a large number of modes may be implemented, as will be shown when discussing the findings regarding RQ3.

The third step of the analysis was "category selection", which consists of defining the analytical categories to classify documents' contents. As already pointed out in the Introduction, the authors adopted a four questions approach analyzing the "Who", "What", "Why" and "How" dimensions of the investigated phenomenon, as earlier described when presenting the RQs. In Figure 2, the adopted interpretative framework is synthesized. In order to operationally describe the contents of each RQ, a short description of the investigated variables is provided as follows:

a) Who: RQ1 is in regard to the actors involved in the collaboration (universities vs. M&SMEs);
b) What: RQ2 concerns, first of all, the nature of inputs (e.g., the nature of the transferred/developed knowledge/technology) and outputs (e.g., typology of the innovation deriving from the transfer) characterizing the collaboration. Based on such analysis, the directionality of the relationships is classified, making it possible to find two main alternatives, namely unidirectional - as in the case of contract research commissioned by a M&SME to the University - and collaborative/joint agreement (Capaldo *et al.*, 2016) - when the research project requires the engagement of both partners;
c) How: RQ3 is related to the modes adopted by universities and M&SMEs to implement the collaboration and their possible classifications;
d) Why: RQ4 looks at three different issues. The first is related to factors inducing universities and M&SMEs to collaborate (drivers), the second refers to elements facilitating the relationships (enabling factors) and the third one concerns those hindering it (barriers).

Fig. 2 - The adopted interpretative framework



Source: own elaboration

The final step of Seuring and Gold's (2012) process model for content analysis is regarding material evaluation. This activity was performed by reading, analyzing and coding all selected documents according the four RQs presented earlier. The process reliability was improved by

discussion among authors (researcher triangulation) and by ensuring process documentation (Denyer and Tranfield, 2009).

3. Findings

3.1 The Who issue

RQ1 (Who?) concerns the actors involved in the investigated collaborations. On the academic side, three articles also direct their focus towards other higher education institutions and research centers (Azzone and Maccarrone, 1997; Cloutier and Amara, 2018; Collier *et al.*, 2011). Furthermore, while 41 out of 69 documents discuss universities in general terms, some authors specifically examine different types of these institutions (Table 5), primarily distinguishing between public and private entities. Additionally, specific actors within the university, such as Technology Transfer Offices (TTOs), were analyzed as distinct units.

Tab. 5 - Typologies of investigated universities and actors within them

Typologies of university	**Number of documents**	**Reference code in Appendix 1**
Universities in general	41	1;2;4;5;6;8;11;12;14;15;16;18;22;23;25;26;27;28; 29;30;35;36;37;38;39;40;42;49;50;53;54;56;57;58;59;60;61;63;64;68;69
Public University	6	7;9;13;32;55;66
Private University	4	7; 32; 55; 66
Regional & Small University	2	17; 55
Foreign University	2	17; 22
Interstate University	1	17
International branch campus	1	7
University of applied studies	1	46
Technical University & Polytechnic	1	19
Business School	1	20
Medical Research University	1	21
Type of actor within university	**Number of documents**	**Reference code in Appendix 1**
Technology Transfer Office	6	16; 17; 24; 31; 37; 62
Department	2	10; 48
Professional Innovation Support Officers	1	37
University Center of excellence	1	41
University technology station	1	51
University Design Research unit	1	65
Principal Investigator	1	52
Professors in Engineering Dept.	1	66
Professors in Biomedical Dept.	1	66

Source: own elaboration

When examining the perspective of firms, Lundberg and Öberg (2021) stand out as the sole authors to conceptualize companies not merely as recipients of technology/knowledge transfer or partners in joint research collaborations, but also as contributors of novel findings for the academic sphere. Furthermore, while 48 articles exclusively focus on Small and Medium Enterprises (SMEs), the remaining 21 also encompass micro-enterprises (Table 6). This discovery holds particular significance, as micro-enterprises constitute a vast majority within international economic systems. Additionally, while the majority of documents (54) address Micro, Small, and Medium Enterprises (M&SMEs) collectively, some authors scrutinize specific categories of companies. For instance, Ndabeni and Maharajh (2009) specifically examine low-tech companies, whereas Rajalo and Vadi (2021) focus on entities with limited innovation capacity.

Tab. 6 - Typologies of investigated M&SMEs

Classification based on the size	**Number of documents**	**Reference code in Appendix 1**
SME only	48	1;2;4;5;6;7;8;9;11;12;13;15;17;18;19;23;25;27;28; 30;32;35;36;37;39;49;40;42;43;44;45;46;47;48;50; 52;53;55;58;59;60;61;63;64;65;66;67;68;69
M&SME	21	3;10;14;16;20;21;22;24;26;28;31;33;34;38;41;49;51;54;56;57;62
Other firm's characteristics	**Number of documents**	**Reference code in Appendix 1**
SMEs in general	54	1;2;3;4;5;7;8;10;11;12;13;14;15;16;18;19;20;21;22;23;25;27;28; 29;31;32;33;34;36;37;38;39;40;41;42; 43;44;45;46;48;50;53;54;55;57;58;60;63;64;65;66; 67;68;69
Start up	3	47;52;59
Young firm	2	6;26
Spin-off	1	6
Old firms	1	26
Firm targeting national mkt	1	6
Academic firm	1	9
Science intensive firms	1	9
Firms purely dedicated to development	1	9
High technology	1	17
Innovative firms	1	24
Low technology but innovative firms	1	30
Rural SME	1	35
New technology firms	1	49
Patent applicant	1	49
Low tech	1	51
National vs. International SMEs	1	52
Low innovation capacity firms	1	56
Firms with R&D Department	1	61
High Growth	1	62

Source: own elaboration

A further useful characterization of investigated companies is the industry they belong to (Table 7). Excluding the two conceptual papers mentioned above, 34 documents concern only one industry, 15 concern two of them while only Asplund and Bengtsson (2020), Capaldo *et al.* (2016) and Garcia-Perez-de-Lema *et al.* (2017) offer a more longitudinal perspective (three sectors). More specifically, the most investigated sector is the manufacturing one (46), while the construction industry was analyzed by only two articles.

Tab. 7 - Breakdown of investigated M&SMEs by sector and industry

Sector/Industry		**Number of documents**	**Reference code in Appendix 1**
No specific sector		14	4;7;8;24;36;37;39;52;54;55;56;61;63;66
Manufacturing		46	
	Manufacturing in general		2;16;17;18;20;22;27;30;31;32;35;38;41;42;44;49;50; 67
	Manufacturing multi-industry		3;9;10;11;13;15;19;23;26;34;40;43;45;51;57;59;62
	Metal based industry		28;29;46
	Biomedical		1;5;47
	Life science		21
	Food industry		48
	Furniture		53
	Cosmetics		64
	Machinery		69
Construction		3	3;13;26
Service		25	
	Service multi-industry		3;9;10;23;26;33;34;57;62;67
	Service in general		13;20;27;38;49;51;58;60
	ICT		5;6;11;12;25;45
	Manufacturing services		65

Source: own elaboration

3.2 The What issue

RQ2 (What?) examines three distinct issues: the nature of inputs and outputs defining the collaboration, and its directionality. Regarding the latter, following Capaldo *et al.* (2016), documents were categorized into two alternatives: unidirectional technology/knowledge transfer and collaborative research projects. Only 49 out of the 69 articles explicitly address the relationship type, evenly distributed between the two alternatives; meanwhile, approximately one-third of the selected articles consider both simultaneously (Table 8).

Tab. 8 - Directionality of collaboration

Directionality	Number of documents	Reference codes in Appendix 1
Joint research	17	1;9;10;11;15;16;34;39;47;53;54;56;59;60;64;65;69
Unidirectional Technology Transfer	16	5;8;13;19;21;25;26;30;32;33;43;44;52;61;67;68
Both	16	2;4;6;14;17;27;31;36;38;40;42;48;49;55;57;62

Source: own elaboration

While investigations into inputs were relatively scarce (only 10 documents), they primarily centered around tacit knowledge (Table 9). However, a diverse range of output types were explored, encompassing ten different categories, with product and process innovation emerging as the most frequently cited (Table 10). Notably, certain studies delved into outputs associated with earlier stages of the innovation process, such as technology demonstration (three documents) and proof of concept (two documents). The significance of the former output is underscored in the context of Micro and Small and Medium Enterprises (M&SMEs), given their resource constraints and risk-averse tendencies. In this regard, the technology demonstration provided by universities may alleviate barriers impeding the innovation process for M&SMEs

Tab. 9 - Breakdown by collaboration input

Typology of knowledge	Number of documents	Reference codes in Appendix 1
Tacit knowledge	7	2;24;25;27;28;45;68
Technical knowledge	3	8;9;33
Codified knowledge	1	28
Basic knowledge	1	2
Codified scientific and technology knowledge	1	2

Source: own elaboration

Tab. 10 - Breakdown by collaboration output

Typology of innovation content	Number of documents	Reference codes in Appendix 1
Product innovation	15	3;16;19;22;30;35;36;37;43;44;51;52;64;67;69
Process innovation	9	3;16;19;22;29;30;36;44;51
Marketing innovation	6	3;22;33;36;43;64
Organizational innovation	4	3;22;64;67
Service innovation	3	35;60;67
Technology demonstration	3	8;44;51
Proof of concept	2	27;54
Managerial innovation	1	14
Technological innovation	1	14
Innovation activities (general/not specific)	1	46
Innovations to be adapted	1	14
New method	1	37

Source: own elaboration

3.3 The How issue

RQ3 (How?) refers to the modes of interaction that universities and M&SMEs use during the collaboration. Scholars identified 22 different alternatives, ranging from MSc and/or PhD theses and co-design projects. Therefore, it seems useful in implementing their analysis to classify them into

homogeneous categories (Table 11). In this regard, very few authors proposed specific classifications; moreover, such proposals differ in terms of adopted criteria. However, three main typologies of these criteria seem to emerge:

a) Collaboration aims: this classification criterion is regarding aims inducing M&SMEs and universities to collaborate. Such a criterion was initially proposed by Perkmann and Walsh (2007) who identified the following two alternatives: i) "academic engagement" - where the receiver aims to have access to the university base of knowledge (e.g., contract and/or collaborative research, training, consultancy); and ii) "commercialization" - where the receiver aims to have access to university research outputs (e.g., through patents sale and/or licensing). In other terms, while "academic engagement" is a form of knowledge-related collaboration between partners (Bozeman *et al.*, 2013), "commercialization" represents a sort of "market acceptance" for academic research results (Capaldo *et al.*, 2016; Markman *et al.*, 2008). The classification under investigation may be considered similar to the one proposed by Corral de Zubielqui *et al.* (2015), which differentiates between university-industry links and relationships. While in the former the receiver aims to access university resources and research outputs and/or activate human mobility transfer (e.g., graduate recruiting), the latter is regarding the development of new research outputs. Therefore, while "relationships" are consistent with the "academic engagement" alternative, "links" refer to the "commercialization" one. Finally, Jones *et al.* (2017) propose differentiating between "generic links" - which is regarding knowledge/technology transfer - and "relational links" - which includes either research services or research partnerships. Therefore, while generic links are more similar to the commercialization option, the relational links fit better with the academic engagement alternative;
b) Content-based: such a criterion concerns the content of the relationships between universities and M&SMEs. In this regard, Brimble and Doner (2007) identified three main categories, namely: training and education, consultancy services, and research. In contrast, Pinto *et al.* (2015) offer a more articulated set of contents, including: i) advanced services (e.g., consultancy and contract research); ii) collaborative research (e.g., joint R&D projects); iii) human resource-based activities (e.g., internships for graduates, exchange of personnel, training for employees); iv) commercialization activities (e.g., patent exploitation, participation in spin-offs); and v) informal relationships;
c) Degree of formalization/Governance mode: Garcia-Perez-de-Lema *et al.* (2017) differentiated the collaborations between universities and M&SMEs according to the mode by which they are governed. More specifically, they propose two alternative approaches, namely: contractual-based and relational-based. While the former typology includes collaboration modes such as research conventions, R&D development projects and innovation ones, the latter includes business alternatives such as business and/or technical training, consultancy and fellowships for students. More recently, Apa *et al.* (2021) suggested differentiating between collaborations according to the degree of formalization, i.e. differentiating between formal and informal ones. The formal category includes "personal formal collaborations" (e.g., student internships and use of university facilities), "formal non-targeted agreements" (e.g., endowed chairs and advisory boards), and "formal targeted agreements" (e.g., patenting and licensing agreements and cooperative research projects). In contrast, informal collaborations include a set of personal informal relationships (e.g., joint and individual lectures and academic spin-offs).

When considering the single mode universities and M&SMEs adopt to manage the collaboration, a large number of specific alternatives were proposed in the extant literature. In this respect, Apa *et al.* (2021) proposed the most complete list, which comprises 28 different alternatives, grouped according to the degree of formalization.

Based on Pinto *et al.*'s (2015) criteria, in Table 11, collaboration modes are classified according to their content; it emerges that the ones based on human resources are the most diffused. This may be, at least partially, explained by the lack of skilled personnel within M&SMEs, with innovation and R&D activity often being outsourced (Hojnik and Rebernik, 2012). In this regard, it is worth noting that Masters and PhD students are often adopted as providers of innovation, especially when academia

supports them as supervisors. However, Gold *et al.* (1996) claim that such a collaboration mode is not free of obstacles and failure risks. Finally, several articles point out the relevance of public financial support for this type of collaboration, especially in the UK (Humphries, 2005; Lipscomb and McEwan, 2001).

The second most frequent category of collaboration modes is regarding the supply of advanced services - especially research contracts. At the same time, commercialization concerns almost exclusively patent licensing/transfer, while collaborative research is rarely implemented. This evidence confirms the M&SMEs' propensity to buy knowledge/innovation more than to internally develop it (Brunswicker and Vanhaverbeke, 2015; Mas-Tur and Ribeiro-Soriano, 2014; Ribeiro-Soriano, 2017; Vahter *et al.*, 2014). Finally, it is worth noting that the informal provision of structured knowledge (e.g., publication) and even information, is a service often appreciated by M&SMEs.

Tab. 11 - Breakdown of collaboration modes by content

Classification (according Pinto *et al.*, 2015)	**Collaboration modes**	**Number of documents**	**Reference codes in Appendix 1**
Human resource-based activities	MSc and/or PhD Thesis	8	3;6;18;31;40;42;44;47
	Researcher's transfer to the SME	8	8;14;19;22;27;28;29;36
	Employing new graduate students	6	4;17;22;31;34;36
	Support in recruiting	1	6
	Academics in the SME board	1	17
	Adjunct Professor	1	17
	Short-term transfer program	1	28
	Collaboration for student training	1	36
Advanced services	Research contract	6	13;17;22;36;40;42
	Use of university facilities/equipment	4	4;8;22;36
	Manufacturing of prototype	1	51
	Technological audits	1	51
	Co-design	1	53
	Design and manufacturing of new products	1	63
Commercialization	Patent licensing and/or transfer	7	4;6;8;17;21;36;63
	Copyright licensing	1	6
	Transfer of plants	1	19
Collaborative research	Joint patent development	1	55
	Co-authorship	1	9
Informal relationship	Access to publications and reports	6	6;17;22;31;36;40
Informal relationship	Provision of information	4	5;6;8;31

Source: own elaboration

3.4 The Why issue

RQ4 (Why?) analyzes three different elements, namely *drivers* inducing collaboration, *enabling factors* and *barriers* which either facilitate or hinder the cooperation between universities and M&SMEs. In the following subsections findings related to these three elements will be discussed.

Drivers

In order to investigate the drivers, the analysis is articulated according to the collaboration partner; therefore, the ones inducing universities to cooperate are presented before those characterizing M&SMEs. In this respect, the findings show university-related drivers were rarely investigated by scholars. More specifically, only six out of the 69 selected articles proposed a total amount of 15 items ranging from one to six. In order to better analyze such elements, the authors divided them into two main categories, namely the "institutional level" - including 11 different drivers affecting the university as an organization - and the "single researcher level" - which embraces the remaining four elements referring to the motivations of the single researcher. It is worth noting only three drivers (testing new scientific resources in industrial contexts; obtaining financial resources for education and research missions; and increasing employment opportunities for students) are cited twice (Table 12).

Tab. 12 - Classification of drivers related to the university's side

Category	Driver	Number of documents	Reference code in Appendix 1
Institutional level	Testing new scientific resources in industrial contexts	2	10, 15
	Obtain financial resources for education and research missions	2	15, 25
	Increasing employment opportunities for students	2	15, 31
	Opportunity to combine complementary research	1	10
	Development of new scientific instruments	1	10
	Access to industrial data	1	10
	Broadening the students' experience	1	15
	Government pressure towards local development	1	25
	Willingness to contribute to local development	1	25
	Supporting the renewal/expansion of companies' technology	1	15
	Speed-up research activity	1	66
Single researcher level	Pleasure of the individual researcher to create knowledge	1	25
	Income increase for individual researcher	1	25
	Opportunity to publish in leading journals	1	25
	Researchers' willingness to participate in the project	1	26

Source: own elaboration

In contrast, 13 documents proposed a total amount of 46 drivers boosting M&SMEs to collaborate. Lam *et al.* (2013) is the single source containing the highest number of drivers (12). The single most cited items (three times each) are 'Strengthen competitive advantage' and 'Access to facilities/equipment'. In order to better analyze the 46 drivers, they were grouped into six homogeneous categories (Table 13), according to the driver nature. The 'Strategic and marketing' category resulted as being the most important in terms of number of drivers (13) and citing sources (seven).

Tab. 13 - Classification of drivers related to the M&SMEs side

Category	Driver (recipients)	Number of documents	Reference code in Appendix 1
Economic and financial driver	Profit	1	27
	Cost reduction	1	49
	Access to research fundings	1	66
	Minimizing costs (process)	1	16
	Attract financial resources	2	31
Human resources driver	Attract talents	1	31
	Access to skilled HR	1	66
	Recruit new employees	2	3
	Awareness of internal competence boundaries	2	40; 57
Knowledge driver	Solve problems	1	3
	Acquire knowledge on new technologies	1	3
	Get new ideas	1	3
	Learning from collaboration	1	10
	Add value based on university knowledge	1	25
	Exploitation of external knowledge	1	40
	Accessing university expertise	1	15
	Obtain new information	2	10
Relational & benchmark driver	Maintain contacts with higher education institutions	1	66
	Achieve new contacts	1	10
	Reputation management	1	40
	Become acquainted with other entrepreneurs	1	58
	Better understand other organizations	1	58
	Acquire familiarity with university	1	58
Strategic & marketing driver	Strengthen national/international market position	1	11
	Develop new/modified products/services	1	18
	Product adaptation to foreign markets	1	18
	Improve market penetration	1	18
	Customer request of innovative and user-friendly products	1	40
	Competition intensity	1	40
	Enabling the customers' and external stakeholders' voice	1	40
	Compliance with environmental and safety standards	1	40
	Shortening new product time to market	1	49
	Promoting and marketing own products/services	1	58
	Identify new (product) market opportunities	1	16
	Minimizing risk (process)	1	16
	Strengthen competitive advantage	3	31; 40; 57

Technological driver	Collaborating in R&D activities	1	18
	Technology complexity and integration	1	40
	Emerging culture for open innovation	1	40
	Upgrade basic R&D skills	1	49
	Commercialize firm's tech seeds	1	49
	Increasing precompetitive research level	1	15
	Explore new (product) technological trends	1	16
	Speeding up (process) R&D activities	1	16
	Access to facilities/equipment	3	15; 40; 66

Source: own elaboration

Comparing universities' and M&SMES' drivers, it is worth noting they are quite different. This finding could represent an obstacle to the implementation of an effective and efficient collaboration between the two partners, as will be discussed in the subsection devoted to the emerged barriers. Moreover, drivers boosting universities to collaborate are mainly related to the more "traditional" missions (namely, education and research) than the so-called "third mission" (e.g., willingness to contribute to local development). On the other hand, M&SMEs are mainly driven by the search for competitive advantage.

Enabling factors

When considering enabling factors, 144 different items were proposed in 43 documents. In order to better analyze such a huge amount of factors, they were divided according to the partner (university-related, M&SMEs-related and shared ones) and then grouped into 10 homogeneous categories. More specifically, the first two are regarding the (internal and external) context where the collaboration takes place; the next three concern preconditions; the following three the cooperation phases (namely, search, implementation and internalization); and the last two are regarding the characteristics of the innovation and the previous collaboration experience (Table 14).

Tab. 14 - Classification of enabling factors

	University		**MSMEs**		**Shared enabling factors**	
Category	**Items**	**Reference code in Appendix 1**	**Items**	**Reference code in Appendix 1**	**Items**	**Reference code in Appendix 1**
External context			6	16; 30; 35; 39; 50; 57; 63	4	2; 16; 19; 23; 39; 54
Internal context	3	3; 17; 32	3	16; 26; 30; 35; 50		
Cultural and managerial preconditions	4	13; 15; 27; 57; 61	10	5; 6; 13; 16; 19; 27; 30; 52; 57; 67	10	9; 27; 52; 56; 61; 67
Economic and financial preconditions			4	13; 19; 30; 50		
Organizational and knowledge-related preconditions	9	1; 3; 5; 7; 9; 13; 17; 33; 35; 37; 43; 62; 67	13	6; 10; 11; 13; 14; 15; 16; 30; 39; 49; 50		
Search	10	3; 9; 12; 13; 14; 23; 37; 41; 62	4	2; 6; 34; 39	4	2; 15; 29; 43
Implementation	5	2; 31; 43; 54; 60; 62	7	6; 13; 43; 67	17	5; 6; 10; 11; 13; 15; 16; 19; 27; 31; 37; 46; 48; 53; 54; 57; 67
Internalization phase			4	12; 17; 23; 26; 30; 46; 56; 57; 60; 61; 67		
Characteristic of type of innovation			2	3; 14		
Previous collaboration experience	3	3; 13; 18; 31; 52	12	9; 26; 30; 34; 35; 52; 64	9	9; 10; 11; 13; 16; 17; 19; 33; 43; 46; 52; 53; 57; 61; 67

Source: own elaboration

As far as the context categories are concerned, the external environment was considered relevant only for the M&SMEs (e.g., industry technological characteristics). At the same time, the most investigated category in terms of preconditions is the one regarding cultural and managerial issues (e.g. M&SME's ability to understand its technological needs vs. comprehension of M&SME's needs). In this respect, it is worth noting that economic and financial enabling factors (e.g. availability of tax incentives) are considered less relevant than the other preconditions. In addition, when

considering the collaboration phases, the large amount of enabling factors are regarding implementation (e.g. university's ability to codify scientific knowledge vs. M&SME's availability of data and information) followed by the search one (e.g., university ability to select M&SMEs truly willing to innovate vs. ability of the M&SME's network to select the focus university). In contrast, the internalization phase was less investigated in terms of enabling factors; in this respect it is worth noting that only the absorptive capacity was frequently cited as a helpful item. Finally, the previous collaboration between partners was supported by 24 enabling factors (from the more previous personal relationships between academics and firm's entrepreneurs/managers to the previous lecturing experience of M&SMEs' representatives). However, 12 of these enabling factors are with regard to the M&SMEs side, while nine are shared ones.

When considering the single enabling factor most cited for each partner, it emerges that the presence of focused organizational units (e.g. TTO and career offices) is the most critical on the university side, while - as earlier pointed out - the absorptive capacity is on the firm's side. Finally, common trust and personal relationships are the most cited enabling factors among the shared ones.

Barriers

When considering barriers, 103 different items were proposed in 29 documents. Also in this case, in order to better analyze such a huge number of elements, they were divided according to the partner (university-related, M&SMEs-related and shared ones) and then grouped into nine of the homogeneous categories already adopted for the enabling factors (Table 15). More specifically, the one concerning the characteristics of the innovation typology was not considered in the extant literature.

Tab. 15 - Classification of barriers

Category	**University**		**MSMEs**		**Shared barriers**	
	Items	**Reference code in Appendix 1**	**Items**	**Reference code in Appendix 1**	**Items**	**Reference code in Appendix 1**
External context			6	30; 35; 40	1	23
Internal context	3	7; 8				
Cultural and managerial preconditions	20	7; 8; 9; 13; 17; 19; 23; 25; 31; 41; 52; 59	13	2; 5; 7; 8; 22; 25; 40; 59; 68	13	8; 9; 10; 12; 14; 15; 17; 19; 37; 45; 47; 57
Economic and financial preconditions			3	19; 23; 31;41; 49;52	2	14
Organizational and knowledge-related preconditions	3	7; 13; 31; 41	5	31; 40; 49; 59	3	10; 14: 49
Previous collaboration experience			1	10		
Search phase	6	7; 13; 19; 23; 25; 31	3	17; 19	2	25
Implementation phase	5	9; 10; 12; 17; 19; 23; 46; 52	3	8; 25; 45	9	6; 8; 10; 14; 19; 25; 49; 68
Internalization phase			2	2; 14; 31; 49; 59		

Source: own elaboration

As earlier noted for the enabling factors, the external context appears as more relevant as a source of barriers (e.g., M&SME's location in a rural area). At the same time, the cultural and managerial preconditions (university lack of focus on knowledge transfer vs. M&SMEs' lack of perception of collaboration needs) emerge as the more relevant. In contrast, economic and financial barriers are less cited. Finally, the implementation phase emerges again as the most investigated one; in this respect, orientation to perfection and the lack of practical perspective were cited as the most relevant for the university side, while lack of patience in conducting research projects was the most relevant barrier on the M&SME's side.

When considering the single barrier most cited for each partner, it emerges that university bureaucracy is perceived as the most critical issue hindering cooperation, together with the M&SME's lack of absorptive capacity. Finally, conflicting aims (publications vs. products) emerges as the most relevant shared barrier.

Comparing evidence related to enabling factors and barriers, a certain level of reciprocity clearly emerges; in other terms, several of the selected factors supporting the collaboration may reduce - and even overcome - the barriers found in the extant literature. For instance, the development of mutual trust (e.g., based on previous collaborations) may counterbalance the M&SME's lack of confidence in universities' capabilities and the university's reluctance to deal with local small business.

The analysis of the extant literature also allowed the authors to identify some best practices - different from the enabling factors - which may support the effective and efficient collaboration between the investigated partners. In Table 16, such items were classified according to the collaboration phase, differentiating between the search and implementation ones. As already noted in the case of enabling factors and barriers, the internalization phase has rarely been investigated. At the same time, it is worth noting that all the best practices regarding the search phase belong to the university side. To the best of our knowledge, Ran *et al.* (2020) are the only authors suggesting criteria M&SMEs may adopt to, first of all, select the most cooperative universities and then find the most appropriate research team.

Tab. 16 - Best practices breakdown by collaboration phase

Collaboration phase	Best practice	Number of documents	Reference codes in Appendix 1
Search	Meetings U-I (ex ante)	6	13;15;29;37;45;53
	Networking events (e.g. workshop, conferences, round table)	4	27;29;40;62
	First meeting realized at the company	1	31
	Availability of University voucher for Masters Thesis	1	3
Implementation	Periodic meetings U-I during the project	8	15;27;31;43;45;47;53;68
	Incremental approach based on trial and error learning process	4	10;11;14;47
	KPI for monitoring U-I collaboration	2	3;58
	Pilot project	1	14
	Involvement of SME's R&D people since the beginning	1	31
	Interdisciplinary composition of students' team	1	18
	Effective communication	1	27
	Evaluation by external experts	1	54
	Team building	1	67
	Use of project management tool	1	57
	Build a list of a joint research themes	1	13

Source: own elaboration

Finally, even if enabling factors and best practices were addressed by some of the selected documents, very few scholars paid specific attention to the evaluation of the collaboration performances. More specifically, 22 documents investigate such an issue but only seven of them offer quantitative data regarding the collaboration projects' success.

Based on the findings discussed earlier, a set of future research avenues will be proposed in the next section.

4. Future avenues for research

The findings presented earlier offer significant insights into the dynamics of the examined collaboration, providing valuable guidance for scholars in terms of future research directions. This study contributes by proposing potential avenues for further investigation, which will be presented in the form of Future Research Avenues (FRA). Methodological considerations are paramount, as only a limited number of selected journal articles offer explicit definitions of the phenomena under investigation. Building upon Bengoa *et al.*'s (2021) suggestion for a broader research scope in technology transfer, future studies should strive to establish a unified conceptual framework for understanding collaborations between universities and M&SMEs (FRA 1), acknowledging the heterogeneous nature of these companies (Ranga *et al.*, 2008).

At the same time, the findings presented above show that only 27 out of the 69 studies adopted a theoretical framework, which may result in being a limitation in new knowledge development. Therefore, *future research should be implemented on single theoretical backgrounds and, even more, on their combination (FRA 2)*. For instance, the integration of the Absorptive capacity lens (Cohen and Levinthal, 1990) and the Triple helix approach (Etzkowitz and Leydesdorff, 2000) may offer a strong theoretical base on which to develop new knowledge that would also be useful for policy makers. This, in turn, could activate a spillover effect which would enable further collaborations

between universities and M&SMEs. In this respect, Ranga *et al.* (2008) and Jones and Corral de Zubielqui (2017), suggest that publicizing the success of relationships between the investigated partners may stimulate the development of further collaborations.

Since only four of the sampled empirical studies adopt a comparative perspective, a third methodological advice suggests *investigating the relationship between University and M&SMEs, comparing the phenomenon in different geographical areas (FRA 3)*. This is consistent with Garcia-Alvarez-Coque *et al.* (2019) who pointed out that universities relate differently to external actors on the basis of the environment in which they are embedded. More specifically, Grimaldi *et al.* (2021 highlight that university participation in the local economy is affected both by regional and national policies and legislation. Therefore, three alternative approaches should be implemented, namely, comparing: a) different countries (e.g., Biro, 2015), different regions within the same country (e.g., Amano-Ito, 2020; Capaldo *et al.*, 2016); and regions with similar features (e.g., in terms of the Regional Innovation Scoreboard) in different countries.

At the same time, only 13 out of the analyzed empirical studies investigate the phenomenon over at least a three-year period. Therefore, *future research should adopt a longitudinal approach in order to verify any evolution in terms of factors affecting the U-ICs in general and/or the single actor (FRA 4).* As far as the U-IC phenomenon is concerned, changes could be enacted by innovations in legislation (e.g., university evaluation systems including also the so-called "third mission") but also in technologies, as in the case of digital ones (Adomako and Nguyen, 2023). In contrast, at the single actor level, changes could be related to the institution of specific organizational units devoted to the U-IC (e.g. TTO) or to changes in the M&SMEs' governance (e.g. in the case of entrepreneurial succession).

The Who Issue

The findings previously presented clearly show the large majority of selected documents analyzing universities and M&SMEs as general categories (see Table 5 and 6), albeit some scholars investigated specific typologies of such actors (e.g., public vs. private university; hi-tech vs. low tech companies). Therefore, *future research should investigate different typologies of both actors and even perform comparisons between them (FRA 5).* For instance, universities including engineering departments (as in the case of Capaldo *et al.*, 2016) could be compared with a Medical Research University (Dahlborg *et al.*, 2017) and/or Business school (Dabic *et al.*, 2016). This approach is consistent with the assumption that there does 'not exist a single mode or template that fits for all universities' (Grimaldi *et al.*, 2021, p. 863). At the same time, the experience of young firms (Bellini *et al.*, 2019) could be compared with the older ones (Garcia-Perez-de-Lema *et al.*, 2017). Once again, this is consistent with Ranga *et al.* (2008).

With a specific focus on the university side, findings clearly show that only TTOs were analyzed in more than one selected document (six in total), while other organizational units (Centers of excellence) and/or actors (e.g., Principal investigators) were addressed very rarely (Table 5). Therefore, *future research should further investigate the single university components interacting with M&SMEs in the different phases of the collaboration (FRA 6).* However, TTOs also deserve further investigation; in this respect, qualitative methods should be adopted in order to improve the knowledge of such an unit of analysis (Pratt, 2009).

On the other hand, with respect to the M&SMEs side, *future research should be implemented by adopting a comparative approach in terms of industry (FRA 7),* since 34 out of the 67 empirical studies focus on only one industry.

The What issue

Regarding RQ2 (What?), an interesting FRA occurs when considering the output of the collaboration. More specifically, in terms of collaboration outputs, it emerged that all the four innovation typologies of the so-called OECD Eurostat (2018) "Oslo Manual" were investigated (Table 10). However, *future research should specifically verify if such outputs influence the way involved actors interact in the different steps of the collaboration (FRA 8).* For instance, the fear of

IP rights disclosure (emerged as one of the barriers on the firm's side) seems to be more relevant in the case of product and/or process innovation, while easiness to copy innovations could be more relevant in the case of organizational and marketing innovation. At the same time, universities hosting different Departments (e.g., business vs. engineering ones) may interact in a diverse way with M&SMEs.

The How issue

The conducted analysis showed 22 different collaboration modes proposed in the extant literature. Based on the Ranga *et al.* (2008) suggestion that M&SMEs are a quite heterogeneous category of firms, *future research avenues should verify if their choice is influenced by specific firms' characteristics (FRA 9)*, such as size, technology level, and industry. For instance, co-authorship is mainly expected in hi-tech industries employing human resources who obtained a PhD; at the same time, MSc students transfer could be easier for micro and small companies.

The Why issue

Pereira and Franco (2023) pointed out that scholars generally emphasize the barriers which hinder the collaboration between universities and M&SMEs. However, specific knowledge of such barriers is still in its infancy. Moreover, it seems there is no adequate debate on how to overcome them. Therefore, *future research should implement a holistic approach which simultaneously considers enabling factors and barriers (FRA 10)*, also taking into account the firms' features (e.g., industry and relative size). Moreover, a specific analysis could be implemented considering separately collaborations regarding the joint research and those based on a unidirectional transfer.

At the same time, it emerged that very few studies examined the performance of the collaboration (only 22 with only seven also offering quantitative data). Therefore, *future research should further investigate the degree of success of the collaboration and also identify best practices for its different phases (FRA 11)*.

Finally, *further research should devote specific attention to the internalization phase (FRA 12)* since its positive result could also induce the single M&SME to enact further collaboration with the specific university and/or academic systems in general.

5. Concluding remarks

This study is aimed at shedding new light on the collaboration between M&SMEs and universities. This research aim was reached through a systematic literature review of 69 Scopus indexed articles published between 1987 and 2022. Collected data were analyzed according to four RQs referring to the following perspectives: 1) who (involved actors); 2) what (collaboration directionality, inputs and outputs); 3) how (collaboration modes) and 4) why (drivers, enabling factor and barriers). By concentrating on the specific interactions between universities and M&SMEs, it is possible to uncover unique insights and develop targeted strategies that might be overlooked in broader studies of university-industry collaborations. This focused approach allows for a deeper and more detailed exploration of the specific factors that drive successful partnerships and innovation within this crucial segment of the economy.

A first contribution of this article is represented by the comprehensive interpretative framework adopted to investigate the Who, What, How and Why dimensions of the collaboration (Figure 2). This methodology allowed us to identify very heterogeneous positions among scholars, with the proposition of several different variables influencing the collaboration, especially in the case of enabling factors and barriers. Moreover, it highlighted the lack of a shared conceptualization of the investigated phenomenon, associated with a relatively scarce adoption of theoretical frameworks. In contrast, a diversified set of research methodologies was adopted, including both quantitative and qualitative approaches. Due to the fragmentation of empirical evidence and the lack of a common

perspective, a further contribution, on the academic side, is represented by the 12 FRAs proposed to support future research efforts.

However, the research also has useful insights for university managers (especially those involved in TTOs), M&SMEs entrepreneurs and managers, and policy makers. Among the implications that emerge for the first two categories, the most important is regarding the relevance of cultural preconditions, often due to the inadequate perception of the counterpart perspectives in terms of aims (e.g., publication vs. new product and process) and owned competences. Therefore, networking activities should be intensively promoted not only by universities but also by entrepreneurs' association, in order to develop mutual knowledge, appreciation and trust. At the same time, universities should carefully select academics really interested in collaborating with M&SMEs, evaluating not only their technical and technological capabilities but also their relational ones. Moreover, university managers should develop the ability to carefully select M&SMEs with a relevant willingness to participate (Caputo *et al.*, 2002), and look for companies having the same technological needs the university has already solved. In this way, those previous companies may represent an useful reference.

For policymakers, it is evident that economic and financial factors hold some importance, but establishing initial contact and fostering mutual trust are crucial for the success of future collaborations. An incremental approach is also deemed effective, where involving Master of Science students in companies, supported by academics experienced in prior collaborations, serves as an initial step. Policymakers could bolster such exchange programs with sufficient funding, encouraging selected students to remain within Micro and Small and Medium Enterprises (M&SMEs) for extended durations.

The primary limitation of this study is its reliance solely on the Scopus database, thus excluding other databases such as Web of Science, JSTOR, and EBSCO. Furthermore, the study's focus on English-language publications in peer-reviewed journals constitutes another limitation. Additionally, the subjective nature of the interpretative framework presents another potential limitation.

Based on the extant literature review, it is confirmed that collaboration between universities and firms may represent a win-win relationship (Pujotomo *et al.*, 2023) also for M&SMEs. However, adequate efforts should be implemented to cope with the large amount of barriers that may hinder that relationship. Therefore, enabling factors and best practices should be adequately taken into account by all the involved actors.

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I microfondamenti delle Phygital Dynamic Capabilities: il caso Webidoo Store

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Abstract

Quadro della ricerca. *Nonostante la letteratura precedente abbia contribuito alla comprensione delle Dynamic Capabilities digitali e di come queste si stiano evolvendo per affrontare le esigenze del mercato nell'era della trasformazione digitale, la ricerca sulle microfoundations delle Dynamic Capabilities in un contesto phygital risulta ancora carente.*

Obiettivo. *Utilizzando la lente teorica delle microfoundations, questo lavoro identifica ed esplora le microfoundations che guidano lo sviluppo delle phygital Dynamic Capabilities di tipo sensing, seizing e reconfiguring.*

Metodologia. *Questo articolo utilizza un caso di studio singolo concentrandosi su Webidoo Store, il primo negozio phygital di esperienze tecnologiche in Europa.*

Risultati. *I risultati dello studio sono sintetizzati in un framework concettuale che illustra come le tre capacità fondamentali 'phygital insight', 'phygital action', e 'phygital agility' si manifestano a livello individuale, di processo e struttura. Inoltre, evidenza come le phygital Dynamic Capabilities non operano in maniera isolata all'interno dell'organizzazione, ma sono interconnesse e si influenzino reciprocamente in un ciclo continuo.*

Limiti della ricerca. *Il presente lavoro rappresenta un primo studio esplorativo che necessita di ulteriori approfondimenti. Studi futuri potrebbe indagare le phygital Dynamic Capabilities in diversi mercati geografici o settori del retail, e testare il framework attraverso studi quantitativi.*

Implicazioni manageriali. *La ricerca fornisce ai manager uno strumento utile per definire e innovare le proprie strategie e operazioni, spiegando come sfruttare in maniera efficace le caratteristiche fisiche e digitali per costruire e mantenere un vantaggio competitivo nel panorama aziendale contemporaneo.*

Originalità della ricerca. *Il nostro studio cerca di comprendere quali sono gli elementi che a livello individuale, di processo e di struttura contribuiscono a creare e mantenere delle phygital Dynamic Capabilities. Il lavoro mostra come le tre dimensioni delle phygital Dynamic Capabilities (phygital insight, phygital action, phygital agility) sono interconnesse in un ciclo continuo, generando un approccio dinamico e adattivo all'implementazione delle phygital Dynamic Capabilities.*

Parole chiave: *phygital; caso di studio; dynamic capabilities; microfoundations.*

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1. Introduzione

La Trasformazione Digitale ha innescato profondi cambiamenti nei modelli e nelle strategie aziendali (Capo *et al.*, 2022; Warner & Wäger, 2019), portando le imprese a ridefinire le relazioni con i consumatori, i processi di vendita e le pratiche di comunicazione (Matarazzo *et al.*, 2020), sfruttando sia piattaforme online e offline. La convergenza tra il mondo fisico e digitale ha dato origine al concetto di *phygital* (sineresi anglofona di "fisico" e "digitale"). Questo termine è adoperato dagli studiosi per indicare l'integrazione fluida di elementi fisici e digitali al fine di creare un'esperienza unificata e arricchente per consumatori e imprese (Baratta *et al.*, 2022; Mele *et al.*, 2023; Pusceddu, 2022; Pusceddu *et al.*, 2023). Esempi di innovazioni *phygital* comprendono realtà aumentata, realtà virtuale, intelligenza artificiale e altri strumenti come tablet e codici QR. La distinzione tra realtà fisica e digitale è ormai sfumata (Mishra *et al.*, 2021). Tecnologie all'avanguardia si complementano sinergicamente con elementi fisici nello stesso spazio, migliorando il valore dei percorsi dei clienti (Akmermer, 2022; Belghiti *et al.*, 2017). Le imprese offrono esperienze d'acquisto più esclusive, personalizzate e su misura. Inoltre, i consumatori possono transitare rapidamente tra canali fisici e digitali per interagire con le imprese o con altri clienti (Huré *et al.*, 2017).

In questo scenario, ci si domanda: quali sono le *microfoundations* delle *phygital Dynamic Capabilities*? In che modo le imprese possono sviluppare tali capacità? Mentre la teoria delle Dynamic Capabilities è stata ampiamente applicata per analizzare l'impatto del digitale sulle imprese (Ancillai & Pascussi, 2023; Ghosh *et al.*, 2022; Warner & Wäger, 2019), le phygital Dynamic Capabilities rappresentano un'area meno esplorata, nonostante la crescente importanza dell'integrazione tra il mondo fisico e quello digitale nei modelli di business contemporanei (Klaus, 2021). Le *Dynamic Capabilities* rappresentano "competenze di livello superiore che determinano la capacità dell'impresa di integrare, costruire e riconfigurare risorse/competenze interne ed esterne per affrontare, e possibilmente plasmare, ambienti aziendali in rapida evoluzione"[4] (Teece, 2012, p. 1395). Gli studiosi hanno identificato le competenze e le capacità necessarie per una transizione digitale di successo a livello individuale e organizzativo (Kroh *et al.*, 2024). Ricerche recenti hanno avanzato la nozione di risorse digitali, definite come "una classe specifica di oggetti digitali che a) sono modulari, b) incorporano oggetti di valore, ovvero specifici beni e/o capacità, c) e sono accessibili tramite un'interfaccia *bitstring* programmabile"[5] (Piccoli *et al.*, 2020, p. 4). Le capacità digitali, le quali rappresentano modelli ripetibili di azioni accessibili programmaticamente attraverso un'interfaccia digitale, sono una classe specifica di risorse digitali (Piccoli *et al.*, 2020). Altri studi sostengono che le *Dynamic Capabilities* digitali sono comportamenti di rilevamento digitale (*digital sensing*), acquisizione digitale (*digital seizing*) e riconfigurazione digitale (*digital reconfiguring*) che contribuiscono ulteriormente al raggiungimento degli obiettivi di trasformazione digitale (Warner & Wäger, 2019). Sebbene la letteratura precedente abbia contribuito alla comprensione delle *Dynamic Capabilities* digitali e di come le *Dynamic Capabilities* si stiano evolvendo per affrontare con successo le esigenze del mercato nell'era della trasformazione digitale (Ellström *et al.*, 2021; Moi & Cabiddu, 2021), la ricerca sulle *phygital Dynamic Capabilities* è ancora carente. Colmare questa lacuna nella letteratura riveste un'importanza fondamentale per progredire nella comprensione di come le organizzazioni possono integrare strategicamente risorse fisiche e digitali nello sviluppo delle proprie competenze, considerando il dinamico contesto della trasformazione digitale.

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Per affrontare questa lacuna, lo studio si pone l'obiettivo di indagare come le imprese possono sviluppare delle *phygital Dynamic Capabilities* di tipo *sensing*, *seizing* e *reconfiguring*. Con un approccio basato sulle *microfoundations*, analizziamo i componenti chiave riconosciuti dagli studiosi come i pilastri fondamentali per lo sviluppo e il mantenimento delle *Dynamic Capabilities*. Questi pilastri includono gli individui, con uno specifico focus sui comportamenti, gli atteggiamenti e le loro competenze; i processi, definiti come i metodi di coordinamento e integrazione adottati all'interno dell'organizzazione per favorire l'interagire e la collaborazione; le strutture, che comprendono le condizioni che abilitano o limitano l'azione individuale e collettiva, ad esempio il clima organizzativo (Barney & Felin, 2013; Felin *et al.*, 2012).

Per raggiungere l'obiettivo del lavoro, è stata adottata la metodologia del caso di studio singolo (Eisenhardt, 1989). In particolare, ci siamo focalizzati sul caso Webidoo Store, il primo negozio *phygital* in Europa.

Lo studio contribuisce alla letteratura precedente sulla trasformazione digitale e le *Dynamic Capabilities* proponendo un nuovo framework concettuale per lo sviluppo delle *phygital Dynamic Capabilities*. Il nostro framework illustra come le tre capacità fondamentali *phygital insight*, *phygital action*, e *phygital agility* si manifestano a livello individuale, di processo e struttura. Inoltre, evidenza come le *phygital Dynamic Capabilities* non operano in maniera isolata all'interno dell'organizzazione, ma sono interconnesse e si influenzino reciprocamente in un ciclo continuo. Dal punto di vista pratico, offriamo ai manager una base solida per definire le proprie strategie e operazioni, spiegando come sfruttare le caratteristiche fisiche e digitali per prosperare nell'era della trasformazione digitale.

2. Background teorico

La teoria delle *Dynamic Capabilities* fornisce una prospettiva cruciale sul modo in cui le imprese dovrebbero costruire, integrare, e ridefinire le proprie risorse e capacità per affrontare in modo efficace i cambiamenti incessanti del mercato (Teece, 2007). Queste capacità possono essere classificate in: capacità delle imprese di individuare e rispondere a opportunità e minacce (*sensing*); capacità di acquisire i processi e le strutture necessarie per generare valore (*seizing*); e capacità di adattare in modo continuo risorse tangibili e intangibili in risposta ai cambiamenti del mercato (*reconfiguring*) (Teece, 2007).

È ampiamente riconosciuto dagli studiosi il ruolo di primaria importanza delle *Dynamic Capabilities* nel fronteggiare le sfide della trasformazione digitale. Queste capacità spingono le imprese a introdurre in modo sistematico cambiamenti nei propri modelli di business e nei processi di creazione di valore, al fine di mantenere un vantaggio competitivo (Ellström *et al.*, 2021; Warner & Wäger, 2019). In particolare, le *Dynamic Capabilities* di *sensing* digitale risultano cruciali per comprendere in modo efficace gli sviluppi imprevisti in un panorama aziendale dinamico e per adottare in modo proattivo misure atte a gestire il cambiamento (Warner & Wäger, 2019). Sottolineando l'importanza delle abilità di *sensing* digitali, gli studiosi evidenziano le risorse digitali necessarie per instaurare capacità decisive nell'ambito dell'espansione aziendale (Daniel & Wilson, 2003). Inoltre, è stato riscontrato che queste capacità permettono alle imprese di esplorare attivamente le tendenze tecnologiche e di valutare scenari digitali futuri (Ghosh *et al.*, 2022; Kroh *et al.*, 2024; Linde *et al.*, 2021).

Nel discutere le *Dynamic Capabilities* di *seizing* digitale, gli studiosi enfatizzano diverse pratiche adottate dalle imprese, tra cui l'utilizzo efficiente delle risorse esistenti, l'applicazione delle capacità tecnologiche digitali, il miglioramento delle offerte attuali, la salvaguardia della

crescita attraverso vantaggi tecnologici e l'espansione di mercato (Teece, 2007; Warner & Wäger, 2019). Inoltre, promuovono l'adattamento del modello operativo per allinearsi agli obiettivi di innovazione (Kroh *et al.*, 2024). Gli studiosi raccomandano alle imprese di sfruttare laboratori di innovazione digitale al fine di agevolare la scalabilità dei modelli di business di innovazione digitale (Ghosh *et al.*, 2022). Ciò permette una rapida riallocazione delle risorse (Linde *et al.*, 2021).

Relativamente alle capacità di *reconfiguring* digitale (Warner & Wäger, 2019), gli studiosi ne evidenziano il ruolo cruciale nell'operazionalizzare la strategia digitale sviluppata (Kroh *et al.*, 2024), guidando la trasformazione del modello di business e il cambiamento di cultura/mentalità (Ghosh *et al.*, 2022). In questo contesto, le imprese collaborano attivamente con partner esterni per creare nuovi ecosistemi, reclutando talenti digitali esterni, e attingendo alla conoscenza digitale interna all'organizzazione (Kroh *et al.*, 2024; Linde *et al.*, 2021).

In merito allo sviluppo delle *Dynamic Capabilities* digitali mediante l'approccio delle *microfoundations*, la letteratura afferma come la costruzione e il mantenimento di queste capacità sia legato ad elementi a livello micro (Ellström *et al.*, 2021; Warner & Wäger, 2019). Questi elementi includono condizioni specifiche, processi, strutture, risorse e competenze che consentono alle imprese di adattare, trasformare e riconfigurare la loro base di risorse per creare valore in un ambiente digitale in rapido cambiamento (Kroh *et al.*, 2024; Sousa-Zomer *et al.*, 2020).

Secondo l'approccio delle *microfoundations*, gli individui svolgono un ruolo cruciale nello sviluppo delle *Dynamic Capabilities* (Felin & Hesterly, 2007). Comportamenti, atteggiamenti, credenze, motivazioni, emozioni, competenze ed esperienza a livello individuale influenzano significativamente il *modus operandi* organizzativo e i processi strategici (Barney & Felin, 2013; Felin & Foss, 2005). Le *microfoundations* a livello individuale contribuiscono a formulare strategie digitali e ad abbracciare in modo più efficace il percorso di trasformazione digitale. Ad esempio, la letteratura sulle *Dynamic Capabilities* digitali sottolinea le capacità adattive degli individui nel trovare in modo rapido e flessibile nuove soluzioni per allineare la strategia all'ambiente in evoluzione (Ellström *et al.*, 2021). Di conseguenza, risulta fondamentale la formazione e la conoscenza digitale (Füller *et al.*, 2022; Scuotto *et al.*, 2021).

Oltre agli individui, è importante considerare come le persone interagiscono tra loro (Barney & Felin, 2013). Le *microfoundations* legate ai processi corrispondono alle modalità di coordinamento e integrazione adottati dall'organizzazione per interagire e collaborare al fine di raggiungere scopi definiti (Felin *et al.*, 2012). Secondo gli studiosi, le imprese devono creare un'architettura digitale solida e matura in tutta l'organizzazione per sostenere la continua ricerca di trasformazione digitale ed un approccio collaborativo interno (Ellström *et al.*, 2021; Kroh *et al.*, 2024; Sousa-Zomer *et al.*, 2020; Warner & Wäger, 2019).

Infine, gli studiosi identificano le *microfoundations* legate alle strutture, che "specificano le condizioni che abilitano e vincolano l'azione individuale e collettiva e stabiliscono il contesto per le interazioni all'interno di un'organizzazione"[6] (Felin *et al.*, 2012, p. 1364). La letteratura sostiene la necessità per le imprese di creare strutture agili e flessibili e stabilire team interfunzionali per abbracciare la trasformazione digitale e sostenere con successo il miglioramento continuo (Füller *et al.*, 2022; Sousa-Zomer *et al.*, 2020; Warner & Wäger, 2019).

Tuttavia, gli studi esistenti che esaminano le *Dynamic Capabilities* digitali attraverso la lente delle *microfoundations* affrontano il tema in modo frammentato, rendendo difficile ottenere una visione completa che catturi le loro interconnessioni nella costruzione e nel mantenimento di queste capacità. Inoltre, gli studi precedenti si sono concentrati sul contesto digitale, lasciando incertezza

[6] Traduzione in italiano svolta dagli autori.

sulle differenze rispetto al contesto *phygital*. A differenza dei contesti digitali, gli ambienti *phygital* coinvolgono processi in cui elementi fisici e digitali si sovrappongono, formando connessioni e strutture che consentono l'interazione e la condivisione tra varie entità umane e non umane (Mele *et al.*, 2023). I contesti *phygital* mescolano in maniera fluida il mondo reale e virtuale, sfruttando i punti di forza di entrambi per creare un ambiente sinergico e arricchito (Mele & Russo-Spena, 2022). Pertanto, in questo studio empirico, cerchiamo di esplorare e concettualizzare le *microfoundations*-individui, processi e strutture-che contribuiscono allo sviluppo delle *phygital Dynamic Capabilities* di un'impresa con riferimento al *sensing*, *seizing*, e *reconfiguring*.

3. Metodologia

Il presente studio adotta un disegno di ricerca esplorativo basato su un caso di studio singolo (Miles & Huberman, 1984; Yin, 1994). La metodologia proposta è fondamentale per acquisire risultati empirici dettagliati e per sviluppare una base teorica solida riguardo a fenomeni poco esplorati (Eisenhardt, 1989), concentrandosi su un caso specifico unico e rappresentativo del fenomeno oggetto dell'indagine (Dube & Pare, 2003).

3.1 Selezione del caso

Per condurre questo studio, è stato selezionato un caso di studio altamente rappresentativo del fenomeno indagato e adeguato alla domanda di ricerca (Yin, 1994). A tale scopo, abbiamo identificato Webidoo Store, il primo negozio *phygital* di esperienza tecnologica in Europa. Il negozio fa capo a Webidoo Ltd., un'impresa innovativa specializzata nella Digital Transformation e nel Digital Marketing, il cui core business è rappresentato dalla vendita di pacchetti di servizi e prodotti alle piccole e medie imprese (PMI). È diviso in sette aree principali (elettronica, *smart mobility*, *smart home*, *gaming*, sport e fitness, video e audio, e *lifestile* e *leisure*). A differenza dei tradizionali negozi fisici, Webidoo Store espone fisicamente solo una parte dei suoi prodotti innovativi. Inoltre, i clienti hanno la possibilità di sperimentare uno o più articoli in mostra e di sceglierne altri dal catalogo digitale. Possono comodamente noleggiare gli articoli attraverso la pagina web di Webidoo Store sia nel negozio sia a casa. Utilizzando strumenti digitali come display digitali e codici QR posizionati vicino al prodotto, possono visitare lo spazio espositivo. Successivamente, gli articoli selezionati verranno consegnati direttamente a casa, in ufficio, in negozio o in qualsiasi altro luogo per provare direttamente il prodotto. I clienti hanno la possibilità di pagare tariffe basate sulla durata della prova e possono decidere se utilizzare gli articoli per un periodo limitato (in questo caso, il prodotto verrà ritirato al termine del periodo di prova) o acquistarli direttamente[7], ottenendo uno sconto sul prezzo finale.

3.2 Raccolta dati

Per garantire la triangolazione e una maggiore robustezza dei dati (Eisenhardt, 1989; Miles & Huberman, 1984; Yin, 1994), ci siamo avvalsi di diverse fonti, tra cui l'osservazione diretta da parte di uno degli autori, undici interviste semistrutturate, numerose conversazioni spontanee, pagine web ufficiali, video online e pagine social (Fig. 1). L'osservazione partecipante ha

[7] Questo sistema è conosciuto come la formula "Try & Buy", ovvero "Prova e Acquista", simile all'e-commerce, ma con il vantaggio aggiunto di poter vedere e toccare i prodotti prima di acquistarli.

consentito di approfondire la comprensione dell'esperienza *phygital*. In particolare, un autore ha trascorso una settimana visitando il negozio e vivendo in prima persona l'esperienza *phygital*, che includeva l'uso di codici QR, la prova di prodotti in negozio, la partecipazione a eventi e l'adesione alla formula "Try & Buy". Ciò ha comportato l'immersone attiva nell'ambiente attraverso l'interazione con manager e consumatori. L'autore ha preso appunti sul campo e ha redatto relazioni dettagliate in seguito. Attraverso questo approccio pratico, sono stati raccolti preziosi dettagli sui comportamenti e le reazioni delle persone che interagivano con gli elementi *phygital*, contribuendo a una comprensione più approfondita e completa dell'esperienza complessiva. Inoltre, sono state condotte undici interviste semistrutturate con i manager che ricoprivano ruoli chiave all'interno dell'organizzazione, come il Responsabile del Commercio al Dettaglio, e il Co-fondatore, Presidente e CEO (Eisenhardt & Graebner, 2007). Le interviste hanno consentito una comprensione più approfondita dell'argomento per rispondere alla domanda di ricerca. È stato seguito un protocollo di intervista semistrutturata per catturare i temi emergenti (Strauss & Corbin, 1998). Le interviste sono state condotte in due fasi, a febbraio 2022 e a novembre 2023, al fine di indagare i principali cambiamenti nelle strategie e operazioni di Webidoo Store nel tempo. Le interviste sono durate circa un'ora e sono state condotte online attraverso le piattaforme Google Meet e Microsoft Teams. Infine, abbiamo condotto un'analisi approfondita dei comunicati stampa, pagine web, video online e pagine social (come Facebook, Instagram, LinkedIn, TikTok, e YouTube) di Webidoo Store (Miles & Huberman, 1984) coprendo il periodo tra novembre 2021 (data di apertura del negozio) e novembre 2023. Per raccogliere e codificare in modo accurato tali contenuti multimediali, è stato impiegato Ncapture.

Fig. 1: Prospetto delle fonti di dati

Fonti Dati Primari				**Fonti Dati Secondati**
Intervista	**Ruolo**	**Sesso**	**Durata dell'intervista**	▪ Sito web ufficiale ▪ Facebook (361 post) ▪ Linkedin (24 post) ▪ TikTok (62 post) ▪ YouTube (78 post) ▪ Dati di archivio (appunti riunioni, comunicati stampa – 12 articoli web)
1	Responsabile del Commercio al Dettaglio	M	56'39''	
2	Co-fondatore, Presidente e CEO	M	56'16''	
3	Responsabile delle Risorse Umane (HR)	F	35'28''	
4	Responsabile del Canale Business/Responsabile dei partner	F	58'06''	
5	Coordinare Marketing	F	75'46''	
6	Jr. Project Manager	F	58'11''	
7	Direttore Generale	M	59'03''	
8	Responsabile delle Assunzioni Specialistiche, Risorse Umane, Brand Ambassador	F	61'37''	
9	Responsabile del Negozio e Marketing Offline	M	44'43''	
10	Co-fondatore e Responsabile della Transformazione Digitale per le PMI	M	56'38''	
11	Responsabile dell'e-commerce	M	57'30''	

3.3 Analisi dei dati

La codifica e l'analisi dei dati sono state condotte attraverso il software NVivo 11 (Gibbs, 2007). Per l'analisi dei dati è stato implementato un processo abduttivo, combinando metodi deduttivi e induttivi. Mentre l'approccio deduttivo si è basato sulla letteratura esistente per interpretare e analizzare i dati qualitativi riguardanti le *microfoundations* (individui, processi, strutture), l'approccio induttivo ci ha permesso di scoprire le varie tipologie di *Dynamic Capabilities phygital* (ovvero, *phygital insight*, *phygital action*, *phygital agility*) associate alle diverse *microfoundations*. Nello specifico, lo studio è stato condotto attraverso diverse fasi di codifica (Fig. 2).

Nella fase 1, i dati delle interviste sono stati astratti seguendo un processo di codifica guidato dal concetto (Gibbs, 2007). Le risposte sono state analizzate indipendentemente da ciascun autore

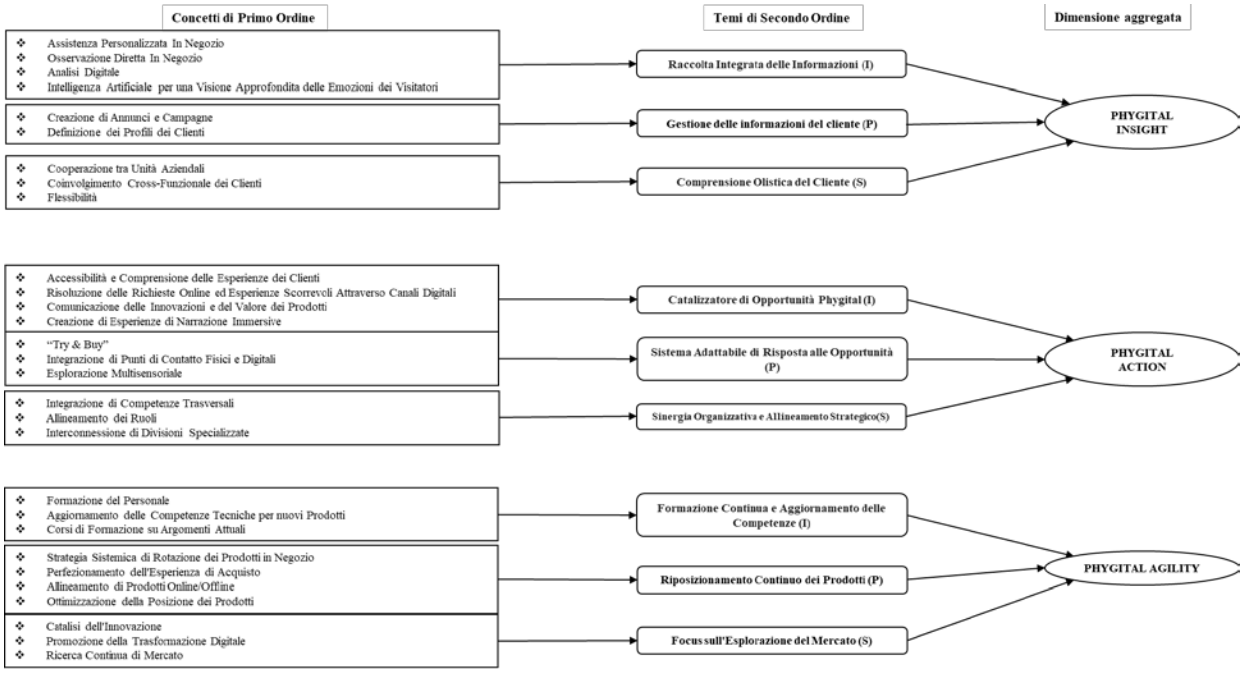
e discusse insieme per ridurre la soggettività nell'interpretazione dei dati. Ogni autore ha successivamente categorizzato e etichettato indipendentemente le dichiarazioni dirette (Patvardhan *et al.*, 2015), creando un elenco provvisorio di codici descrittivi e interpretativi (ad esempio, "contaminazione di innovazione tra vari prodotti complementari", "decompressione della possibile ostilità verso l'esperienza *phygital*") (Miles & Huberman, 1984).

Nella fase 2, i dati sono stati riesaminati e nuove categorie e codici sono stati identificati e confrontati con i dati già codificati. I dati delle interviste sono stati triangolati con le fonti secondarie fino al raggiungimento della saturazione teorica (Strauss & Corbin, 1998). In questa fase, sono stati identificati concetti di primo ordine (ad esempio, "assistenza personalizzata in negozio", "cooperazione tra unità aziendali", "analisi digitale").

Nella fase 3, abbiamo impiegato un processo iterativo convenzionale basato su temi comuni/meno comuni. Abbiamo esaminato somiglianze e differenze tra i concetti di primo ordine, "sintetizzando e raggruppando i codici di primo ordine in temi di ordine superiore"[8] (Patvardhan *et al.*, 2015, p. 411), mirando alle relazioni tra i dati. In questa direzione, i concetti di primo ordine sono stati raggruppati in temi di secondo ordine (ad esempio, "aggiornamento e sviluppo continuo delle competenze", "riposizionamento continuo dei prodotti"). Basandoci sulle definizioni fornite dagli studiosi (Barney & Felin, 2013; Felin *et al.*, 2012), queste dimensioni sono state categorizzate come *microfoundations* ai livelli di individui, processi e strutture.

Infine, nella fase 4, abbiamo collegato le *microfoundations* identificate alle corrispondenti *Dynamic Capabilities* seguendo le definizioni di Teece (2007). Ciò ha portato a raggruppare le *microfoundations* sulla base di tre tipologie di *Dynamic Capabilities*: *phygital insight*, *phygital action*, e *phygital agility*.

Fig. 2: Panoramica del processo di analisi dei dati



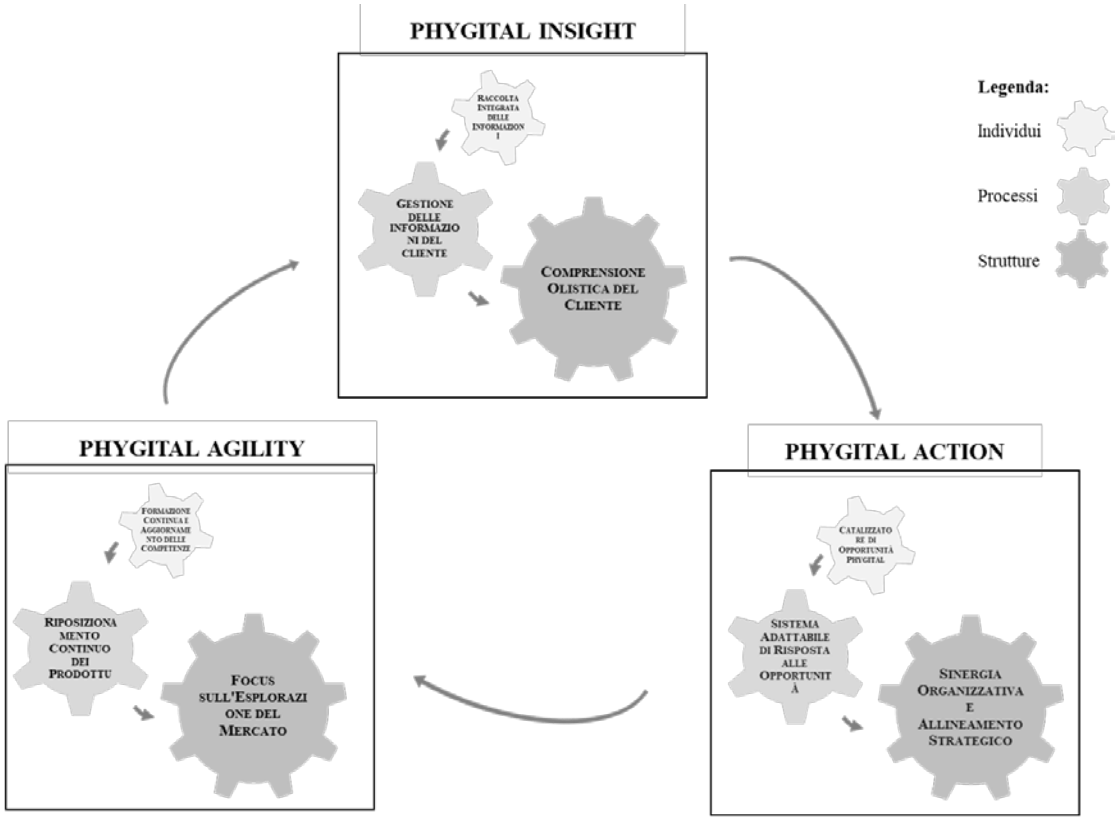
Legenda: I: individui; P: processi; S: strutture

[8] Traduzione in italiano svolta dagli autori.

4. Risultati

I nostri risultati rivelano interessanti approfondimenti su come le imprese possono sviluppare le *Dynamic Capabilities* per adattarsi e rispondere in modo più efficace ai cambiamenti introdotti dai contesti *phygital*. Concentrandoci su un caso unico rappresentato da Webidoo Store, identifichiamo le *microfoundations* principali (individui, processi, strutture) che contribuiscono allo sviluppo delle *phygital Dynamic Capabilities* di tipo *sensing*, *seizing* e *reconfiguring* (Teece, 2007). In particolare, proponiamo un framework integrativo per lo sviluppo delle *phygital Dynamic Capabilities* che combina elementi individuali, di processo e strutturali intrecciati alle *phygital Dynamic Capabilities* delle imprese: *phygital insight*, *phygital action*, e *phygital agility* (Fig. 3). Questa interazione si verifica nei vari livelli all'interno dell'organizzazione, creando un approccio olistico e adattivo all'implementazione delle *phygital Dynamic Capabilities*.

Fig. 3. Framework teorico per lo sviluppo delle phygital Dynamic Capabilities



4.1 Phygital Insight

La capacità di *phygital insight* rappresenta l'abilità integrata di dipendenti, dispositivi tecnologici, sistemi e canali nell'interpretare e analizzare le azioni e reazioni dei clienti, sia nell'ambiente fisico che in quello digitale, per definire opportunità e minacce.

Per sviluppare tale capacità, è necessario costruire specifiche microfoundations a **livello individuale**. I nostri risultati evidenziano in particolare l'importanza della **raccolta integrata delle**

informazioni, sottolineando la necessità di combinare le abilità nel monitorare i clienti nei negozi fisici con la raccolta dei dati online in un contesto di negozio *phygital*.

Ciò implica la fusione di dati o informazioni provenienti da sensori, tecnologie digitali e canali online con le intuizioni derivate dalle competenze digitali dei dipendenti e dalla loro abilità nel profilare i clienti in base alle loro caratteristiche, preferenze, e necessità. Ad esempio, nel caso di Webidoo Store, il mercato coinvolge sia clienti B2B che B2C, online e offline. In questo contesto, la forte cooperazione tra i membri dell'organizzazione, la tecnologia, e l'analisi digitale dei dati diventa cruciale poiché il segmento di mercato evolve continuamente, e le aspettative e le preferenze dei clienti possono variare significativamente a seconda della loro tipologia. Sfruttando preparazione ed esperienza, il team dimostra una notevole agilità nell'interpretare e affrontare la natura "mista" dei consumatori, garantendo una pronta assistenza in negozio. Si impegnano in interazioni personalizzate e adattano la comunicazione al tipo di cliente che incontrano. Come spiega il Responsabile del Commercio al Dettaglio: *"[...] è necessario guardare e ascoltare attivamente. Essere intorno all'utente nel suo campo visivo [...] sapere come frammentare la comunicazione in base al tipo di utente che si ha davanti [...]"*. Allo stesso tempo, tecnologie come telecamere ad alta risoluzione con visione tridimensionale e modellizzazione dell'intelligenza artificiale di prossima generazione in tutto il negozio offrono un robusto supporto nella raccolta di dati in tempo reale per cogliere gli stati emotivi, i comportamenti, le caratteristiche fisiche, e le informazioni demografiche: *"[...] Abbiamo poi introdotto, nella fase di beta testing, una piccola telecamera che profila tutti i clienti in base alle loro emozioni, determinando se sono felici, neutrali, tristi o arrabbiati, oltre a identificare il loro genere, se hanno la barba, gli occhiali etc."* (Responsabile del Negozio e Marketing Offline). Questi strumenti aiutano anche a raccogliere dati su quali aree del negozio sono più "attraenti" o meno. Infine, gli strumenti di analisi digitale forniscono informazioni sui clienti online: *"[...] All'interno del sito web, ad esempio, c'è un intero sistema che include un chatbot che raccoglie feedback e segnala difficoltà. Inoltre, una funzione molto utilizzata dagli utenti del sito web è la chat con il nostro servizio clienti [...]"* (Co-fondatore e Responsabile della Trasformazione Digitale per le PMI). L'incorporazione di strumenti di analisi digitale permette ai manager e ai dipendenti di monitorare e analizzare i comportamenti, le preferenze, e i modelli dei clienti online.

Questa strategia integrata nella raccolta di dati è la base per la creazione di una panoramica completa dei dati dei clienti che può essere elaborata e utilizzata per comprendere, esplorare, e approfondire le caratteristiche dei clienti. In termini di **processi**, la capacità di *phygital insight* si basa sulla **gestione delle informazioni del cliente**, il che implica che il feedback raccolto da strumenti fisici e digitali viene sintetizzato o combinato per creare una visione unificata e completa delle preferenze dei clienti. Questo feedback sarà utile nell'orchestrare meglio le operazioni, prendere decisioni mirate, e migliorare complessivamente l'esperienza *phygital* sia online che offline. Nel caso di Webidoo Store, ad esempio, l'impresa ottiene un quadro chiaro dei profili potenziali dei clienti, sia B2B che B2C: *"[...] stiamo lavorando per capire l'identità delle persone [...] che hanno effettuato acquisti sia online che offline. Stiamo cercando di tracciare il percorso del cliente. [...] Stiamo implementando il tracciamento Bluetooth per monitorare quando le persone entrano nel negozio. Questo ci permette di capire se una persona ha già acquistato da noi, cosa ha comprato e quando è stata la sua ultima visita. Il nostro obiettivo è identificare coloro che entrano nel negozio, specialmente i clienti abituali, per avvisare il personale vendite che questa persona ha già visitato Webidoo Store in precedenza [...]"* (Direttore Generale). Come ci racconta il Responsabile del Commercio al Dettaglio, una tipologia di cliente può essere l'impresa che cerca prodotti per scopi specifici (ad esempio, il titolare di una palestra alla ricerca di attrezzature particolari) o il consumatore "appassionato di tecnologia" che vuole scoprire le ultime innovazioni

(*early adopters*). Il cliente potrebbe essere anche un marchio di dimensioni ridotte, medie o grandi, desideroso di esporre il proprio prodotto tecnologico, trasformando così il Webidoo Store in una vetrina. L'approccio proattivo di risposta alle esigenze dei consumatori si armonizza con le mutevoli preferenze ed aspettative di una clientela in continua evoluzione: *"[...] Pertanto, abbiamo informazioni complete su chiunque entri, consentendoci di individuare potenziali nuove campagne di marketing o strategie di marketing locali [...]"* (Responsabile del Negozio e Marketing Offline).

A livello **strutturale**, la capacità *phygital insight* si traduce in una **comprensione olistica del cliente**. La struttura organizzativa si distingue per la sua flessibilità, resa possibile da una solida collaborazione interna che facilita un aggiornamento continuo e trasversale delle conoscenze e la condivisione di informazioni tra diverse funzioni. Tale rete innovativa costituisce la base per interconnettere i diversi aspetti dell'impresa, consentendo uno scambio di informazioni fluido e una forte sinergia tra reparti fisici e digitali. Questo approccio integrato emerge chiaramente nelle testimonianze dei nostri intervistati nel momento in cui illustrano le interazioni e la collaborazione tra le diverse unità aziendali di Webidoo, lavorando insieme per garantire un coinvolgimento più profondo e significativo del cliente: *"[...] Le telecamere termiche portano dati ai brand all'interno ed estraggono dati per il negozio. Sul lato aziendale, quando avvocati, architetti e commercialisti vengono a vedere i nostri computer professionali e software, il dipartimento aziendale li contatta, e noi entriamo in gioco. Sono potenziali clienti dei servizi aziendali di Webidoo. Stanno entrando per acquistare un computer, e forniamo anche un'analisi del loro sito web [...], delle loro pagine social, che possono non esistere ancora, e del loro profilo LinkedIn. Quindi, non offriamo solo prodotti per i loro uffici e il loro lavoro, ma anche soluzioni di comunicazione online [...]"* (Responsabile del Canale Business/Responsabile dei Partner); *"[...] Organizziamo eventi sia B2B che B2C. Tutti gli eventi B2C iniziano con un discorso che include l'aspetto aziendale del negozio, poiché ogni potenziale consumatore che entra nel negozio potrebbe anche essere un potenziale cliente aziendale [...]"* (Jr. Project Manager). Le diverse unità aziendali collaborano per profilare il cliente e comprendere le sue potenziali esigenze. Un altro esempio di come avviene questa cooperazione proviene dalle parole del Responsabile del Commercio al Dettaglio: *"[...] La ricerca completa e l'analisi di mercato vengono effettuate attraverso i nostri KPI, consentendoci di monitorare i prezzi dei nostri prodotti sul lato e-commerce del negozio. Abbiamo anche un responsabile dell'e-commerce che si impegna a tracciare gli acquisti online. Ciò ci permette di sviluppare una strategia di marketing da promuovere sui canali social e sul web [...]"*.

4.2 Phygital Action

Lo sviluppo della capacità *phygital action* implica la creazione di una proposta di valore centrata sul cliente che fonde in modo sinergico i vantaggi distintivi dei mondi fisico e digitale.

In particolare, identifichiamo la microfoundation **catalizzatore di opportunità *phygital*** a **livello individuale**. I dipendenti riconoscono e agiscono in base alle opportunità emergenti sia dal mondo fisico che da quello digitale, comunicando il valore dei prodotti e delle innovazioni e adattando il loro approccio per soddisfare le preferenze e le esigenze individuali. Nel caso di Webidoo Store, è fondamentale il ruolo svolto dal personale del negozio nel guidare i clienti a rendere l'esperienza *phygital* accessibile e comprensibile: *"[...] Ti dirò dove ti trovi, ti dirò cosa puoi trovare, puoi trovare le informazioni attraverso il codice QR, se hai bisogno di informazioni vengo da te, quindi sono a tua disposizione [...]"* (Jr. Project Manager). Una volta identificato il tipo di cliente, i dipendenti lo guidano verso soluzioni più adatte alle sue esigenze. Il team del negozio, alimentato da una passione instancabile per il marchio, i suoi prodotti e un servizio clienti

eccezionale, guida abilmente i clienti attraverso esperienze di narrazione coinvolgenti: *"[...] Arricchiamo l'esperienza fornendo un elemento narrativo unico per ciascun prodotto insieme al codice QR. Il vero punto di svolta sta nell'aspetto narrativo dei nostri prodotti [...] Ripetere le stesse informazioni su ciascun prodotto, possibilmente 20 volte al giorno, può diventare monotono; quindi, trovare aspetti che accendano la passione è essenziale [...]. Concentrarsi solo sulle caratteristiche tecniche ti categorizza come Assistente di Negozio. Uno "Specialista dell'Esperienza del Cliente" è una persona curiosa con una mentalità imprenditoriale, in grado di navigare nelle dinamiche delle vendite, promuovere un prodotto in modo efficace [...]"* (Responsabile del Negozio e Marketing Offline). Un approccio autentico, radicato nella passione, fa sentire i clienti genuinamente apprezzati, e coltiva relazioni di fiducia. Questa autenticità è costruita attraverso la condivisione di conoscenze e il coinvolgimento emotivo, che innalzano le aspettative dei clienti. Come sottolinea il Co-fondatore, Presidente & CEO: *"[Il commesso] deve essere un ambasciatore, un appassionato di tecnologia e innovazione che trasferisce questa passione al cliente [...]. La bellezza che dico loro da sempre è che non devono vendere. Devono aiutare il cliente a vivere la migliore esperienza [...]. Soprattutto, devono avere empatia e connessione con i clienti, individuandone i bisogni attraverso domande aperte [...]. Inizi a capire come il cliente risponde; se è assertivo, sa tutto, non è comunicativo [...] o vuole subito comprare [...]"*. Di conseguenza, quando i clienti sperimentano un servizio attento, diventano sostenitori entusiasti, condividendo storie positive con amici, familiari e colleghi. Questo passaparola contribuisce al successo complessivo dell'impresa e aumenta la fedeltà del cliente: *"[...] scoprono questo spazio e diventano acquirenti e curiosamente quasi si trasformano in ambasciatori con i loro amici che hanno 50 anni, non sono nativi digitali, ma hanno potere d'acquisto [...]"* (Co-Fondatore & Responsabile della Trasformazione Digitale delle PMI).

Un approccio centrato sul cliente in contesti *phygital* sfrutta **un sistema di risposta adattabile alle opportunità** per quanto riguarda le microfoundations **a livello di processo**. Per creare valore per i clienti, i processi devono essere flessibili e adattarsi rapidamente alle condizioni in evoluzione legate al cliente su entrambi i canali fisici e digitali. La natura unica e distintiva di un contesto *phygital* è che abbraccia una nuova concezione di business che non è statica ma altamente dinamica e interattiva. Come nel caso di Webidoo Store: *"[...] Consente di scoprire prodotti tecnologici innovativi e poco conosciuti, provarli e decidere se acquistarli o restituirli. Una formula simile a quella dell'e-commerce, con il vantaggio di vedere e toccare i prodotti di persona prima di acquistare [...]"* (Comunicato stampa). Il negozio diventa un centro per la promozione dell'innovazione, unendo i punti di forza delle esperienze online e offline per esplorare e conoscere prodotti innovativi: *"[...] Questo negozio è uno spazio in cui i clienti possono mettere le mani sulle ultime innovazioni Hi-Tech. Aziende e professionisti possono scoprire il potenziale delle piattaforme web avanzate, dell'e-commerce, e della pubblicità digitale. I marchi tecnologici avranno accesso a un marketplace unico per mostrare e promuovere i loro prodotti, il tutto con il supporto degli specialisti digitali di Webidoo [...]"* (Comunicato stampa). Entrando nel Webidoo Store, i visitatori vengono trasportati in un contesto futuristico fatto di droni, dispositivi *smart home*, veicoli elettrici e macchine fitness interattive. I clienti intraprendono un percorso *phygital* che li affascina: *"[...] È un'esperienza cinestetica [...]. Questo è tipico dell'essere umano. Abbiamo vari sensi, quindi non si tratta solo di udito, vista e gusto ma anche di tatto [...] quindi il phygital ti consente di abbattere le distanze, di stabilire una connessione [...]"* (Co-fondatore & Responsabile della Trasformazione Digitale delle PMI). Il consumatore diventa quindi un partecipante attivo quando si tratta di esperienze *phygital*: *"[...] È un parco giochi per gli amanti dell'innovazione [...]. Vedi, tocchi e provi i prodotti di persona senza preoccuparti che quando entri ci sarà qualcuno che vuole venderti il prodotto. Vieni per vivere un'esperienza, percorrere*

un percorso e vedere e sentire l'innovazione. Ogni mese passi e trovi qualcosa di nuovo, e questo è molto bello [...]" (Co-fondatore, Presidente & CEO). Inoltre, i consumatori partecipano attivamente alla fase iniziale di test dei prodotti. I manager dell'impresa sostengono l'approccio "Prova e Acquista" (Try & Buy), che consente ai consumatori di valutare in modo esaustivo e determinare il valore e la compatibilità di questi prodotti nel soddisfare le loro esigenze e aspettative: *"La formula è semplice: tutti i prodotti esposti hanno un codice QR che, scannerizzato con il telefono cellulare, consente di scoprire tutte le caratteristiche e i prezzi. Passando quindi dal negozio fisico a quello virtuale, è possibile decidere di noleggiare il prodotto per provarlo per qualche giorno, pagando un canone giornaliero, e poi in un secondo momento acquistarlo (recuperando il denaro speso per la prova) o restituirlo"* (Comunicato stampa).

Infine, per quanto riguarda le **strutture**, la capacità *phygital action* è supportato dalla microfoundation **sinergia organizzativa e allineamento strategico**. Team con competenze trasversali lavorano sugli stessi progetti per promuovere prodotti di maggior valore che possano soddisfare le aspettative in evoluzione dei consumatori: *"[...] Forte interazione e collaborazione trasversale per capire dove possono essere apportati miglioramenti con uno scambio congiunto di informazioni. Molta analisi, benchmarking, riunioni interne, brainstorming [...]"* (Responsabile del Punto Vendita).

4.3 Phygital Agility

Phygital agility si basa sulla capacità di modificare dinamicamente o adattare l'organizzazione, il comportamento o le caratteristiche dei componenti fisici e digitali per allinearli alle strategie e agli obiettivi dell'impresa.

A **livello individuale**, la capacità *phygital agility* è caratterizzata da una **formazione continua e aggiornamento delle competenze** (ad esempio, formazione del personale e sviluppo delle competenze), che è cruciale per rimanere al passo con le tendenze in continua evoluzione. I manager di Webidoo Store supervisionano e promuovono una cultura di apprendimento e formazione continua per garantire un servizio di alta qualità, specialmente nei settori in cui l'avanzamento rapido della tecnologia accelera la necessità di una formazione costante sui prodotti: *"[…] Migliorandoci, abbiamo effettivamente individuato le persone più adatte a questi ruoli. Dobbiamo essere in grado di cambiare e adattarci rapidamente, catturando dati esterni, e questo è proprio l'approccio strategico all'interno di una startup, soprattutto una innovativa [...]"* (Direttore Generale). L'aggiornamento delle competenze tecniche dei dipendenti consente all'impresa di affrontare le richieste dei clienti, fornire consigli personalizzati, gestire eventuali dubbi, e offrire assistenza di alta qualità. Come spiega il Co-fondatore e Responsabile della Trasformazione Digitale delle PMI, *"[…] è emerso che i nostri dipendenti avevano interesse a comprendere meglio Chat GPT. Anche se non tutti conoscono l'inglese, abbiamo ideato un programma di formazione basato su queste richieste. Il programma includeva sessioni settimanali con diverse lezioni. Ad esempio, se qualcuno è interessato a Chat GPT, colui o colei che fa formazione potrebbe essere un noto YouTuber con competenze su quella piattaforma. Durante una sessione di due o due ore e mezza, i partecipanti imparano come utilizzarlo efficacemente, scoprono trucchi interessanti ed esplorano vari aspetti [...]"*.

A **livello di processo**, è necessario un **riposizionamento continuo dei prodotti**. Feedback basati su informazioni provenienti dai mondi fisico e digitale consente un ricambio continuo dei prodotti. Ad esempio, il Webidoo Store conduce una ricerca di mercato continua e analisi dei KPIs (Indicatori chiave di performance) per capire come migliorare le performance online e offline:

"[...] cercare costantemente prodotti, coltivare la passione, ruotare l'inventario in modo efficace e studiare approfonditamente i dati si collega alla comprensione del nostro modello di business [...]. È cruciale interrogarsi sul motivo per cui certi articoli attirano più attenzione e utilizzare tutte queste informazioni. Questo rappresenta un nuovo modello nell'industria del retail [...]" (Co-fondatore & Responsabile della Trasformazione Digitale delle PMI). I miglioramenti offline coinvolgono tattiche efficaci in negozio come la gestione delle scorte, la disposizione dei prodotti o la frequente rotazione dei prodotti per allinearsi ai mutamenti degli interessi dei clienti. I marchi vengono esposti per 3-6 mesi, garantendo un percorso del cliente riconoscibile ma costantemente rinnovato. Questo approccio mira ad aumentare la probabilità che i clienti scoprano articoli che corrispondono alle loro preferenze e mantengano l'entusiasmo durante tutta l'esperienza. Gli stessi miglioramenti vengono apportati online (ad esempio, nella pagina web e condivisione di video online su piattaforme social come Facebook, Instagram, LinkedIn, TikTok, e YouTube): *"[…] Offline e online, nel nostro caso, sono strettamente collegati, quindi siamo in contatto ogni giorno, sia con il negozio fisico che con la logistica [...] Anche a livello di magazzino, gli articoli dello store di Milano devono avere la stessa quantità in negozio e online. I prezzi, ovviamente, devono essere aggiornati su entrambe le piattaforme, e-commerce e in negozio, in modo che un cliente veda la stessa offerta online e, acquistando offline, sia indifferente [...]"* (Responsabile dell'E-commerce).

Infine, per quanto riguarda le microfoundations a **livello di struttura**, la capacità *phygital agility* richiede alle imprese di coltivare una forte **focus sull'esplorazione del mercato**, ovvero essere sempre un passo avanti, pronte ad anticipare le esigenze in evoluzione del mercato con obiettivi ambiziosi e azioni rischiose per raggiungerli. Nel caso di Webidoo, *"Siamo un gruppo con molte anime, tutte con la stessa propensione per il futuro [...] Facciamo questo con l'intenzione di mettere le nuove tecnologie al servizio della crescita di imprese di tutti i tipi e dimensioni, in Italia e all'estero"* (Pagina web). In Webidoo si cerca di catalizzare innovazioni e pratiche migliori per i clienti per affrontare in modo più efficace le loro esigenze. Pertanto, *"Percorrere l'evoluzione significa anche percorrere contemporaneamente molteplici strade, sviluppando idee ed esperienze in campi diversi. Per noi, ciò significa lavorare in diverse divisioni aziendali per scoprire nuovi approcci e sviluppare nuove tecnologie da portare sul mercato per promuovere trasformazioni positive"* (Pagina web). Il team si avvale di competenze trasversali, per raggiungere l'eccellenza con un atteggiamento proattivo: *"[…] Ci sono prodotti che sono una certezza perché forse sono anche un po' conosciuti, mentre altri sono più come delle scommesse. A volte investi in qualcosa che non funziona, ma altre volte qualcosa ti sorprende e dici: 'Wow, questo funziona!' [...]"* (Direttore Generale). Tale cooperazione stimola l'impegno dei dipendenti a riflettere su nuove direzioni strategiche (ad esempio, realtà virtuale e realtà aumentata per visitare il negozio in 3D, shopping su WhatsApp, eventi nel Metaverso, integrazioni di *non-fungible token* (NFT) e assistenti personalizzati per gli acquisti basati sull'intelligenza artificiale). Abbracciare il potenziale trasformativo delle innovazioni posiziona il negozio all'avanguardia del panorama del retail, offrendo ai clienti un'esperienza dinamica e orientata al futuro: *"[…] Abbiamo creato il nostro negozio virtuale, che abbiamo recentemente presentato in una fiera a Milano, dove, naturalmente, offriamo a chiunque la possibilità di indossare un visore ed entrare nel nostro negozio. Quindi, fondamentalmente, con questo visore, dai ai clienti la possibilità di vedere l'intero negozio, fare clic su prodotti dove si apre una finestra con una spiegazione [...]"* (Responsabile dell'E-commerce).

4.4 Interazione dinamica tra le microfoundations

Secondo la nostra analisi, le tre principali *phygital Dynamic Capabilities* (*phygital insight*, *phygital action*, e *phygital reconfiguring*) e le relative *microfoundations* non sono isolate, ma interconnesse in un ciclio continuo (si vedano le frecce nella Fig. 3).

Nel contesto del *phygital insight*, la raccolta integrata delle informazioni costituisce la base, combinando dati sui clienti provenienti da fonti fisiche e digitali. La gestione delle informazioni del cliente utilizza questi dati combinati e li affina in approfondite comprensioni dei loro comportamenti e preferenze. Insieme, sia la raccolta integrata delle informazioni che la gestione delle informazioni del cliente contribuiscono a creare una comprensione olistica del cliente, in cui le diverse unità aziendali collaborano nella profilazione dei clienti e nel rilevare le loro potenziali esigenze.

L'output del *phygital insight* funge da base per cogliere opportunità (*phygital action*). Le *microfoundations* "catalizzatore di opportunità phygital", "sistema adattabile di risposta alle opportunità", e "sinergia organizzativa e allineamento strategico" lavorano insieme per creare una proposta di valore centrata sul cliente. I dipendenti, agendo come catalizzatori, individuano opportunità provenienti da entrambi i mondi fisico e digitale. Nel frattempo, i team centrali con competenze diverse collaborano per capitalizzare su queste opportunità identificate.

Successivamente, l'impresa riconfigura l'organizzazione, il comportamento o le caratteristiche dei componenti fisici e digitali in risposta a dati e azioni (*phygital agility*). Le *microfoundations* di "aggiornamento continuo delle competenze e acquisizione di nuove abilità", "riposizionamento continuo dei prodotti", e "focus sull'esplorazione del mercato" si integrano reciprocamente per allinearsi alle strategie e agli obiettivi dell'impresa. Lo sviluppo continuo delle competenze dei dipendenti migliora la qualità del servizio, dando loro la capacità di gestire le mutevoli esigenze dei clienti. Ciò, unito al riposizionamento continuo dei prodotti, garantisce che le offerte online e offline risuonino con le esigenze del mercato. Inoltre, l'attenzione dell'impresa all' "esplorazione di mercato" incoraggia innovazioni orientate al futuro.

La capacità *phygital agility* getta le basi per un nuovo ciclo, perpetuando un'evoluzione continua all'interno del panorama *phygital*.

5. Discussione

Sebbene la teoria delle *Dynamic Capabilities* sia ampiamente accettata nella letteratura per spiegare come le imprese innovino, si adattino o ridisegnino le proprie risorse e capacità nei mercati segnati dalla Trasformazione Digitale (Ancillai & Pascussi, 2023; Ghosh *et al.*, 2022; Warner & Wäger, 2019), ancora pochi studi si sono soffermati su come sviluppare *phygital Dynamic Capabilities* (Klaus, 2021).

Studi precedenti sull'analisi del *sensing* digitale spiegano come queste capacità consentano alle imprese di esplorare attivamente le tendenze tecnologiche, analizzare segnali del mercato, e valutare scenari digitali futuri, promuovendo una visione digitale a lungo termine (Ghosh *et al.*, 2022; Kroh *et al.*, 2024; Linde *et al.*, 2021). Il nostro studio indica che, in un contesto *phygital*, la capacità *phygital insight* si riferisce all'abilità collettiva di dipendenti e tecnologie di rilevare, interpretare e analizzare le azioni dei clienti sia in ambienti fisici che digitali. Rispetto alla

letteratura precedente, *phygital insight* amplia la portata delle capacità di *sensing* grazie alla sua applicazione in ambienti *phygital*, consentendo alle imprese di identificare opportunità e potenziali minacce in modo più completo. *Phygital insight* implica la raccolta integrata delle informazioni come una fondamentale *microfoundation* a livello individuale, secondo la quale i dipendenti utilizzano strumenti digitali per monitorare i comportamenti dei clienti offline e online, combinando i dati provenienti dalle interazioni. Questa *microfoundation* riprende la letteratura precedente sulle *Dynamic Capabilities* digitali, la quale enfatizza l'importanza dell'istruzione e della formazione digitale degli individui (Füller *et al.*, 2022; Scuotto et al, 2021), ma aggiunge la necessità di competenze nella fusione di dati e informazioni derivanti da interazioni fisiche e digitali per potenziare il *sensing*. Per quanto riguarda le *microfoundations* di livello processuale per la capacità *phygital insight*, avanziamo il concetto di gestione delle informazioni del cliente, che implica la sintesi dei feedback provenienti dai canali fisici e digitali per una visione unificata e completa delle preferenze del cliente. Infine, identifichiamo la comprensione olistica del cliente, sottolineando l'importanza di favorire la collaborazione tra dipartimenti fisici e digitali per un approccio più olistico volto al coinvolgimento del cliente. Questa *microfoundation* di livello strutturale del *phygital insight* conferma la letteratura precedente riguardo alla necessità di creare una struttura agile e di stabilire team interfunzionali (Füller *et al.*, 2022; Sousa-Zomer *et al.*, 2020; Warner & Wäger, 2019), specialmente nel contesto di un ambiente *phygital* in cui le preferenze dei clienti e le tecnologie sono in costante evoluzione.

La letteratura precedente in merito al *seizing* digitale sostiene l'uso di risorse esistenti, l'applicazione di capacità tecnologiche digitali, e il miglioramento delle offerte attuali per consentire una rapida riallocazione delle risorse, un riposizionamento agile e una maggiore "prontezza" nei confronti del cambiamento (Kroh *et al.*, 2024; Linde *et al.*, 2021). I nostri risultati rivelano come lo sviluppo della capacità di *phygital action* comporti la creazione di una proposta di valore centrata sul cliente che integra in modo fluido i punti di forza sia dei contesti fisici che digitali. *Phygital action* espande gli approcci convenzionali nell'utilizzo di risorse e capacità digitali in risposta al cambiamento, enfatizzando la centralità del cliente in entrambi i domini fisici e digitali. Per sviluppare la capacità di *phygital action*, una fondamentale *microfoundation* a livello individuale è il concetto di catalizzatore di opportunità *phygital*. I dipendenti devono seguire un approccio su misura, centrato sul cliente, nel capitalizzare le opportunità che emergono sia dai contesti fisici che digitali. Questo aspetto si allinea con la letteratura precedente, la quale sostiene l'adattabilità delle capacità individuali all'ambiente in evoluzione (Ellström *et al.*, 2021), ma estende la rilevanza dell'attenzione dei dipendenti alle specifiche esigenze dei clienti sia nei contesti fisici che digitali. Per quanto riguarda le *microfoundations* di livello processuale del *phygital action*, identifichiamo il sistema di risposta adattabile alle opportunità, consentendo una rapida esecuzione in risposta alle opportunità identificate attraverso canali fisici e digitali. In linea con la letteratura precedente sulle *Dynamic Capabilities* digitali, le imprese devono creare un'architettura digitale solida e matura in tutta l'organizzazione per sostenere una trasformazione digitale continua e un approccio collaborativo interno (Ellström *et al.*, 2021; Kroh *et al.*, 2024; Sousa-Zomer *et al.*, 2020; Warner & Wäger, 2019). Inoltre, nei contesti *phygital*, il potere delle tecnologie è accompagnato da sistemi flessibili intrecciati con il mondo fisico. In questo contesto si inserisce la sinergia organizzativa e allineamento strategico, una fondamentale *microfoundation* a livello strutturale del *phygital action*. Questo concetto favorisce una collaborazione fluida tra team fisici e digitali per ottimizzare la capacità dell'impresa di rispondere alle opportunità, confermando quindi gli studi precedenti sull'importanza di strutture agili e team interfunzionali (Füller *et al.*, 2022; Sousa-Zomer *et al.*, 2020; Warner & Wäger, 2019).

La letteratura precedente evidenzia il ruolo cruciale delle capacità di *reconfiguring* digitale nell'operazionalizzare le strategie digitali sviluppate (Kroh *et al.*, 2024; Warner & Wäger, 2019), guidando l'innovazione attraverso partner esterni, nuovi ecosistemi, reclutando talenti digitali ed esperti di tecnologie e attingendo alla conoscenza digitale interna (Kroh *et al.*, 2024; Linde *et al.*, 2021). I nostri risultati suggeriscono che le capacità di *phygital agility* comportano la modifica di componenti fisiche e digitali per allinearsi alle strategie e agli obiettivi dell'impresa. Pertanto, estendendo la letteratura precedente, *phygital agility* richiede un adattamento e un allineamento simultaneo di elementi fisici e digitali in modo coeso per sostenere le strategie e gli obiettivi dell'impresa. Sottolineiamo l'interconnessione e l'interdipendenza dei mondi fisici e digitali nel raggiungimento dell'allineamento strategico e dell'efficienza operativa. Per sviluppare *phygital agility*, è necessaria una *microfoundation* a livello individuale che comprenda formazione continua e aggiornamento delle competenze del personale per allinearsi alle tendenze in evoluzione focalizzandosi sui feedback raccolti attraverso interazioni sia fisiche che digitali. La letteratura precedente sulle *Dynamic Capabilities* digitali sostiene che la formazione e la conoscenza sono fondamentali per affrontare la complessità di ambienti incerti e in rapida evoluzione (Füller *et al.*, 2022; Scuotto *et al.*, 2021; Sousa-Zomer *et al.*, 2020; Warner & Wäger, 2019). Per quanto riguarda la *microfoundation* di livello processuale della capacità *phygital agility*, avanziamo il concetto di riposizionamento continuo dei prodotti, un ciclo di feedback che integra dati fisici e digitali per adeguare continuamente i prodotti al fine di soddisfare in maniera efficace le esigenze del mercato. Infine, riconosciamo l'importanza di un focus sull'esplorazione del mercato come fondamentale *microfoundation* di livello strutturale per *phygital agility*. Riguarda l'anticipazione delle esigenze in evoluzione del mercato, spingendo l'organizzazione a stabilire obiettivi ambiziosi e ad intraprendere azioni rischiose per raggiungerli.

Infine, i nostri risultati mostrano come le tre dimensioni delle *phygital Dynamic Capabilities* (*phygital insight*, *phygital action*, e *phygital agility*) non agiscano come compartimenti stagni isolati all'interno di un'organizzazione. Le tre dimensioni delle *phygital Dynamic Capabilities* sono interconnesse in un ciclo continuo, in cui le informazioni ottenute dal *phygital insight* raggiungono le capacità *phygital action* e *phygital agility*. *Phygital agility*, a sua volta, influenza i cicli successivi di *phygital insight*, generando un approccio dinamico e adattivo all'implementazione delle *phygital Dynamic Capabilities* a diversi livelli organizzativi.

5.1 Implicazioni manageriali

La presente ricerca offre importanti implicazioni per i manager e i professionisti, contribuendo in modo significativo alla comprensione delle *Dynamic Capabilities* all'interno del contesto in evoluzione degli ambienti *phygital*, un'area finora trascurata nella ricerca. In un'epoca contrassegnata da una concorrenza intensa e da dinamiche di mercato plasmate dalla Trasformazione Digitale, la ricerca di *Dynamic Capabilities* più efficaci è diventata prioritaria per i manager e i professionisti che cercano di competere in contesti imprenditoriali in cui la convergenza dei mondi fisici e virtuali è sempre più diffusa. L'identificazione delle *microfoundations* che sottendono alle *Dynamic Capabilities* di *phygital insight*, *phygital action* e *phygital agility* offre una guida pratica per i manager al fine di coltivare tali capacità all'interno delle proprie organizzazioni, imparando come passare da un contesto puramente digitale ad uno *phygital*. Il framework sviluppato in questo studio è informativo e operativo poiché fornisce preziose informazioni riguardo agli aspetti chiave e ai meccanismi che, a livello individuale, processi e strutture, caratterizzano le *phygital Dynamic Capabilities*. Questo approccio strutturato

si pone come guida graduale verso lo sviluppo delle *phygital Dynamic Capabilities*, agevolando la comprensione di come costruire e mantenere un vantaggio competitivo nel panorama imprenditoriale contemporaneo.

5.2 Limiti e ricerca futura

L'analisi qualitativa effettuata mediante l'impiego di un caso di caso singolo non garantisce la generalizzazione delle conclusioni dello studio. Il presente lavoro rappresenta un primo studio esplorativo da ampliare attraverso analisi ulteriori. Pertanto, sarebbe necessario indagare questo argomento in contesti di ricerca multipli per testare il nostro framework teorico, ad esempio, attraverso studi quantitativi su scala più ampia. La ricerca futura potrebbe sviluppare uno strumento di misurazione multidimensionale per catturare le *phygital Dynamic Capabilities* e convalidarlo attraverso ricerche quantitative. Un ulteriore vincolo risiede nel fare affidamento su un caso all'interno di un Paese specifico come l'Italia. La validità esterna o la trasferibilità dello studio potrebbero essere rafforzate estendendo l'analisi per includere altri casi provenienti da diverse realtà *phygital*. Una domanda di ricerca interessante potrebbe riguardare come le imprese *phygital* in diversi mercati geografici o settori del retail configurano le loro *Dynamic Capabilities*. Ci sono similitudini o differenze? Ciò potrebbe fornire informazioni su come le imprese *phygital* in diversi mercati geografici o settori del retail configurano in modo simile le loro *Dynamic Capabilities* e potrebbero esplorare ulteriori *microfoundations* in contesti *phygital*. La ricerca futura potrebbe, in questo senso, basarsi sull'esperienza dei rivenditori in settori diversi dal retail digitale, inclusi generi alimentari e moda di lusso, per consentire una maggiore generalizzazione dei nostri risultati. Altri studi potrebbero esaminare il ruolo dell'analisi dei dati e dell'intelligenza artificiale nell'estrarre informazioni operativi dalla fusione di dati fisici e digitali.

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Exploring the convergence between alliance management capabilities and relational view: sustainability-oriented collaboration in emerging green energy markets

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Abstract

Frame of the research. *Sustainability-oriented collaborations are interorganizational arrangements where the competencies of diverse companies are pooled together to tackling environmental challenges. These collaborations are distinguished from strategic alliances since they face complex goals, high uncertainty about the results and deals with heterogeneous compositions of partners.*

Purpose of the paper. *Scholars have questioned whether the mainstream strategic alliance literature is capable to explain the outcomes variability of sustainability-oriented collaboration. Driven by the aim of developing an integrated view of Alliance Management Capabilities (AMC) and Relational View (RV) we investigate to what extent the focal companies of 16 different partnerships employ the theoretical constructs of the above theories in sustainability-oriented projects.*

Methodology. *Results of a fuzzy-set Qualitative Comparative Analysis unravel four different combinations of coordination, interorganizational learning, governance models and transaction specific assets, capable to tackle the peculiar constrains of this form of collaboration and to provide a performing functioning of the projects.*

Results. *As its main contribution, this study offers a configurational perspective illustrating the interaction between the levers of two theoretical frameworks into the sustainability field.*

Research limitations.

Future research can address our limitations: a larger sample size for a more comprehensive analysis, expanding the geographical scope beyond Italy to explore patterns in different cultural or environmental contexts, and utilizing longitudinal studies for more concrete project performance indicators.

Managerial implications. *Companies focusing on energy transition or sustainability initiatives can extract valuable insights from the analysis of 16 projects in this study. Managers can leverage diverse RV and AMC configurations to develop inter-company organizational models tailored to their specific needs, considering factors such as previous knowledge, business overlap, technical complexity, perceived risks, and governance tools.*

Originality of the paper. *To the best of our knowledge this paper is unique in its genre by adopting the perspective of focal company operating in sustainability-oriented projects aimed at developing a new market based on green sustainable hydrogen.*

Key words: *relational view; alliance management capabilities; sustainability-oriented collaborations; sustainable transition; fuzzy-set analysis; qualitative comparative analysis*

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1. Introduction

In recent years, companies have been subject to increasing pressure to innovate products, services, and business models as a possible response to societal needs that range from reducing environmental risk, pollution, and other negative impacts of resource use (Bocken *et al.*, 2014). The transition toward more sustainable production processes often requires additional competencies in technological and non-technological spheres, inducing companies to establish partnerships that mitigate the complexity of the challenges through resources and knowledge exchange (Rizzi *et al.*, 2013). Partnerships and alliance management capabilities are vital in eco-innovation (Capaldo 2007; Dangelico 2016; Hartman 1997; Hartman 1998), but their role in sustainability-oriented collaboration (SOC) is still considered an underexplored research direction (Caldwell *et al.*, 2017; Gölgeci *et al.*, 2019; Melander, 2022).

Recently, there has been a growing demand to broaden the scope of the mainstream strategic alliance literature beyond its conventional focus on profitability and competitive advantage (Al-Tabbaa *et al.*, 2019; He *et al.*, 2020). This call advocates a deeper understanding of the managerial levers available for companies operating in emerging business ecosystems oriented towards sustainability.

In particular, Vurro *et al.* (2023) argued sustainability-oriented collaborations distinguish themselves from strategic alliances based on three key factors: (i) goal complexity, where the attainment of environmental objectives may supersede the conventional logic of business competitiveness (ii) heterogeneity of the partners engaged in the collaboration and (iii) limited predictability where the complexity of the sustainability challenges makes the approaches to solve the problems not straightforward, with consequences that are difficult to predict.

Considering these peculiarities, the current literature asks whether new capabilities are needed for the operation of SOCs (Menghwar and Daood, 2021; Niesten and Jolink, 2020; Vurro *et al.*, 2023) recognizing a gap about the ability of constructs from mainstream literature to explain variability in the effectiveness of these collaborations. Hence, it becomes crucial to investigate whether theoretical constructs explaining the success of alliances can be borrowed from strategic alliance literature to also explain the performing functioning of SOC.

Among these constructs, we distinguish between (i) those constituting the structural dimension of the partnership (or alliance level) which fall within the framework of the Relational View (Dyer and Singh, 1998), and (ii) those shaping the individual dimension (or firm level) belonging to the Alliance Management Capabilities framework, which pertain to the attitudes, skills, and capabilities of each individual firm engaged in the alliance (Schilke, 2014; Schreiner *et al.*, 2009).

Many studies have examined structural or individual dimensions of collaborations independently, lacking a focus on their complementarities (Menghwar and Daood, 2021; Niesten and Jolink, 2020). To advance understanding in this area, scholars (Helfat and Raubitschek, 2018; Kohtamäki 2018) have advocated for investigating the interactions between structural and individual dimensions for a more comprehensive perspective. Indeed, recent studies (Dhaundiyal and Coughlan, 2022; Donbesuur *et al.*, 2021) attempted to understand how Alliance Management Capabilities (AMCs) of a company allow this firm to capitalise on the constructs of the Relational View (RV) to generate eco-innovation. However, these preliminary findings leave ample room for further exploration of how the structural components of alliances and the individual skills of a focal company relate to sustainability outcome.

Hence, our paper aims to employ a holistic view of the literature on partnerships and to comprehend how the components of RV and AMC synergize within Sustainability-Oriented Collaborations (SOC) to generate sustainable results. This translated into the following research question:

RQ1: How do companies employ their AMCs and Relational View pillars in sustainability-oriented collaboration to better tackle the challenges embedded into these projects?

To this end, we investigated a series of collaboration with an explicit environmental intent in addition to the conventional economic and competitive purpose. All these projects shared interest in collaboratively addressing environmental issues by developing new disruptive processes and business models capable to reduce their emission or by facilitating the scale-up of new green technology. We have adopted the perspective of the leading company of each project that we will call focal company, to analyse the characteristics of each partnership and to identify how the constructs of AMC and RV are leveraged in the most performing projects.

The analysis took advantage of the emerging market of green hydrogen in Italy (i.e. hydrogen produced by water electrolysis using renewable power) as a meaningful research setting that, falling within the broader perimeter of the energy transition, presents (i) relevant institutional pressures towards greenhouse gasses reduction (IPCC 2022), (ii) significant demand of innovations to advance technologies, processes and business models and develop the related markets, which are currently at the early-stages (IEA 2022), (iii) a variety of stakeholders throughout the green hydrogen value chain, and (iv) a multitude of projects facilitated through collaborative partnerships.

An articulated qualitative research methodology encompassing a qualitative comparative analysis (Ragin, 2000, 2008), which is of growing interest in managerial studies but is still relatively underexplored in management literature (Parmigiani, 2021), leveraged extensive data collected through interviews, questionnaires and public reports of companies involved in hydrogen projects. This approach provided us with insights concerning the practical issues regarding the combinations of AMCs and structural components of the RV associated with high performance in SOC.

As a result, we have conceptualized various configurations of AMCs and RV pillars associated with elevating project performance, thereby affirming the significance of these managerial levers in the realm of SOCs. Our study demonstrates that specific aspects of each collaboration, such as its underlying purpose, pre-existing knowledge and business overlap among partners and the levels of technical complexity, determine the prevalence of certain AMCs over others. In general, the constraints typical of SOCs can be addressed by employing an appropriate mix of AMCs and RV pillars.

The related theoretical and managerial implications contribute to the management of organisation in sustainability-oriented collaborations.

2. Theoretical Background

2.1 The theoretical foundations of collaborations

The imperative of concentrating on partnerships as a means to attain sustainable results is relatively recent in the scientific literature (Hartman *et al.*, 1997; Srivastava, 2007). Over the last decade, many inter-organizational arrangements have emerged with a shared interest in collaboratively addressing environmental issues (Wassmer *et al.*, 2014). This type of collaboration includes the interaction between different companies to share environmental objectives and plan and develop innovations to reduce the environmental footprint (Vachon and Klassen, 2008). In particular, “sustainability-oriented collaboration” refers to collaborations aimed at upgrading a company’s products, processes, or practices to realise environmental value besides economic returns (Adams *et al.*, 2016). Similar concepts can also be found in the extant literature under the name “green alliances” or “cross-sector social partnerships”, among others.

The mainstream literature examines collaborations from different angles. When studies target the partnership as a whole, the RV is the most suitable theoretical lens for understanding the relationships established between the parties (Dyer and Singh, 1998). When, instead, the study targets a single company, the AMCs theoretical framework is the most appropriate for understanding the characteristics that allow a company to maximise the outcome of the partnership (Schilke, 2014; Schreiner *et al.*, 2009).

In particular, the RV framework proposed by Dyer and Singh (1998; 2018) posits the effectiveness of partnerships in generating competitive advantage because of supernormal profits, called relational rents, deriving from the extraction of value from mutually integrated resources (Lavie, 2006). According to the original formulation of the RV and further empirical evidence, effective governance, complementary resources, investment in relationship-specific assets, and knowledge-sharing routines are necessary to generate relational rents (Dyer and Hatch, 2006; Lavie, 2006).

The AMCs framework, instead, integrates the RV in that it adopts a firm's perspective on multiple relations (Wang and Rajagopalan, 2015) to distinguish the resources that are necessary to handle individual alliances (Schreiner *et al.*, 2009) from those that are necessary to manage a portfolio of alliances (Schilke *et al.*, 2010). In particular, AMCs spotlight the firm's skills and competencies that help orchestrate strategic alliances (Kale and Singh, 2007), which is crucial in explaining performance differences across alliances (Wang and Rajagopalan, 2015).

In recent years, the literature has begun to apply these theoretical frameworks beyond profitability to address eco-innovation and environmental outcomes (Vasudeva and Anand, 2011), providing evidence that intense collaborative endeavours among multiple actors help tackle environmental challenges (Albino *et al.*, 2012) and achieve higher sustainability performance (Dangelico, 2016). Concerning AMCs, Inigo *et al.* (2020) have shown how the alliance portfolio coordination capability helps establish new sustainability-oriented collaborations, while other scholars (Dhaundiyal and Coughlan, 2022; Donbesuur *et al.*, 2021) investigating the alliance post-formation phase demonstrated the connection of coordination and communication capabilities with the achievement of better environmental results.

Focusing on these peculiarities, it emerges unequivocally that collaborations might stimulate green performance (Melander, 2017).

These studies demonstrate that despite various attempts, a clear and concrete evidence about the interrelations between the constructs of AMC and RV during the development of sustainability-oriented collaborations is still lacking.

2.2 An integrative analytical framework to investigate organisational lever for sustainability-oriented collaboration.

Based on the framework proposed by Wang and Rajagopalan (2015), we focus on the post-formation phase of inter-company collaboration, which encompasses the stage where partners have already been selected, and the alliance's design has been established. Focusing on this phase allows us to concentrate on how alliances are managed within the firm.

This choice led us to analyse the RV and AMC constructs relevant in this phase, excluding the capabilities valuable in the pre-formation alliance stage. Thus, we did not include in our analysis the resources complementary since according with the latest review of the RV, it is an essential construct in the pre-formation phase serving as a trigger to form an alliance and selecting the partners (Dyer and Singh, 2018). In the same vein, we focus on coordination and inter-organizational learning since, according to previous studies on AMC are essential to creating value once the partnership is established (Kale and Singh, 2007; Schilke and Goerzen, 2010; Schreiner *et al.*, 2009). Finally, regarding the slight overlap between Knowledge-Sharing Routines (RV) and Intrafirm Learning Process (AMC), we decided to focus on the latter since it is a skill belonging to the focal company (Wang and Rajagopalan, 2015) and unlike knowledge-sharing routines, its implementation is not dependent on the behaviours of other partners. This structure is functional to examine the levers that a focal company can control and manage autonomously in sustainability-oriented collaboration once the partnership has been formed. Figure 1 shows the analytical framework that integrates RV dimensions and AMCs to better perform SOC.

Therefore, we posit that companies, when pursuing the development sustainability-oriented projects can leverage and arrange different intersections of:

(i) Intrafirm learning processes: they regard the routines associated with articulating, codifying, sharing, and internalising alliance knowledge (Kale and Singh, 2007). This construct looks at the implementation by the focal firm of new internal mechanisms to accumulate new information (Zollo and Winter, 2002) and, thus, to develop environmental learning (Donbesuur *et al.*, 2021; Yli-Renko *et al.*, 2001). The intrafirm learning processes determine the ability to absorb new skills from partners, crucial to attain sustainable goals (Ardito *et al.*, 2018; Jean *et al.*, 2012).

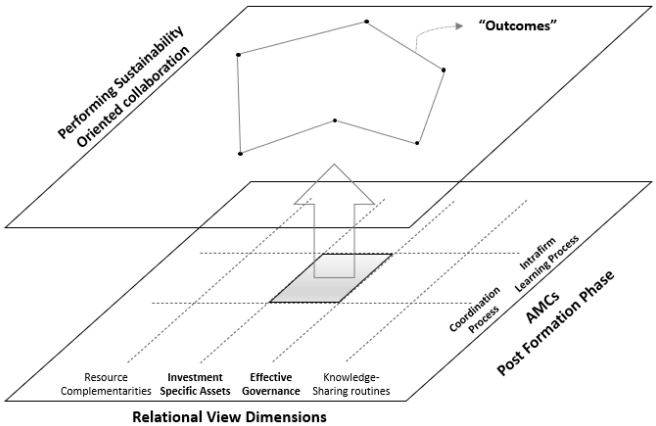
(ii) Coordination: it refers to the capability of the focal firm to coordinate activities and resources with the alliance partners (Gulati *et al.*, 2005), to efficiently manage tasks, responsibilities, and interdependences and to flexibly adapt partners' agreements (Schilke, 2014; Schreiner *et al.*, 2009). Huang and Li (2017) have demonstrated that the coordination capability, by inducing an effective co-engagement between separate functions, positively impacts green product developments. Moreover, as empirically demonstrated by Donbesuur *et al.* (2021), environmental in-learning mediates the positive relation between inter-organizational coordination and eco-innovation.

(iii) Investment-Specific Assets: when a firm develops specialised assets in collaboration with partners, it generates a configuration of resources that is not easily replicable by rivals (Dyer and Singh, 1998). The specialisation of assets generates deeper trust in partners, activates new interactions and stimulates informal communication (Dyer *et al.*, 2018). Co-investing with partners on key assets is also associated with achieving better innovation outcomes. Scholars have found a positive relationship between the level of relationship-specific investments and the generation of innovative ideas (Potter and Wilhelm, 2020; Wagner and Bode, 2014). Higher transaction volumes between firms facilitate communication and operational efficiency, improving the capacity for product development and differentiation (Dyer and Hatch 2006).

(iv) Governance Mechanism: the governance model applied to the partnership describes how companies have formalised their agreements, authorities, roles, and responsibilities within the relationships. Effective governance is necessary to boost value creation, reduce transaction costs, and reduce partners' opportunistic behaviours. Various alliance governance models exist, ranging from highly formalised to less formalised and from high to low-directional power relations. In eco-innovation partnerships, resource interdependence and shared investments are typical but can create appropriation concerns (Dyer *et al.*, 2018). Thus, the governance models are necessary to avoid litigations and contrasts among partners and enhance alliances' orientation toward innovation (Gulati and Singh, 1998).

Current literature provides solid evidence on the relevance of these dimensions for successful management of collaborative projects, but miss guidance on their set-up and combination especially in SOCs. To this end, our research distils recurring configurations of AMCs and RV constructs from a vertical exploration of challenging collaborative projects targeting environmental results.

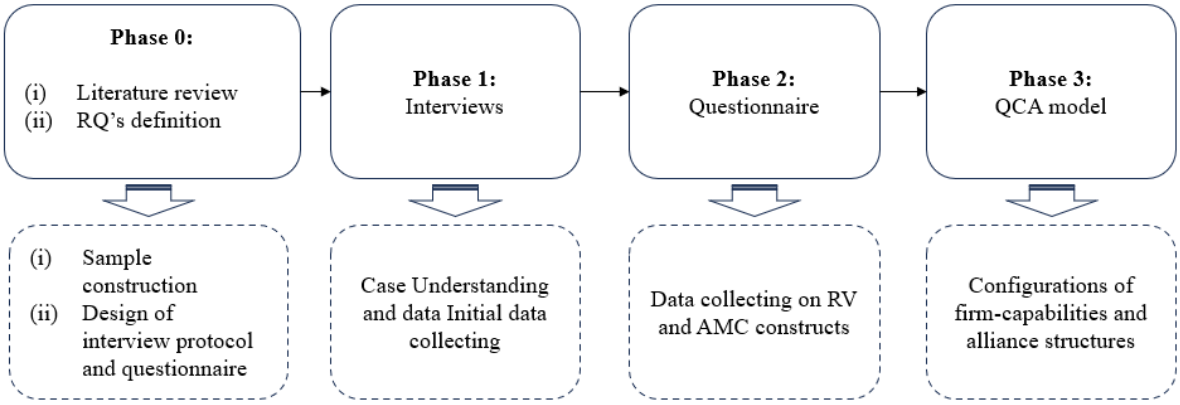
Fig. 1: Analytical Framework



3. Research Context and Method

This study unfolds by analysing 16 projects undertaken through sustainability-oriented collaboration. We focused on the focal company of each project to understand the levers that a company can harness to make effectively work a collaboration. **Figure 2** indicates the methodological flow employed in this study. The boxes with solid lines describe the methodological activities carried out in each step, while the boxes with dashed lines depict the purpose and the outcome associated with that step.

Fig. 2: Methodological Flow



3.1 Research context: green hydrogen and the Italian market

Investments in green hydrogen (H2) have recently gained increasing interest from institutions and policymakers, making this setting ideal for our research. This energy carrier enables the decarbonisation of hard-to-abate industries where direct electrification is not feasible, and it serves as an enabler for the utilisation of renewable sources (IEA, 2021; IEA, 2022), which justifies its inclusion in the political agendas of numerous governments as a mean to address climate change (IPCC, 2022). Despite studies reporting increasing H2 demand and consumption in the coming years (Nunez-Jimenez *et al.*, 2022), several challenges still hamper the H2 diffusion, resulting in high variations in H2 implementation forecasts (IRENA, 2022; Wappler *et al.*, 2022).

This context is optimal for our research since it involves incumbents and new entrants trying to establish new business models and solutions to overcome barriers through SOC. Indeed, this setting presents a plurality of partnerships between different market players specially created to overcome together the critical issues of this emerging market that could otherwise be insurmountable if addressed individually.

We choose to limit our analysis to Italy to ensure environmental homogeneity in terms of, among others, infrastructures, regulatory constraints, renewable energy availability and energy pricing, and to focus on a context that presents (i) goal complexity due to high hydrogen interest and declared commitment (MISE, 2020). Indeed the 2020 EU's hydrogen strategy (EU, 2020) and the 2030 target in REPowerEU plan (EU, 2022) significantly pushed H2 investments in Italy (ii) high uncertainties because of an ongoing regulation and infrastructural development (iii) relevant potential synergies among different industries and operators into the supply chain (MISE, 2019).

3.2 Sample and data source

The selection of cases matched the relevance criteria and the availability of abundant secondary data sources, which are essential to triangulating our observation of the phenomena and ensuring that no single point of view dominated our understanding (Gibbert *et al.*, 2008).

Initially, we used the IEA Hydrogen Projects Database, a repository of projects launched since 2000 (last updated in October 2022) for H2 production, distribution, and utilisation. Then, we added companies affiliated with associations that promote H2-related technologies, such as H2IT and the European Clean Hydrogen Alliance. We examined public documents and sectoral publications concerning these companies and interviewed 2 experts from GME (the Italian organisation overseeing the electricity market) to complete the list of projects relevant to the study. This approach yielded an in-depth market understanding and a list of 64 Italian companies engaged in the H2 sector, matching our research scope.

To further refine the list of selected companies, we performed the analysis of the ongoing activities of these companies to ensure all projects exhibit a high adherence to the typical characteristics of SOCs: (i) an intention to achieve impacts beyond the confines of the collaboration itself (Pedersen *et al.* 2021), such as enabling a new hydrogen supply chain or generating an environmental upgrade regardless of profitability returns; (ii) a deliberate search for heterogeneity in the composition of partnerships, where companies from entirely different sectors collaborate; and (iii) limited predictability due to the innovativeness of these projects and the plurality of purposes they pursue (e.g., mobilization of institutional support while establishing new standards).

Combining these constraints with the companies' willingness to participate in the study, we arrived at a final sample of 16 projects. Our sample benefits of adequate heterogeneity among the selected companies, thus mitigating the risk of obtaining context-specific results.

Table 1 illustrates the selected projects and their positioning along the value chain.

For confidentiality reasons, we cannot disclose the projects and partners. However, it should be considered that all of them are large-scale industrial initiatives, each exceeding significantly one million euros in investment, and are nationally recognized as projects of strategic importance. This recognition is due to their potential to enable entire supply chains and the opportunity to transform traditional production processes into new sustainable production models. The focal companies leading each project are all large multinational corporations with a workforce exceeding 1,000 employees and turnovers in the vicinity of or well above one billion euros.

3.3 Interviews Process and qualitative data collection

The interviews were conducted between September 2022 and March 2023. Each interview was conducted via online videoconferencing and lasted between 2 and 3 hours, producing approximately 35 hours of recorded material. We utilized a research protocol to conduct semi-structured interviews aimed at developing an understanding of: (i) the project and its associated objectives and results; (ii) the governance of the collaboration and the focal company's organizational set-up developed to manage the relationships with partners.

This information has enriched our QCA model and enhanced our understanding of reasons why certain configurations of capabilities and alliance structures are conducive to generating higher performance in SOC. The informants were key figures of the focal company involved in strategic decision-making and committed to project advancement, guaranteeing a broad view of the project's corporate strategy and managerial dynamics. The job positions of the interviewees fall into the categories of the company's CEO, innovation director, or project manager. In this phase, to triangulate the evidence emerging from the interviews, we leveraged secondary data available on the websites of the interviewed companies, in sustainability reports, and in sector-specific journals focused on developments in the Italian hydrogen economy. For instance, we verified project start dates, the involved partners, the objectives declared to investors, and, most importantly, communications on ongoing results, such as hydrogen production volumes, emissions reductions, specific investments, and the creation of new companies.

Tab. 1: Projects Details (see it after reference)

H2 Value Chain Steps	Project n°	Focal Company	Project	Project Partners	Project Description
a) R&D testing	1	Utility – Energy Company	Testing Platform	(i) Energy Company (ii) Users	Development of an experimental platform to test H2 supply chain, electrolysers, H2 delivery and stocking.
	2	Steelworks	Steel Making Blending	(i) EPC contractor (ii) Utility (iii) Consulting (iv) Steelworks	(i) Use of hydrogen in burners (blended with Gas) used in the steel heating process. (ii) Assessment of the impacts that burners fuelled with a % of H2 have on the product.
	3	Utility – gas transportation and storage	Steel Making flexible Blending	(i) Utility – gas (ii) Energy Company (iii) Steelworks	Development of an electrolyser in a steel mill connected to a dedicated photovoltaic park (off-grid) to supply H2 to an electric furnace. Continuity is guaranteed by methane.
	4	EPC Contractor	Optimisation of Value chain steps	(i) EPC contractor (ii) Utility – gas (iii) Electrochemistry	Development of an in-house laboratory to test burners on a real scale. The project has developed photovoltaic roofs to produce renewable energy and thus connected to an electrolyser installed on-site
b) H2 Production	5	Utility – Energy Company	Hydrogen valley	(i) Energy Company (ii) Engineering developer company (iii) EPC Contractor	Construction of three hydrogen production centres powered by photovoltaics with integration from the grid.
	6	Energy Hubs Developer	Energy hub and H2 Stock	i) Energy Hubs Developer ii) EPC contractor iii) Private equity fund	Development of an energy hub powered by offshore wind and floating photovoltaics. H2 is used as storage to mitigate the intermittency of renewables and sold as feedstock to neighbouring businesses (off-takers).
c) Distribution	7	Utility – gas transportation and storage	Definition of blending % in national pipelines	(i) Utility – gas (3) (ii) Technical Consultant (iii) Category association	Assessment of the entire supply chain and all parties connected to the gas network to test the possible increase in the percentage of blending within national gas pipelines.
d.1) H2 Usage decarboniz. in Hard to Abate	8	Refinery	Refinery	(i) Energy Company (ii) Refinery	Installation of an electrolyser in a refinery powered by energy from the grid certified through a Power Purchased Agreement (PPA) to replace some of the grey hydrogen used with green H2.
	9	Utility – Energy Company	Refinery	(i) Energy Company (ii) Refinery	Supply of green H2 to a Refinery company through installation within the plant of an electrolyser powered by the electric grid (Virtual PPA). Origin certificates qualify it as green H2.
	10	Utility – Energy Company	Refinery	(i) Energy Company (ii) Refinery	Supply of green H2 to a Refinery company through the construction of an electrolyser adjacent to a photovoltaic park and transportation by road (40 km). .
	11	EPC Contractor	Steel Making	i) Partnership between 2 EPC contractors ii) Steelworks client	Development and installation of a direct reduction plant in a steel mill.
	12	EPC Contractor	Steel Making	i) Partnership between 2 EPC contractors ii) Steelworks client	Development and installation of a direct reduction plant in a steel mill.
d.2) H2 Usage Transportation	13	Utility – Energy Company	Transportation Trucks	(i) Energy Company (iii) Trucking companies (iii) Networkist company	Production of certified green H2 and delivery to refilling stations where partner trucks will be supplied.
	14	Utility – gas transportation and storage	Transportation Train	(i) Utility – gas (ii) Energy Company (ii) Rail transport company	Construction of a first hydrogen production plant adjacent to a train station and replacement of the current fleet with H2-powered electric trains.
	15	EPC Contractor	Transportation Busses	(i) EPC contractor (ii) Energy company (iii) Bus transport company	Construction of an H2 production and storage site and a refilling station for bus charging.
e) Technology Providing	16	Utility – gas transportation and storage	Electrolysers Giga Factory	(i) Utility – gas (ii) Electrochemistry	Creation of a giga factory for electrolyser components based on alkaline technology.

3.4 Questionnaire for the QCA

The questionnaire sent to the key informants in the focal companies integrated information about the alliance characteristics, firm capabilities and the level performance achieved for each project. Each construct's value was calculated as the average of its respective items. The items were based on prior literature and were measured using a 7-point Likert scale from 1 = strongly disagree to 7 = strongly agree (**Table 2**). We assessed the variables Coordination, Interorganizational Learning, and Transaction-Specific Assets based on psychometric scales (Schilke and Goerzen's 2010; Schreiner *et al.* 2009; Wu et al 2017).

The binary variable Governance was the result of our direct observation of the phenomenon through the interview. Grounding on Dyer and Singh (1998), we assigned 0 to partnerships where the nature of the partnership relationship is based on rigid contractual agreements defining the parties' obligations, and 1 when the alliance has a shared governance through either the creation of special-purpose entities (SPV) or the creation of a new company with a shared board.

Finally, we employed a psychometric scale to measure Project Outcomes (Kale and Singh, 2007; Krishnan *et al.*, 2006), a variable capturing whether the objectives for which the partnership was established have been achieved, the satisfaction with overall performance and whether the partnership has improved the company competitive position. Considering that all our projects are sustainability-oriented collaboration, the variable alliance performance proxies the achievement of environmental

outcomes (for this purpose, the construction of the sample was a highly sensitive phase). Moreover, although this variable assesses performance subjectively, we highlight that prior studies have shown in similar contexts that perceptual subjective indicators exhibit a significant correlation with actual performance (Richard, *et al.*, 2009).

3.5 QCA Data Sets and Calibration

We have previously highlighted four attributes that, based on theory, are individually connected to the effective management of partnerships. Our objective is to understand how these attributes combine to generate satisfactory outcomes in sustainability-oriented partnerships. Thus, QCA is adequate in our case since it allow to unravel patterns of attributes from a small sample of projects (Greckhamer *et al.*, 2013) adding more nuances to the interplay of different attributes (Schneider and Wagemann 2010), assuming equifinality (i.e., different combinations of attributes can produce the same outcome) (Ragin, 2000;2008). What is more, it complements statistical methods that are unable to accommodate multiple alternative paths (Woodside, 2013).

We employed a fuzzy set variant of qualitative comparative analysis (fsQCA). Differently from the traditional Crisp QCA (Ragin, 1987), fsQCA allows for the use of continuous variables ranging between 0 and 1. This higher granularity in data observation (Ragin, 2000) is particularly useful in social or managerial studies, where variables frequently exhibit vagueness that seldom result in extreme values (Campbell *et al.*, 2016), requiring instead to express nonbinary degrees of membership in a specific set.

The calibration is a crucial stage in QCA since it transforms the observed variables into a range between 0 (complete non-membership) and 1 (complete membership) (Ragin, 2008). We set thresholds to capture variations in degrees among cases (Greckhamer *et al.*, 2018), this entailed determining the three cut-off points representing full membership, complete non-membership and intermediate set point to differentiate membership levels based on conditions and outcome sets (Greckhamer *et al.*, 2018). We carried out the transformation by using sample dependent anchors defined by the 0.95, 0.50, 0.05 percentiles as the three thresholds (or breakpoints), transforming the data into the log-odds metric with all values being between 0 and 1. In fact, in absence of a solid theoretical foundation to define ex-ante high or low levels of membership to a specific set, consistently with prior studies (Fiss 2011; Greckhamer *et al.*, 2008; Greckhamer and Gur, 2021; Orlandi *et al.*, 2022; Diez Martinez *et al.*, 2023) we opted for the application of sample-dependent anchors corresponding to predetermined percentiles of the distribution. Table 2 shows the calibration rules adopted for each attribute and outcome.

Tab. 2: Questionnaire' Items

Constructs	**Description and previous literature usage**	**Calibration**
Coordination Dimension	Categorical variable based on a 4 items construct (Schreiner *et al.* 2009) to capture the extent to which the focal company has established process and routines to coordinate external partners activities	Sample Based Calibration 0.95 percentile → Fully membership 0. 50 percentile → Cross Over point 0.05 percentile → Full non-membership
Interorganizational learning	Categorical variable based on a 4 items construct (Schilke and Goerzen's 2010) to capture the extent of routines designed to facilitate knowledge transfer and absorption from alliance partners	
Transaction-Specific Assets	Categorical variable based on a 4 items construct (Wu et al 2017). It measures the relation-specific investments in terms of the extent to which the company invested in an alliance relationship	
Governance Mechanisms	Dichotomous variable resulting from direct observation of the phenomenon through the interview process. In line with (Dyer and Singh 1998) it discriminates between (i) partnerships governed by client-supplier contracts and (ii) partnership with shared governance through the creation of special-purpose entities (SPV)	Not shared governance → 0 Shared Governance → 1
Alliance Performances (Outcome of interest)	Categorical variable based on a 4 items construct. This construct used by Dhaundiyal and Coughlan (2022) and adapted from Krishnan *et al.* (2006) with one extra item from Kale and Singh (2007) relating to competitive position. This construct reflects the subjective perception of alliance performance.	Sample Based Calibration 0.95 percentile → Fully membership 0. 50 percentile → Cross Over point 0.05 percentile → Full non-membership

4. Results

4.1 FsQCA Analysis

After the calibration of our dataset, we implemented the fsQCA through three essential steps.

First, we constructed the so-called truth table, which identifies all possible combinations (including those without empirical evidence) of the selected attributes. Then, we sorted the empirical observations into the rows of this table based on their attribute values (Fiss, 2011). In this table a value of 1 indicates the presence of a condition in that specific combination, while 0 indicates its absence.

Second, we reduced the number of rows based on two conditions (Ragin, 2008): (i) a frequency threshold equal to 1, which determined the minimum number of cases required for a solution to be considered, and (ii) a consistency threshold equal to 0,8, which reflected the minimum degree to which cases conform to the set-theoretic relationships expressed in a solution (Fiss, 2011). **Table 3** shows the truth table providing, after the described simplification, nine different combinations of attributes displayed by our 16 projects.

Third, we employed an algorithm based on Boolean algebra to logically reduce the rows of the truth table to simplified combinations (Fiss, 2011). We utilised the Quine-McCluskey algorithm (implemented in the fsQCA 3.0 software package) to minimise sufficiency statements, simplify complexity, and obtain a more parsimonious outcome (Schneider and Wagemann, 2012). These results are illustrated in next section, focusing on the necessary and sufficient analysis.

Tab. 3: Truth Table

	CONDITIONS				***OUTCOME***	
ROWS	Coordination	Interorganizational learning	Transaction-Specific Assets	Governance Models	Number of cases	Alliance Performance
1	0	0	1	1	2	1
2	0	0	0	1	1	1
3	1	0	1	1	1	1
4	1	1	1	0	1	1
5	1	1	1	1	3	1
6	0	1	0	0	2	0
7	1	1	0	0	3	0
8	0	0	1	0	1	0
9	0	0	0	0	2	0

4.2 Partnerships Management and the interplay of individual and structural dimensions

The analysis of necessity enables us to determine whether certain conditions included in the analysis are necessary for the outcome to occur, i.e. whether RV or AMC attributes are consistently present when the partnership achieves superior performance. In the necessity analysis, it is recommended to use a consistency benchmark of at least >0.90 (Ragin, 2008; Schneider and Wagemann, 2012) as a threshold to conclude that empirically observed configurations are associated with the outcome (Greckhamer *et al.*, 2018).

Coverage is similar to R2 in traditional regression analysis and indicates how much a solution accounts for the outcome of interest (Campbell *et al.*, 2016). **Table 4** shows the results considering whether the presence or absence (labelled ~) of a condition is necessary for the presence (Alliance performance) or absence (~Alliance performance) of the outcome.

Given that no conditions have a consistency above 0.9, we conclude that no conditions were necessary to reach a high level of alliance performance.

As Schneider *et al.* (2012) emphasised, a condition is considered sufficient when all cases that display the condition also display the result. The FsQCA software uses the Quine-McCluskey algorithm to reduce the causal complexity to a minimal equation of attributes sufficient for an outcome (Greckhamer *et al.*, 2008), computing complex, parsimonious, and intermediate solutions. In line with Ragin (2008), we opted for the intermediate solution, which uses only the remainders that survive counterfactual analysis (Ragin, 2008; Schneider and Wagemann, 2012) and is more

appropriate in situations of limited diversity due to its simple assumptions based on easy counterfactuals (Fiss 2011).

Tab. 4: Necessary conditions analysis

	ALLIANCE PERFORMANCE		***~ ALLIANCE PERFORMANCE***	
CONDITIONS	**Consistency**	**Coverage**	**Consistency**	**Coverage**
COORDINATION	0.724	0.755	0.627	0.537
~COORDINATION	0.556	0.645	0.714	0.679
INTERORGANIZATIONAL LEARNING	0.692	0.723	0.631	0.541
~INTERORGANIZATIONAL LEARNING	0.561	0.649	0.677	0.643
TRANSACTION-SPECIFIC ASSETS	0.729	0.812	0.476	0.435
~TRANSACTION-SPECIFIC ASSETS	0.492	0.534	0.795	0.706
GOVERNANCE SHARED	0.602	0.755	0.237	0.244
~GOVERNANCE SHARED	0.398	0.389	0.763	0.611

Table 5 shows the results of the analysis suggesting that the answer to our research question is a set of 4 different combinations of attributes, it provide both the raw coverage, which indicates the share of the outcome explained by the configuration, and the unique coverage, which reflects each configuration's relative empirical weight, for each combination (Campbell *et al.*, 2016; Ragin, 2008).

Tab. 5: Sufficiency conditions and QCA results

Conditions / Configurations	**Configuration 1** "***TECHNOLOGY UPLIFT***"	**Configuration 2** "***NEW BUSINESS EXPLORATION***"	**Configuration 3** "***SYNERGIC DECARBONIZATION***"	**Configuration 4** "***INDUSTRY CATALYST***"
Coordination	⊗	●		●
Interorganizational learning	⊗	●	⊗	
Transaction-Specific Assets		●	●	●
Governance Shared	●		●	●
Consistency	1	0.905	0.974	0.861
Raw coverage	0.251	0.469	0.298	0.387
Unique Coverage	0.044	0.157	0.029	0.011
Solution Coverage			**0.720**	
Solution Consistency			**0.901**	

- Configuration 1:

We have defined this configuration as "**technology uplift**" since it occurs in situations where the leading company initiates a project to exploit the market's need for a green transition by offering technical solutions which are not yet widely adopted as market standards but still capable of deeply improving the environmental impact of partners. This configuration is well represented by projects 11 and 12 by demonstrating the presence of a shared governance among partners and lacking coordination and inter-organizational learning as determinant to the outcome.

Both projects are undertaken by two Engineering, Procurement and Construction (EPC) contractors (or technological developers) who collaboratively work with a third company from a different sector to develop a technological upgrade. Two key elements are crucial in explaining the managerial structure of the collaboration: (i) the **longstanding relationship** between the players and (ii) the **highly technical nature** of the project.

Indeed, the lack of coordination and inter-organizational learning shows that the focal company did not require novel processes for project coordination or knowledge integration to achieve the outcomes. This is largely attributed to the profound familiarity among the partners, who, owing to their longstanding collaborative experience, exhibit well-established and efficient coordination and communication and to the high technicality of the projects which require every partner to carry on its

project segment. The project manager of the focal company engaged in Project 12 stated, "*we know each other… we have daily and constant interaction that doesn't require the establishment of new procedures or ad hoc structures… everyone offer its deep expertise to develop the activities more in line with its background*", Therefore, player with a mature relationship tend to exhibit a propensity for achieving high performance in environmental projects without the need to structure new coordination processes or internal learning mechanisms, but they leverage shared and equitably distributed governance.

- Configuration 2:

We have termed this configuration "**New Business Exploration**" as it occurs in situations where the leading company endeavours to explore innovative business models aimed at improving the environmental conditions of a sector (e.g., hydrogen mobility).

In project 13 for instance, the focal company is an Energy Utility and the project's objectives **go beyond its business as usual**. To the scope, the focal company had to allocate dedicated resources both in financial investments and in human assets. While investments in specific assets are recurrent in many different projects, in this configuration it is peculiar the centrality of learning and sharing knowledge with partners.

"*During the project design phase, we made face-to-face meetings almost on a day-by-day basis* […]"

This reveals that new processes and workgroups were crucial to coordinate activities and knowledge absorption in newly formed partnerships specifically designed to develop a project that deviates from the companies' business as usual.

Indeed, the project manager of the energy company stated: "*We learned a lot about the truck technologies, prices, refilling methods, and customer needs* [...] *All this precious knowledge came from our partners*",

Therefore, in projects designed to explore new markets, with the aim of contributing to the improvement of environmental conditions within the sector where partners operate (e.g., transportation), the focal company benefits from acquiring new and additional knowledge to comprehend the counterpart's business. Furthermore, new coordination procedures are crucial for both overseeing and enhancing specific investments, as well as addressing interactions with partners.

- Configuration 3:

This configuration aligns with projects aimed at significantly reducing emissions in hard-to-abate industries. Therefore, we define this managerial combination encompassing shared governance and high specific investments as "**Synergic Decarbonization**",

In projects like this, none of the involved companies could independently undertake the project, both due to the **magnitude of financial exposure** and the presence of **non-transferable technical expertise** essential for the required activities

In the case of Project 9, a partnership was established to develop a decarbonisation project requiring a *specific investment* in a dedicated photovoltaic power plant to produce green hydrogen. The involved companies formed a special purpose vehicle (SPV) to isolate risks, guarantee shared management of project assets and limit financial exposure by pooling resources under a single entity. This configuration is particularly effective in complex projects where substantial investments of human, technical and economic resources are needed. The project manager of the energy company involved in Project 9 stated: "*In a technically complex project like this one, the work we are undertaking is synergistic and complementary* [...] *We have made shared investments because we believe in the project* [...] *To manage these unique characteristics and the associated risks, we have established a 50-50 joint venture, where we are equal partners*." The interplay between shared governance and dedicated assets helps create deep trust between partners and shared risk exposure. Moreover, this configuration enhances the frequency of the transaction and thus generates specialisation and efficiency.

Projects of this nature, characterized by a high level of technical specialization, do not revolve around knowledge absorption processes but they highlight the importance of synergetic approach where each player address the tasks more in line with its expertise. It's critically important to collectively address the substantial investments required and overseeing the evolution of activities through shared governance models.

- Configuration 4:

The "**Industry Catalyst**" configuration is well represented by Project 16 where the partnership is instrumental in developing synergies between completely different businesses and laying the foundations for enabling future supply chain.

In contrast to Configuration 2, where the purpose of the SOC is primarily to explore a new market, this configuration is in line with projects aiming to establish a new commercial entity that will serve as a catalyst for an emerging business (e.g., the production of electrolyzers to facilitate the national development of the hydrogen economy).

The **participating companies can yield benefits to this new business however the competences made available for the project is not usefully integrable into the core business of the focal company** (e.g., the gas utility may not be interested in learning how to manufacture electrolyzers but can provide the new company with commercially significant contacts).

According to the interviewed executive of the Gas utility of project 16, the establishment of a new company was fruitful to consolidate companies' assets dedicated to the project and to manage them with a centralized governance. It is crucial for the focal company to establish new project coordination mechanisms, not to expand mutual knowledge but to support the commercial activity of the new company.

In fact, the project manager of the utility company stated: "*In this project, the products and the technical development skills belong to our partner. We bring a deep knowledge of the industrial world and a huge portfolio of potential customers.…*"

This configuration is established to initiate high-risk projects aiming to build new market supply chains. The substantial resource effort is addressed through specific shared investment, the high risk and also the potential returns are shared through a new company with common governance structure. Ultimately, the new coordination processes implemented by the focal company facilitate the management of activities among players with no prior experience or overlap in their business.

5. Discussion and conclusions

5.1 Theoretical contribution: The interplay of RV and AMC in SOC

Our study finds a set of configurations of RV and AMC pillars linked to superior performance results in SOCs. The different configurations we have identified allow us to confirm that the constructs of traditional management literature maintain their validity in the perimeter of sustainability.

The configurations we found, highlight that: pre-existing knowledge among partner companies, the technical complexity of projects (i.e., the relative non-transferability of knowledge), the level of financial exposure, and the associated project risk are determinants influencing the combination of attributes necessary for the collaboration to function effectively.

Thus, the combination of the analysed constructs resulted capable to address the criticalities associated with peculiarities of SOCs, namely goal complexity, high heterogeneity and limited predictability. Our findings respond to Vurro's (2023) call about gaining a deeper understanding of how sustainability-oriented collaborations integrates with or challenges mainstream management literature related to AMC and RV.

Firs of all, we recognize that **goal complexity** is a distinctive trait of SOCs, setting them apart from traditional strategic alliances. For instance, many of the projects we analysed, presents a clear diseconomy due to the green reinterpretation of the production process. While traditional alliances ultimately focus on achieving economic and financial results (e.g., relational rent) (Dyer and Singh, 1998; Dyer *et al.*, 2018), SOCs exhibit a different orientation towards achieving impacts that extend beyond collaboration boundaries into wider society and environmental protection (Pedersen *et al.*, 2021).

Our analysis highlights that in projects with higher financial exposure and risk of diseconomies, establishing a Special Purpose Vehicle (SPV), which is a new and separate business entity from the constituent companies, significantly mitigates these limitations. Creating an SPV promotes fair investment and asset allocation, reduces transaction costs, and tensions among investors, and provides a balanced exposure to risks.

In the context of the green hydrogen market we examined, it is evident that the use of green hydrogen despite significant potential in emission reduction, incurs additional costs compared to the business as usual. This design perspective, unacceptable in traditional collaborations, aligns with the nature of these projects. In fact, as reported by Grewatsch *et al.*, (2021) it is common that the goal of achieving environmental targets leads to choices that are uneconomic. The creation of a Special Purpose Vehicle (SPV) with shared governance among partners proves to be functional in sharing financial risks associated with risky projects and in separating such potential impacts from the constituent companies.

Secondly, as evidenced in configurations 3 and 4, the combination of shared governance model with the concurrent presence of dedicated and project-specific investments is instrumental in addressing the profound uncertainty inherent in such endeavours. SOCs are marked by **limited predictability**, owing to the intrinsic complexity and uncertainty surrounding the outcomes. Through the simultaneous presence of specific investments and the establishment of new entity with shared governance, projects acquire a stable and distinctive identity that proves valuable in mitigating risks, and uncertainties (DiVito *et al.*, 2021).

These distinct entities, established to undertake projects with unpredictable outcomes, are poised to operate within a context of profound uncertainty. Consequently, by embracing higher levels of risk, they demonstrate greater resilience and determination in pursuing their objectives compared to what partner companies would do.

An additional element raised by our interviewees, pertains to the heightened commitment and reciprocal trust that emerges as a spill-over effect of this combination of factors. The synergy of specific investment and shared governance deeply engages partners in the project, a facet deemed crucial in fostering the implementation of eco-innovation (Donbesuur *et al.*, 2021) and mitigating ineffectiveness and appropriation concerns (Dyer and Singh, 1998; Dyer *et al.*, 2018). Thus, this perspective complements the recent findings of Patrucco *et al.* (2022) by elucidating how investment-specific assets and effective governance can be established in diverse partnerships oriented toward sustainability outcomes.

The third peculiarity distinguishing SOCs is the profound **heterogeneity** of the involved actors. This heterogeneity is both a consequence of the inherent nature of sustainability challenges and a result of explicit research by leading companies when forming collaborations (Pinkse and Kolk, 2012).

Our findings indicate that low overlap between the partners' businesses, and little knowledge of the partners, lead companies to develop new inter-company learning processes. However, there are circumstances in which high technical complexity makes intercompany learning unsuitable, underscoring the importance of shared governance to understand and manage profound differences among players.

As regard the development of new coordination and learning processes, we found they do not adhere to standardized or recurring logics. In other words, when partners engage in their initial collaboration or possess limited knowledge of each other's, there is a greater inclination to develop new coordination and learning processes that could be beneficial for the focal company. This

tendency is evident in Configuration 2, where leading companies express the need to delve into the partners' businesses for the project's proper evolution. In the same vein in Configuration 1, the pre-existing relationship between partners makes the development of new, specific learning and coordinating processes unnecessary.

This evidence enriches previous studies (Dangelico *et al.*, 2016; De Marchi and Grandinetti, 2013) and support Gulati's findings (2005) about partner-specific experience and related collaboration benefits.

On the other hand, regarding the role of a shared governance in addressing heterogeneity, our findings reveal that a shared board of directors enhance interaction and mutual knowledge, proving functional to address profound differences among partners.

Indeed, in certain cases, knowledge is not transferable, and new learning processes results useless. As reported by some interviewees, in projects characterized by profound technological complexity, the leading company may not find it necessary to absorb the skills of other operators: "*it is necessary for all partners to row in the same direction; no one has time to learn how the others row, but everyone must trust each other's ability to do it*". In projects subject to high technical complexity, the shared governance among operators takes precedence over interorganizational learning in addressing the high heterogeneity. By creating a context of mutual trust, facilitated by investments and the sharing of directional boards, the leading companies get to know partners, and this facilitate delegation of responsibilities. This aspect is useful in SOCs to ensure the coexistence of companies with different objectives (Baranova, 2022). The awareness and acceptance of partners' differences emerge as crucial conditions for developing collaborative practices to overcome siloed approaches (Dentoni *et al.*, 2021). Thus, our study found the importance of establishing new processes in certain situations and underscores the significance of not imposing identical processes in other situations for the effective functioning of SOCs.

5.2 Managerial Implications

This study holds significance for companies approaching energy transition challenges or eco-innovation pathways. The contributions lie on different streams:

As demonstrated, sustainability-oriented alliances exhibit distinctive features that must be effectively managed to ensure the success of projects. Companies embarking on these pathways can leverage managerial strategies, specific governance models, and tailoring the combination of these levers based on the project's unique characteristics.

From a managerial-organizational perspective, once suitable project partners are identified, managers of focal companies can identify the necessary components to develop within the partnership in terms of implementing new coordination and learning processes, as well as in defining governance and specific investments to be done. The different configurations of AMC and RV help managers to set up relationships with partners based on the determinants described: previous knowledge of partners, overlap with the business partners, technical complexity of the projects, perceived risks, and consequent governance tools to protect the parties.

In conclusion, companies engaged in energy transition pathways or committed to open new sustainable markets, can draw insights from this study by examining 16 distinct projects and identifying the intersection between strategies and managerial configurations of the top-performing projects. By aligning with our findings, future project leaders can structure partnerships and invest in the capabilities that yield optimal results.

5.3 Limitations and further research

The present research carried out an empirical analysis of the relational dynamics underpinning SOCs, but future studies could also address some of the limitations of our work.

First, the understanding of the interplay of AMC and RV constructs is based on a sample of 16 projects. Even if the sample size is appropriate for studying 4 attribute interactions, a larger one might offer a more comprehensive and exhaustive analysis, and eventually could include more attributes into the research.

The second limitation concerns the geographical perimeter, which is limited to Italy. Even though limiting the perimeter to a single country was necessary to ensure homogeneity in the sample, as having the companies under the same roof helped focus on RV and AMC pillars, future studies could enlarge the perspective to check whether the successful sustainability-oriented projects follow the same patterns in other cultural or environmental contexts.

The third limitation regards the measurements of the results achieved in SOC which, given the difficulties in using more concrete and comparable indicators to test the outputs, consists of respondents' self-perceptions of project performance. Future studies can usefully conduct longitudinal studies to observe projects' impact after completion.

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Transition from Industry 4.0 to Industry 5.0: the role of intermediary organizations

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Abstract

Frame of the research. *Firms and intermediary organizations face the transition from strategic-operational management based on a techno-centric approach typical of Industry 4.0 to a value-centric approach required by Industry 5.0. Existing literature, however, investigates the role of innovation intermediary organizations in transition contexts mainly with reference to the green transition, neglecting to deepen the other axes of Industry 5.0: triple bottom line of sustainability, resilience, and human-centeredness.*

Purpose of the paper. *The research aims to understand the ability of intermediary organizations to transit from Industry 4.0 to Industry 5.0 by answering the following research question (RQ): Does the different configuration of intermediary organizations launched in support of Industry 4.0 affect their readiness to Industry 5.0 transition?*

Methodology. *The study conducts a multiple case study of 23 intermediary organizations in the Metropolitan City of Turin through an analysis of the websites of the 23 organizations. The research is enriched with 9 interviews and 1 focus group.*

Results. *The results highlight limited readiness of the investigated organizations in the transition to Industry 5.0, particularly in the human-centeredness axis.*

Research limitations. *The study is at an exploratory stage and the transition from Industry 4.0 to Industry 5.0 is a phenomenon still in an emerging phase, consequently future studies should be carried out to compare the analysis with more geographic realities and to consider more intermediary organizations.*

Managerial implications. *The results can be useful: to intermediary organizations, to gain awareness of their role in Industry 5.0 transition; to policy makers, to direct policies to develop and accompany businesses.*

Originality of the paper. *The originality lies in analyzing intermediary organizations – traditionally studied in their role as network developers supporting innovation – in a context of transition from Industry 4.0 to Industry 5.0.*

Keywords: *Industry 5.0 transition; Intermediary organization; Industry 4.0; Sustainability; Resilience; Human-centeredness*

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1. Introduction

Since the early 2000s, intermediary organizations assumed an increasing role as key catalysts for coordinating the various actors involved in production processes and achieving the growth objectives preposed by international institutions (Kivimaa *et al.*, 2019). The literature's interest in innovation intermediary organizations (van Lente *et al.*, 2003; Howells, 2006) develops along two main strands of research. The first focuses on the types of organizations and their characteristics (Caloffi *et al.*, 2023). The second delves into their function as relational enablers in innovation processes (Hernández-Chea *et al.*, 2021).

As a result of the development of new technologies peculiar to the Fourth Industrial Revolution - or Industry 4.0 (Kagermann *et al.*, 2013) - the role of intermediary organizations becomes even more relevant and their heterogeneity and numerosity increases considerably (Caloffi *et al.*, 2023) to support businesses in the changes taking place. International tensions, geopolitical changes, natural events, and health emergencies show that the use of 4.0 technologies for efficiency purposes alone is not sufficient to deal with the many sources of crises and the generalized state of uncertainty. To cope with the unstable international scenario, the European Commission, in January 2021, is promoting the Industry 5.0 cultural revolution (EC, 2021). The program is launched to create sustainable competitiveness of firms and territories based on 4.0 technologies oriented on the principles of sustainability, resilience and human-centeredness (Cillo *et al.*, 2022). In this context, the European Commission calls for a rethinking of the role of intermediary organizations to respond to the major challenges: environmental, social and economic, which include the need for environmental protection, climate threats, demographic, health and welfare concerns, mobility, and difficulties in generating smart, sustainable and inclusive economic growth; and technological, which relate to the transformation of production and consumption system change processes - Industry 4.0 - (Mazzuccato *et al.*, 2020; Mazzuccato, 2018).

At present, the literature on innovation intermediary organizations in transitional contexts predominantly considers the changes required for environmental sustainability (Hodson and Marvin, 2009; Moss, 2009), using a definitional approach and through the creation of taxonomies (Kivimaa *et al.*, 2019). However, the ability of intermediary organizations to transition from Industry 4.0 to Industry 5.0, which requires structuring strategic-operational planning aimed at sustainability, human-centeredness, and resilience, remains little explored.

The research aims to understand the ability of intermediary organizations to transition from Industry 4.0 to Industry 5.0 by answering the following research question (RQ): Does the different configuration of intermediary organizations launched in support of Industry 4.0 affect their readiness to Industry 5.0 transition?

The originality of the study lies in analyzing intermediary organizations - traditionally studied in their role as network developers supporting innovation - in a context of transition from Industry 4.0 to Industry 5.0.

The centralities of the contribution of intermediary organizations in their transition from Industry 4.0 to Industry 5.0 cannot be made explicit by considering only the support of technological implementation directed at improving productivity and competitiveness - a typical component of the Fourth Industrial Revolution - but simultaneously requires technological development and the organization's capacity for strategic orientation to the principles of sustainability, human centeredness, and resilience advocated by the European program Industry 5.0 (EC, 2021) and the Sustainable Development Goals (UN, 2015).

2. Methodology

The study uses a qualitative approach - which allows to investigate an emerging phenomenon in depth and detail (Yin, 2009) - through multiple case studies on intermediary organizations launched in support of Industry 4.0 located in the Metropolitan City of Turin. The urban agglomeration is

relevant because it has transitioned from a traditional industrial economy, based on automotive (a model that dominated the course of the twentieth century), to diversified system from both industrial and technological perspective (Colombelli *et al.* 2019), where additive manufacturing, integrated information systems, industrial internet of things, big data analytics, and collaborative robotics assume a significant role (Startup Genome, 2022). Turin's industrial context is gradually being redefined to include emerging firms in new industries related to innovation and sustainability (Colombelli *et al.*, 2021). Moreover, the Turin reality represents a benchmark in the international landscape in terms of Industry 4.0 (Startup Genome, 2022) and innovation, fostering the development of several and heterogeneous intermediary organizations oriented to drive change in firms and territories.

To answer the research question, the study is carried out in three phases.

The first phase identifies the map of intermediary organizations launched in support of Industry 4.0 from an analysis of Atlante i4.0. The mapping is integrated through a scouting activity developed through brainstorming among the Authors and through consensus conferences with policy makers, practitioners, entrepreneurs and managers working in research and innovation.

The second phase outlines the operations of intermediary organizations through an analysis of the main websites of the intermediary organizations under analysis.

The third stage identifies the readiness of intermediary organizations in the transition from Industry 4.0 to Industry 5.0 through in-depth interviews and focus groups targeting key members of intermediary organizations (Eisenhardt and Graebner, 2007). The methodology adopted allows for the systematic collection of information while ensuring the inclusion of new and unexpected information (Yin, 2009).

The rationalization of information is based on an analysis grid identified from the interpretive framework developed in the taxonomy by Caloffi *et al.* (2023), integrated with the axes of the Industry 5.0 paradigm (sustainability, human-centeredness, and resilience). The final dimensions are as follows: (i) organization name; (ii) type; (iii) nature; (iv) initiative; (v) function; (vi) activity; (vii) attention to Industry 5.0 axes; (viii) sustainability orientation; (ix) human-centeredness orientation; and (x) resilience orientation. Dimensions (i), (ii), (iii), and (iv) enable the mapping of existing intermediary organizations launched in support of Industry 4.0. Dimensions (v), (vi), (vii) allow investigating their operations. Dimensions (viii), (ix), and (x) highlight the readiness of intermediary organizations in the transition from Industry 4.0 to Industry 5.0. Readiness is understood as the ability of intermediary organizations to adapt to Industry 5.0 in terms of change (Lachvajderová & Kádárová, 2022): not perceived; perceived; embedded in the vision; initiated.

The final number of intermediary organizations identified is 23, for a total of 23 websites analyzed, 9 in-depth interviews - one for each type of intermediary organization analyzed - and 1 focus group addressed to 6 experts operating in the innovation ecosystem of the Metropolitan City of Turin (Tab. 1, Tab. 2).

Tab. 1: List of intermediary organizations and respondents

Intermediary organization	Interviewed (Yes/No)
1	Yes
2	No
3	No
4	Yes
5	Yes
6	No
7	No
8	Yes
9	No
10	No
11	No
12	No
13	No
14	Yes

15	Yes
16	No
17	No
18	Yes
19	No
20	No
21	No
22	Yes
23	Yes

Source: our elaboration

Tab. 2: List of experts who participated in the focus group

Expert	Position
1	Chief Financial Officer
2	Senior Program Manager
3	Innovation Manager
4	Area Manager
5	Entrepreneur and investor in startups
6	Co-founder e ceo

Source: our elaboration

The interviews and focus group are performed between April and June 2023 in-person. Each interview lasts between 60 and 90 minutes and the focus group approximately two hours.

Information analysis is conducted through an interpretive methodology carried out in two steps. The first step consists of the Authors comparing the information gathered from the analysis of the websites and the transcripts of the interviews and focus group. The second step allows to identify the main themes emerging from the collected material and the alignment of intermediary organizations to the transition from Industry 4.0 to Industry 5.0.

The rationalization of the information makes it possible to arrive at an understanding of the readiness of intermediary organizations in the transition from Industry 4.0 to Industry 5.0.

3. Results

The results provide a description of the intermediary organizations established to address the transition to Industry 4.0, located in the Metropolitan City of Turin, identifying their intrinsic characteristics, operativeness and readiness to Industry 5.0 transition.

The results identify the map, operativeness and readiness of intermediary organizations in the transition from Industry 4.0 to Industry 5.0.

3.1 Map of intermediary organizations

The intermediary organizations identified by Atlante i4.0 are 15, while the organizations identified through brainstorming among the Authors and consensus conferences with experts in the field are 9, for a total of 23 organizations. This mapping is based on the assessment of the most relevant intermediary organizations in the territory of the metropolitan city of Turin, in terms of impact such as: number of actors involved in the innovation process; participation in or promotion of events on the phenomenon; number of start-ups incubated; European planning; scientific production on the topics analyzed (articles and monographs presented at conferences, workshops and international journals).

The inherent characteristics of intermediary organizations are summarized in Table 3 and described below.

Tab. 3: Map of intermediary organizations

Intermediary organization	Type	Legal nature	Initiative
1	Digital innovation hub	Private	Public
2	Digital innovation hub	Private	Public
3	Digital innovation hub	Private	Public
4	Competence center	Private	Public-private partnership
5	FabLab	Private	Public
6	FabLab	Private	Public
7	FabLab	Private	Public
8	FabLab	Private	Public
9	ITS (higher technical institutes)	Private	Public
10	ITS (higher technical institutes)	Private	Public
11	ITS (higher technical institutes)	Private	Public
12	ITS (higher technical institutes)	Private	Public
13	ITS (higher technical institutes)	Private	Public
14	PID (Digital business point)	Public	Public
15	Incubator	Private	Public-private partnership
16	Incubator	Private	Public-private partnership
17	Incubator and accelerator	Private	Private
18	Development center of Innovation 4.0	Private	Private
19	Development center of Innovation 4.0	Private	Public-private partnership
20	Development center of Innovation 4.0	Private	Public-private partnership
21	Development center of Innovation 4.0	Private	Public-private partnership
22	Science and technology park	Private	Private
23	Development center of Innovation 4.0	Private	Private

Source: our elaboration

The intermediary organizations mapped belong to 9 different types, of which: 3 Digital Innovation Hubs; 1 Competence Center; 4 FabLabs; 5 ITS (higher technical institutes); 1 PID (Digital business point); 1 Science and Technology Park; 2 Incubators; 1 Incubator and Accelerator; 4 Development Centers of Innovation 4.0.

The intermediary organizations mapped are predominantly private in nature (21 out of 23 intermediary organizations). This makes the organizations more flexible and dynamic in the face of change and emerging challenges.

Most of the intermediary organizations were established by public initiative (13 intermediary organizations) or public-private partnerships (6 intermediary organizations). These types of initiatives could have a greater influence on public policy architecture regarding Industry 5.0 transition in order to increase the competitiveness of firms and territories. In accordance with the literature, these models may allow addressing specific system failures (Intarakumnerd and Chaoroenporn, 2013; Russo *et al.*, 2018), facilitating knowledge exchange, avoiding the lock-in effect or providing support to the most fragile components of the system (Smedlund, 2006; Polzin *et al.*, 2016).

The analysis shows that intermediary organizations, as a result of the changing scenario, exhibit increasingly weakly defined boundaries, with partial overlaps between the main types of organizations identified in the literature (Caloffi *et al.*, 2023), presenting configurations with variable geometries capable of reconfiguring their strategy and operations flexibly in response to changing scenarios.

3.2 Operation of intermediary organizations

Once the intrinsic characteristics of the intermediary organizations are mapped and described, the study is carried out through an analysis of websites to identify their main functions and activities and the possible presence in them of cross-cutting attention to the axes of sustainability, human-centeredness, and resilience (Tab. 4).

Tab. 4: Operation of intermediary organizations

Intermediary organization	Functions	Activities	Transversal attention to Industry 5.0 axes		
			Sustainability	Resilience	Human-centeredness
1	- Supporting competitiveness of firms and territories	- Supporting the formation of networks - Supporting entrepreneurship in new areas - Promote collaborative R&D projects - Provide knowledge-intensive services for local businesses	- Organizing events aimed at raising business awareness on environmental sustainability	-	-
2	- Supporting competitiveness of firms and territories	- Promote collaborative R&D projects - Provide knowledge-intensive services for local businesses - Support the formation of networks - Develop skills - Support the transition to Industry 4.0 - Digital readiness assesment	-	- Organizing events to raise awareness on the use of technology to support business resilience post Covid-19	-
3	- Supporting innovation and technology transfer	- Support the formation of networks - Manage knowledge on Industry 4.0 - Provide knowledge-intensive services for local businesses - Digital readiness assessment - Technology matching - Supporting the implementation of 4.0 technologies - Investment support	-		
4	- Supporting innovation and technology transfer	- Promote the transition to environmental sustainability - Promote the transition to digitalization - Developing skills - Advice in the area of open innovation - Testing technologies - Investment support - Support on 4.0 technologies - Technological readiness assessment	- Support in green transition projects	-	-
5	- Supporting collaborative innovation	- Manage knowledge about Industry 4.0 - Support collaboration among groups - Organize and animate communities of practice - Identify and connect technology experts	- Awareness for the development of circular economy	-	- Awareness for thedevelopment of inclusive technologies
6	- Supporting collaborative innovation	- Manage knowledge about Industry 4.0 - Support collaboration among groups - Organize and animate communities of practice - Identify and connect technology experts	- Awareness for the development of circular economy	-	- Awareness for thedevelopment of inclusive technologies
7	- Supporting collaborative innovation	- Manage knowledge about Industry 4.0 - Support collaboration among groups - Organize and animate communities of practice - Identify and connect technology expert	- Awareness for the development of circular economy	-	- Awareness for thedevelopment of inclusive technologies
8	- Supporting collaborative innovation	- Manage knowledge about Industry 4.0 - Support collaboration among groups - Organize and animate communities of practice - Identify and connect technology experts	- Awareness for the development of circular economy	-	- Awareness for thedevelopment of inclusive technologies
9	- Training	- Manage knowledge about Industry 4.0 - Develop skills - Provide opportunities for practice in the use of technologies	- Training on environmental sustainability	-	-
10	- Training	- Manage knowledge about Industry 4.0 - Develop skills - Provide opportunities for practice in the use of technologies	- Training on environmental sustainability	-	-
11	- Training	- Manage knowledge about Industry 4.0 - Develop skills - Provide opportunities for practice in the use of technologies	-	-	-
12	- Training	- Manage knowledge about Industry 4.0 - Develop skills - Provide opportunities for practice in the use of technologies	-	-	-
13	- Training	- Manage knowledge about Industry 4.0 - Develop skills - Provide opportunities for practice in the use of technologies	-	-	-
14	- Supporting competitiveness of firms and territories	- Managing knowledge about Industry 4.0 - Provide knowledge-intensive services for enterprises - Promote the transition to digitization - Digital readiness assessment - Support the formation of networks	-	- Organizing events to raise awareness on the use of technology to support business resilience post Covid-19	-
15	- Incubate new firms	- Supporting entrepreneurship in new fields - Promoting technological entrepreneurship - Organize events for creativity and networking - Create relationships between companies and financiers/investor	-	-	-

16	- Incubate new firms	- Supporting entrepreneurship in new fields - Promoting technological entrepreneurship - Organize events for creativity and networking - Build relationships between companies and funders/investors - Provide advice in the area of open innovation	-	-	-
17	- Incubate and accelerate new firms	- Supporting entrepreneurship in new fields - Promoting technological entrepreneurship - Organize events for creativity and networking - Create relationships between companies and financiers/investors	-	-	-
18	- Supporting innovation and technology transfer	- Promote collaborative R&D projects - Identify and disseminate best practices in product, process and marketing innovation - Supporting the implementation of 4.0 technologies - Enhancement of technological assets	-	- Organizing events to raise awareness on the use of technology to support business resilience post Covid-19	-
19	- Supporting competitiveness of firms and territories	- Promote the transition to digitization - Support the formation of networks - Providing investment support - Providing support in the development of ecosystems	- Participation in European project geared to promote sustainability	-	-
20	- Supporting innovation and technology transfer	- Provide support in ecosystem development - Develop expertise - Providing investment support - Provide support in the formation of networks - Promote collaborative R&D projects - Provide advice in the area of open innovation - Support the implementation of 4.0 technologies - Provide opportunities to practice technologies	- Promotion of best practices in the area of sustainability		
21	- Supporting innovation and technology transfer	- Promote the development of collaborative R&D projects - Support the implementation of 4.0 technologies - Develop skills - Manage knowledge about Industry 4.0	- Explicit mission to create impact in the area of environmental sustainability through the use of technology	-	-
22	- Supporting innovation and technology transfer	- Supporting R&D projects between universities and businesses - Support collaborative R&D programs - Supporting entrepreneurship in new fields - Promote technological entrepreneurship - Develop technology leadership geared toward attracting innovative enterprises	- Explicit mission to create impact in the area of environmental sustainability through the use of technology		
23	- Supporting competitiveness of firms and territories	- Supporting investment - Support the development of ecosystems - Provide technology-intensive services for local businesses - Provide advice in the area of open innovation - Promote collaborative R&D projects - Support innovation in new sectors - Manage knowledge on Industry 4.0	- Explicit mission to create impact in the area of environmental and social sustainability through the use of technology	- Dissemination on issues related to business resilience	- Dissemination on issues relating to the human-centeredness

Source: our elaboration

An analysis of intermediary organizations' websites reveals a difference in the information reported. Some websites make the primary function and specific activities implemented more explicit (see among others intermediary organizations number 4, 23, 21), while others appear to be less clear and detailed (see for example intermediary organizations number 1, 5,6,7,8).

As the primary functions are concerned, Table 2 highlights 6 of them: supporting the competitiveness of businesses and the territory (5 intermediary organizations); support innovation and technology transfer (6 organizations), support collaborative innovation (6 organizations), training (5 organizations), incubate new businesses (3 organizations), incubate and accelerate new businesses (1 organization). The intermediary organizations mapped have a techno-centric orientation, linked to efficiency criteria typical of Industry 4.0. Sometimes the use of the concept of Industry 4.0 overlaps with that of digitalization, seeing technology as a key element for achieving better economic performance and increasing the productivity of the company and human resources.

The activities identified are mainly linked to: managing knowledge for Industry 4.0 (13 organizations); develop skills (9 organizations); support the formation of networks (6 organizations), promote the development of collaborative R&D projects (6 organizations); support the implementation of 4.0 technologies (5 organizations); provide knowledge-intensive services for local

businesses (5 organizations); support investments (5 organizations). This result is in line with the literature on innovation intermediary organizations (Kivimaa *et al.*, 2019), as these have the ability to enable networks to create innovation and offer services to businesses, to orient businesses towards the entities most suitable for solving their problems and to develop collaboration between organizations, universities and private individuals. Intermediary organizations remain anchored to the offer of technological solutions to address specific problems of individual firms, without a vision of systemic transition. In this direction, only two organizations (20 and 23) pay attention to ecosystem development, which is essential to enable systemic change. Furthermore, the activities carried out by the different organizations are placed on different levels and targets. Some organizations, such as intermediary organizations 4, 21, and 3, offer services to firms in more advanced stages of business development. Organizations such as incubators, accelerators and FabLabs provide basic services to develop early-stage ideas. Finally, ITS (higher technical institutes) create a pool of technical-scientific skills functional to the development of human resources 4.0 for the labor market.

The attention of the organizations analyzed to the three axes of the transition to Industry 5.0 appears to be weak and present in a few cases. 13 intermediary organizations show sensitivity exclusively to sustainability understood mainly as attention to the environment. In particular, only two organizations (21 and 23) explicitly declare in their mission the desire to create environmental impact through the use of 4.0 technologies, while the others essentially carry out European planning activities (intermediary organization 19) and almost all the intermediary organizations carry out communication and awareness-raising activities for businesses. Four organizations show an attention to resilience, understood mainly as the resumption of production activity post Covid-19, through support for the use of technologies. Only the intermediary organization number 23 shows attention towards the human-centeredness even if not expressed in dedicated initiatives. The other organizations are not anchored to the concept of human-centeredness, as they are still linked to the vision of the man-machine relationship understood as improvement of the ergonomic dimensions aimed at improving the well-being of workers with a view to greater production efficiency (Romero *et al.*, 2016).

From the analysis of the organzsations' websites it emerges, however, that none of the intermediary organizations currently reflect on what the methods and tools could be aimed at supporting Industry 5.0 transition simultaneously on the three axes, both internally within their own organization, and for firms and territories.

3.3 Intermediary organizations readiness

The following section reports the results of the in-depth interviews and the focus group, aimed at identifying whether - in addition to the attention emerged from the analysis of the organizations' websites - worker of the intermediary organizations in their daily work construct a sense of the transition from Industry 4.0 to Industry 5.0 in line with what was hoped for by the European Commission. The results are reported along the three transition axes: sustainability, human-centeredness and resilience.

Concerning triple bottom line of sustainability, all interviewees (I) take the impact of ongoing transitions on economic sustainability as a given. Furthermore, they agree that the most important area is environmental sustainability. This is mainly expressed as a need to improve energy efficiency in response to recent geo-political transformations and the consequent increases in energy costs. In some cases, attention is paid to the development of the circular economy. I22 states that: "*We carry out communication initiatives related to the circular economy, in which we underline the need to use technologies to support product recycling*". Even in these cases, however, there is no evidence of a readiness to establish new business models aimed at redefining the entire production process and rethinking the products themselves. Interviewee I23, in this regard, underlines that "*It is necessary that the entire value proposition is rethought, not only orienting itself towards the need to recycle old products, but imagining new products with new materials*". Social sustainability is mentioned by a smaller number of interviewees (interviewee I23), defining it as improving the digital skills of

workers aimed at increasing productivity in Industry 4.0 contexts and employee well-being in the workplace. Interviewee I23, in this direction, highlights: "*The training of digital skills is placed at the center of our activity to improve the performance of workers and their positioning within the organization"*. Industry 5.0 transition, however, requires greater attention to improving the quality of life inside and outside firms' boundaries, attacking emerging social challenges, such as moving from work-life balance practices to support measures of parenthood or from the model of "the right man in the right place" to age management and digital reverse mentoring strategies.

From the focus group, uniformity emerges on the concept of resilience understood as the recovery of production levels following the Covid-19 pandemic. Expert E3, for example, states that: "*Our organization has found that the implementation of digital technologies has enabled improved productivity and consequently accelerated post-pandemic recovery*". This result clearly shows a techno-centric vision, which sees technology as the main driver of competitiveness, forgetting the role highlighted by the management literature of digital reorganization and not of activities (Cugno *et al.*, 2022). This highlights that to date, intermediary organizations partly neglect the role of the change in strategic-operational management associated with Industry 5.0 transition.

Human-centeredness the axis that presents the greatest critical issues and conflicting visions. Some experts improperly overlap it with ergonomics and corporate welfare measures or with social sustainability. Expert E2 declares that: "*Human-centeredness allows workers to increase their well-being in the workplace thanks to specific measures implemented by company welfare*". Others associate it with the human-machine relationship understood as an improvement in graphic interfaces and ergonomics. Expert E5 reports that "*The human-centeredness allows us to improve workstations and human-machine interaction, guaranteeing better performance and greater safety in the workplace"*. From these discordant visions emerges a limited understanding of the concept and a techno-centric vision that is misaligned with what the European Commission hopes for. In reality - as highlighted by European policies and scientific literature - human-centeredness aims to create not so much ergonomic workplaces, but rather new workplaces and organizational practices that allow workers to use and develop their maximum potential, their creativity, their experience and their knowledge, improving not only performance but also commitment and well-being (EC, 2014). A further aspect is to use value-driven technologies to create an inclusiveness with a high impact on society through a symbiosis between man and cyber-physical systems (Romero *et al.*, 2016).

4. Conclusion

In the current context of transition from the techno-centric approach proper to Industry 4.0 to the human-centric approach required by Industry 5.0, the European Commission calls for a cultural change aimed at defining a new strategic-organizational set-up capable of responding to the current economic, social and environmental challenges.

In this context, intermediary organizations should redefine their role in accompanying firms in the ongoing change. Indeed, if intermediary organizations do not fully understand the Industry 5.0 guidelines, they cannot rethink their functions and activities to support their own transition and the one of firms and territories.

The study, therefore, aims to understand the ability of intermediary organizations in the transition from Industry 4.0 to Industry 5.0 by answering the following research question (RQ): Does the different configuration of intermediary organizations launched in support of Industry 4.0 affect their readiness to Industry 5.0 transition?

To answer this question, the research is based on a multiple case study of 23 intermediary organizations located in the Metropolitan City of Turin deepened with 9 interviews and 1 focus group with 6 experts in innovation.

The originality of the study lies in analyzing intermediary organizations - traditionally studied in their role as network developers supporting innovation - in a context of transition from Industry 4.0 to Industry 5.0.

The results highlight that intermediary organizations born for the transition to Industry 4.0, show limited attention to the three axes of Industry 5.0: sustainability, resilience and human-centeredness. In particular, the sustainability axis appears to be more developed mainly concerning environmental aspect, and human-centredness appears to be treated residually. Moreover, the initiatives pursued along the three Industry 5.0 axes are mainly related to communication and awareness-raising activities. Consequently, the readiness of the intermediary organizations analyzed in the transition from Industry 4.0 to Industry 5.0 still remains at a preliminary stage.

The results may be useful for: intermediary organizations, to gain awareness of their role and of the need to align with the three axes of Industry 5.0; and for policy makers, to direct policies to develop and accompany firms in the transition to Industry 5.0.

The study, however, is at a preliminary stage and the transition is actually at an emerging phase, consequently the results may be incomplete or capture only some aspects of the ongoing dynamics of Industry 5.0 transition. Future research might make comparisons among intermediary organizations located in different regional/national innovation systems responding to the need highlighted by the European Union to develop mission-oriented innovation policies with a bottom-up approach (Mazzuccato, 2018). In order to study the phenomenon, it is also necessary to measure its performance, identifying metrics that allow a fair assessment of the work of intermediary organizations, comparing homogeneous categories of different types of intermediary organizations (Digital Innovation Hub, ITS (higher technical institutes), ...). Additional aspects that need to be investigated concern the cultural change and sense-making regarding Industry 5.0 in intermediary organizations and their renewed role as facilitators of the development of trust relationships between business, academia and institutions.

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Track 5
Management of sustainability and well-being for individuals and society

The stakeholders of social projects: a systematic literature review and bibliometric analysis[1]

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Abstract

Frame of the research. *The socioeconomic, political, and health shocks have had a considerable impact on different stakeholders, such as firms, households, police making, and public administrations. It is crucial to assess the effectiveness of sustainable practices and understand the outcomes they generate for the communities.*

Purpose of the paper. *The aim of this study is to understand the state of art about the topic of stakeholders of social projects in management research, the key research streams related to this subject area and the trends and possible future studies*

Methodology. *To achieve this goal, we conducted a literature review starting from SCOPUS and WOS database and two types of bibliometric analysis, the Keyword Co-occurrence Analysis and the Bibliographic Coupling Analysis. Keyword Co-occurrence Analysis using VOS viewer software*

Results. *We highlight the trends of publications by years, the geographic distribution of the literature, the main journal, cited authors and cited articles. Moreover, the study identifies the recurring keywords and nine clusters of 74 papers.*

Research limitations. *The clusters created by VOSviewer excluded 27 articles not connected with other papers under review. This implies the loss of part of the existing literature. Furthermore, the analysis was carried out only in English-language and open access articles.*

Managerial implications. *The paper suggests some practical implications: advocate for an integrated stakeholder management approach, emphasize collaborative partnerships, ethical supply chain practices, and effective communication, and encourage continuous learning and capacity building for impactful social projects.*

Originality of the paper. *To date, there are no managerial studies that provided a literature review about the topic of stakeholders of social projects.*

Key words: *stakeholders; social projects; social inclusion; social sustainability; literature review; bibliometric analysis.*

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1. Introduction

Over the last two decades, Italy has tackled a series of economic, financial, and geopolitical crises, while also facing persistent challenges generated by the ongoing pandemic. The socioeconomic, political, and health shocks have had a considerable impact on different stakeholders, such as firms, households, police making, and public administrations. These actors face an increasingly complex and dynamic environment. In this context, the World Economic Forum identified the topic of sustainability as crucial factors leading to major systematic risks globally. It has extensively captured attention in management literature over the past thirty years (Baffoe and Mutisya, 2015). However, the main definition is provided by the Brundtland Commission, which states that sustainable development is the "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environmental Development, 1987, p. 41). The OECD (2001) stressed that it is crucial to assess the effectiveness of sustainable practices and understand the outcomes they generate for the communities and stakeholders (Epstein and Yuthas, 2014; Rawhouser *et al.*, 2019; Khandker *et al.*, 2009).

In managerial literature, this topic has given rise to many concepts such as sustainability management, corporate sustainability (Dyllick and Hockerts, 2002), sustainability innovation, sustainable entrepreneurship (Schaltegger and Wagner, 2011), and social business (Yunus at al., 2010). In particular, it has been associated with the triple bottom line (Elkington, 1997), referring to the 3 P's of sustainability - people, planet, and profit. Since the late 1990s, European Union (EU) and OECD have raised concerns about social cohesion, because of perceived threats (Jenson 1998) that include rising income inequality, unemployment and crime, increased immigration, the segregation of migrant communities, and political extremism and terrorism (Green and Janmaat 2011).

It is more than evident that the use of government resources for the exploitation of social projects requires, first of all, an appropriate mapping of the key stakeholders.

In managerial literature, the term "stakeholder" gained significant recognition over the last two decades (Ginige *et al.*, 2018). R. Edward Freeman in his scientific book "Strategic Management-Strategic Management: A Stakeholder Approach", defined a stakeholder as "any group or individual who can affect or is affected by the achievement of the organization's objectives" (Freeman, 1984). The authors suggested that managers ought to consider the interests of all those who can affect the company, not solely the shareholders, but also customers, employees, partners, the community, and the environment (Freeman, 1984). A consideration of various interests leads to a better firm's performance and encourages innovation and the firm's efficiency (Grant and Berry, 2011; Miller *et al.*, 2012).

In detail, the stakeholder in the context of societal challenges is "anyone who has an influence on changing the status of a particular societal challenge in a country or anyone who can potentially be harmed or have their rights affected by societal challenges" (Ginige *et al.*, 2018, p. 1196). This definition is based on concepts of justice, equity, and social rights that significantly influence stakeholders' moral suasion over project development or change initiatives (Gibson, 2000).

2. Methodology

2.1 Research protocol

This study adopts a systematic literature review (SLR), which provides an overview of the existing literature. This methodology is the most appropriate for categorizing previous studies (Del Vecchio *et al.*, 2021), identifying new research areas and paths, and clarifying the way forward (Grant and Booth, 2009; Kraus *et al.*, 2022; Vrontis and Christofi, 2021). According to Tranfield et al. (2003), this method relies on filtering to ensure repeatability, minimize biases, and increase transparency.

The main methodological steps that were carried out are described below (Dumay, 2010). First of all, it is necessary to establish the research questions (Massaro *et al.*, 2016). In this study, the research

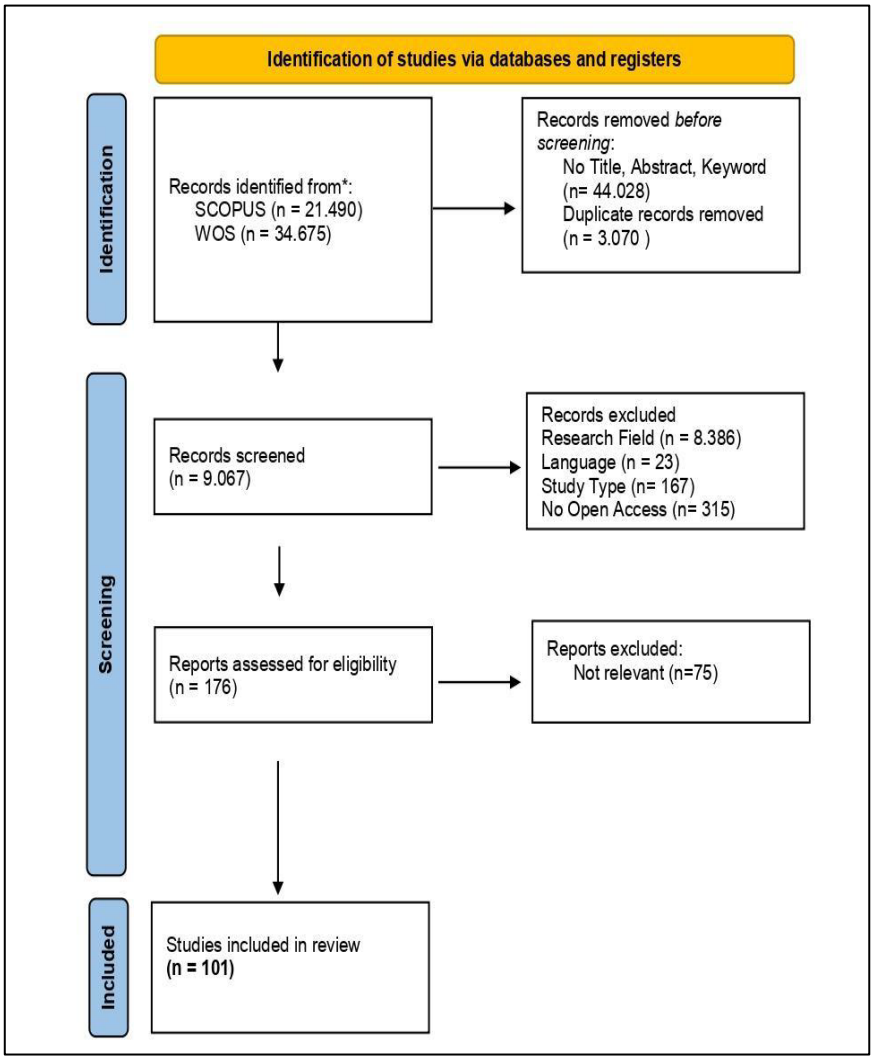
questions identified are: What is the state of art about the topic of stakeholders of social projects in management research? What are the key research streams related to this subject area? What are the guidelines for future research?

In particular, we aim to understand which authors, articles, journals, institutions and countries were the most influential in the last years, how articles can be clustered, and which research streams which stream of research can be explored further by future management literature.

According to Petticrew and Roberts (2008) after defining the research objectives, the next step is to outline the research protocol. It encompasses three essential aspects: (1) the identification of the appropriate sources of information for gathering literature. (2) the development of a detailed search strategy using keywords, and boolean operators to effectively retrieve relevant papers from identified sources; (3) the establishment of clear screening criteria to eliminate irrelevant papers based on specific elements such as publication date, research methodology, and alignment with the research objectives; (4) the definition of the method for analyzing the extracted data that may involve quantitative analysis using or statistical methods to summarize and draw data or qualitative analysis employing content or narrative analysis to identify patterns, themes, and connections within data. A well-defined research protocol serves as a roadmap for the SLR process.

According to the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) protocol, the search process has undergone three steps: identification, screening, and included (Fig. 1).

Fig. 1: PRISMA Protocol



Source: Our elaboration of PRISMA flowchart

Articles for the study were obtained from Elsevier's Scopus and Clarivate's Web of Science (WOS), which are comprehensive databases of bibliographic sources from multiple disciplines and provide extensive coverage of academic journals (Snyder, 2019). The literature searches were conducted in January 2024.

The detailed keywords queries are presented in Table 1. The first search string of keywords consisted of words that belong to or are related to the concept of stakeholders (Pedrini, and Ferri, 2019). The second set of keywords contained words that are relevant to social projects dimension. The third string is related to disadvantage groups. The purpose of having a wide range of keywords was to ensure the collection of literature was as wide and inclusive as possible. Initially, the search using above keywords involved all fields both in SCOPUS and WOS.

Tab. 1: Search strings of keywords

KEYWORD THEME	SEARCH STRINGS
STAKEHOLDER	"stakeholder*" OR "interested part*" OR "related part*"
SOCIAL PROJECTS	"social project*" OR "social program*" OR "social initiative*" OR "social inclusion" OR "social sustainab*"
DISADVANTAGES GROUPS	"disadvantaged group*" OR "marginalized communit*" OR "marginalized group*" OR "marginalized population*" OR "underprivileged communit*" OR "underprivileged population*" OR "underprivileged group*" OR "vulnerable communit*" "vulnerable group*" OR "vulnerable population*"

Source: Our elaboration

As a result, a sample of 21.490 documents was retrieved from the Scopus and 34.675 papers from the WOS, from 2001-2024. Afterwards the search involved only the title, abstract and keyword fields in SCOPUS database and the TOPIC field (title, abstract, keywords and keywords plus) in WOS. Duplicates have been removed from the final set of results, including duplicates within the same database and duplicates created by merging results from the two databases. They were identified using a manual checking. A total of 3.070 duplicates were found and removed, reducing the final set of results to 9.067 documents.

An additional screening effort was undertaken using a set of exclusion criteria based on subject area, publication type, language and open access license. These criteria were used to reduce the size of the sample and improve its quality. In detail, the selected subject areas for SCOPUS were Business, Management and Accounting (with 467 documents), while for WOS were Business, Management Economics; Social Issues; Ethics and Business Finance (with 214 documents). In summary, the application of all other excluded criteria led us to a sample of articles and review articles written in English, provided with an open access license and published in scientific journals, with the exclusion of books, book chapters, conference proceedings and notes.

After reading the title, abstract and keywords (Kauppi *et al.*, 2018), articles inconsistent with the research topics were removed (75 documents). This step resulted in 101 selected documents that we proceeded to analyze.

2.2 Bibliometric analyses

The analysis of the final sample was developed to provide an in-depth understanding of the phenomenon under study.

Firstly, we involved a descriptive analysis to provide a comprehensive overview of the publication and citation structure of the sample. This initial analysis aimed to a baseline understanding of the overall landscape of the research domain.

Then, the cluster analysis was performed using VOSviewer, a professional software designed to visualize intellectual structure (Van Eck and Waltman, 2010; Del Vecchio *et al.*, 2021; Secundo *et al.*, 2020; Shah *et al.*, 2019). This analysis is useful to identify distinct clusters of keywords and publications based on their shared characteristics. In detail, the analyses implemented are Keyword Co-occurrence Analysis and Bibliographic Coupling Analysis. Keyword Co-occurrence Analysis

examined the frequency of co-occurrence of keywords within the publications, allowing us to identify the most prevalent and interconnected concepts within each cluster (Secundo *et al.*, 2020). This provided a deeper understanding of the underlying intellectual structure and the relationships between different keywords and concepts. Bibliographic Coupling Analysis aims to identify links between publications that jointly cite another publication (Kessler, 1963). The analysis was conducted using documents as the unit of analysis. A document is considered coupled to another when they share common references.

A content analysis was conducted to examine the prevalent topics in each cluster and refine our understanding of the specific research areas.

These three stages of analysis - descriptive analysis, cluster analysis, and content analysis allowed us to identify key thematic areas, subfields, and influential contributions, providing a valuable foundation for further research and discussion.

3. Results

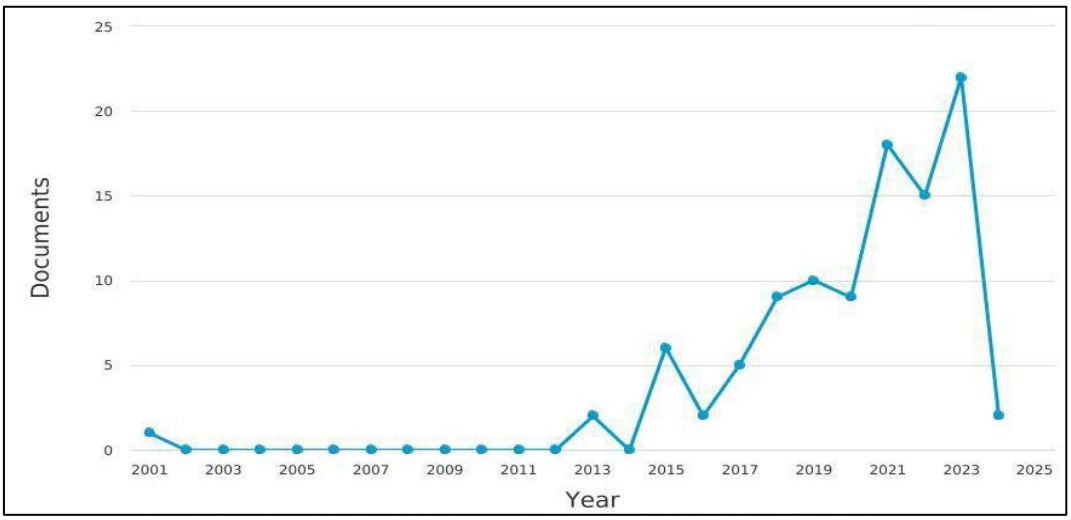
3.1 Descriptive statistics

The following section describes the 101 papers based on several criteria. In detail, the descriptive analysis examines the distribution of publications across different years of publication, geographic area, journals, authors, keyword, as well as identifying the most influential contributions as measured by citation counts. This analysis provides a general overview of the research on this topic. It can help to identify the key trends and areas of focus in the field.

3.1.1 Publication by year

The distribution of articles published from 2001 to 2024 on social sustainability issues and the role of stakeholders is shown in Figure 2. Beginning in 2018, the number of articles published begins to increase, peaking in 2023 with 23 articles being published; growth, over the last five years, highlights the increasing academic interest in addressing social sustainability concerns and the relationship between social projects and their stakeholders. This focus on social sustainability could be also driven by stakeholder expectations and the evolving regulatory landscape. As society becomes more aware of the impact of businesses on social issues, stakeholders, including consumers, employees, and investors, are demanding greater transparency and accountability from corporations.

Fig. 2 Publication by Year

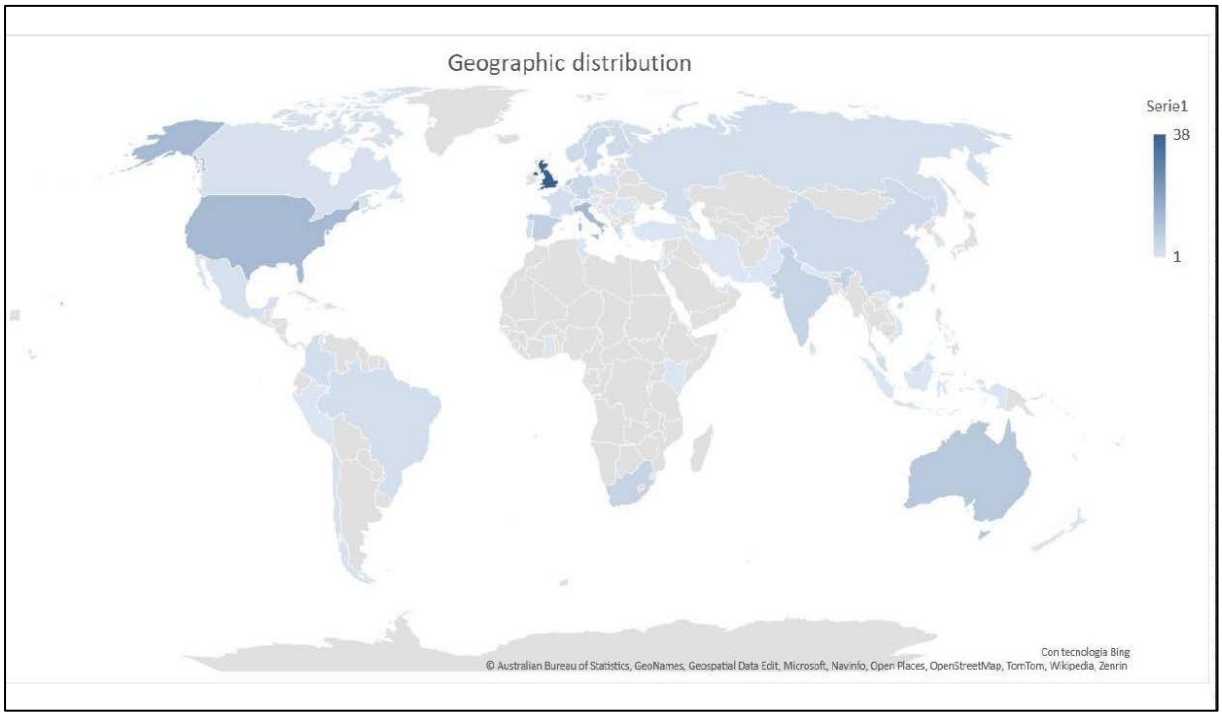


Source: SCOPUS database

3.1.2 Publication by country

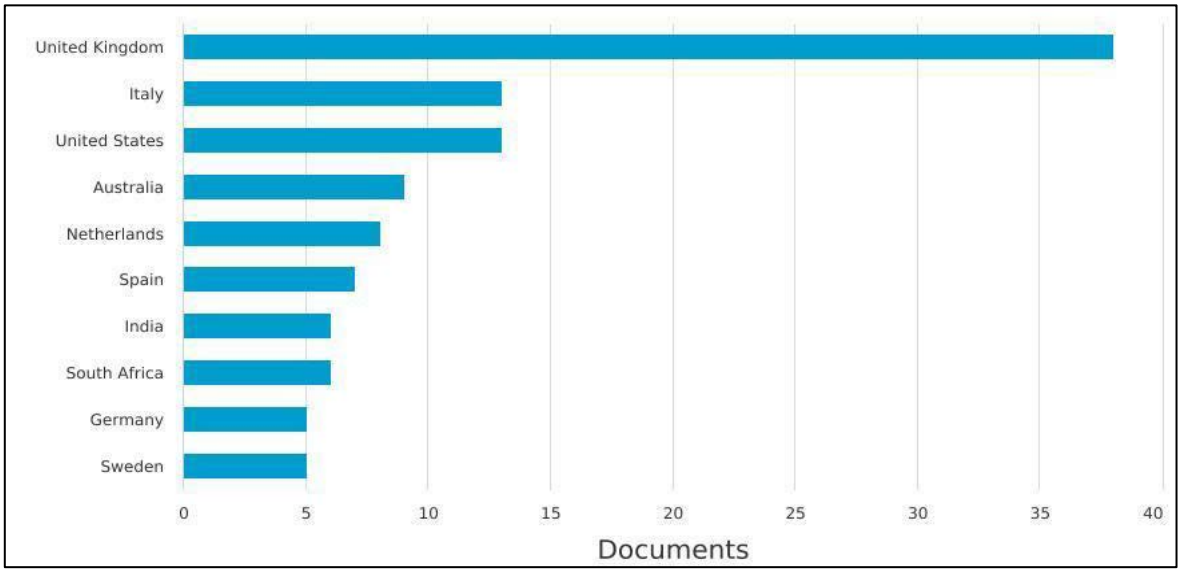
To analyze the geographical distribution of the published articles, according to Secundo et al. (2020) we are taking into account the country of authorship. Figures 3 and 4 indicate that the United Kingdom, Italy, and the United States are the top three countries in terms of the number of published articles. The United Kingdom has significantly more articles than any other country (38 documents), while the second and third countries have an equal number of papers (13 each). Australia, the Netherlands, Spain, India, South Africa, Germany, Sweden, China, Finland, and Norway each present between 9 and 4 documents.

Fig. 3 Publication by country - Maps graph



Source: our elaboration

Fig. 4 Publication by Country

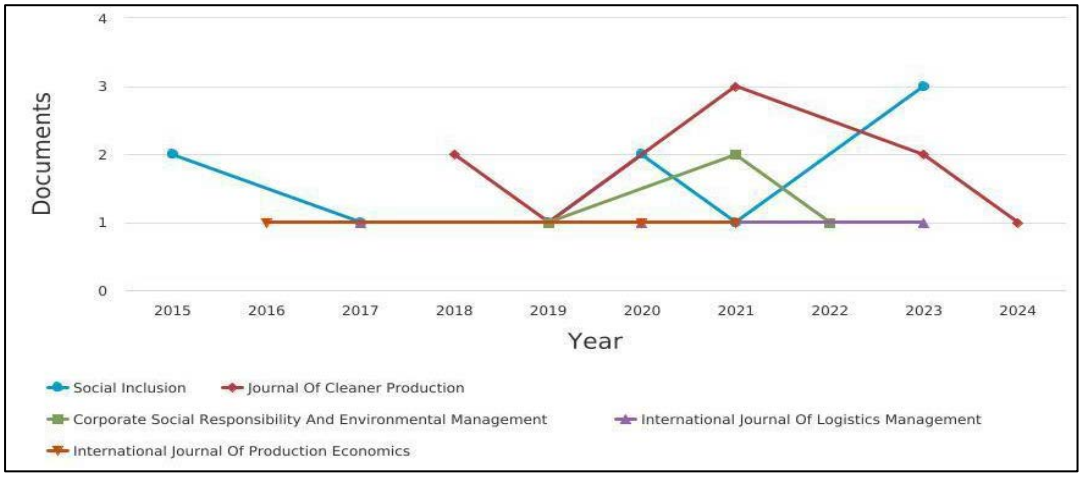


Source: SCOPUS database

3.1.3 Publication by journal, authors and citations

Figure 5 shows the journals that have had the most coverage of the topic under review. This information is important for authors so that they have an idea of where articles have been published (Dumay and Cai, 2014). In this case, the top five papers based on the number of publications are: Social Inclusion (10 documents), Journal of Cleaner Production (9 documents); Corporate Social Responsibility and Environmental Management (4 documents); International Journal of logistics Management (3 documents) and International Journal of Production economics (3 documents). All these journals, except the journal "Social Inclusion", are A-ranking journals for the italian national agency ANVUR.

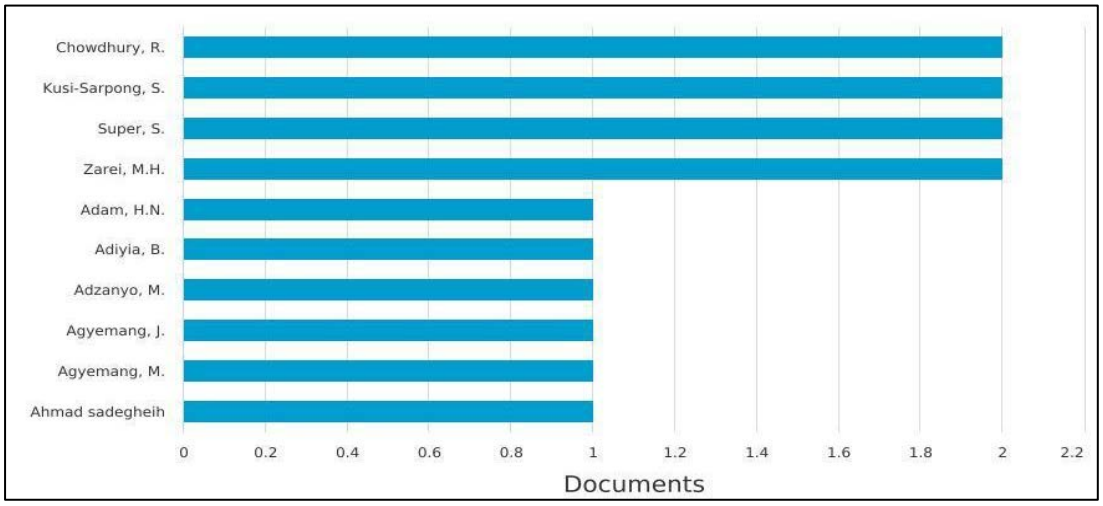
Fig. 5 Publication by journal



Source: SCOPUS database

Chowdhury R., Kusi-Sarpong S., and Super S. are the most prolific authors (fig. 6). However, their articles represent less than 8% of the total number of articles reviewed, indicating a strong fragmentation and dispersion among authors. The observed fragmentation raises questions about the dynamics of scholarly contributions to this topic. On one hand, it suggests a set of insights from a multitude of authors, each bringing different perspectives and expertise to the discourse; on the other hand, the limited concentration of contributions by three authors indicates an absence of a singular, highly influential reference author or authors on the subject.

Fig. 6 Publication by authors



Source: SCOPUS databse

3.1.4 Citations

Identifying articles that have received significant attention and citations from the scholarly community is another aspect of descriptive analysis. These studies serve as foundational pillars, shaping discourse and influencing subsequent research endeavors. Table 2 shows the top three articles based on the total number of citations: Eriksen et al. (245 citations), Wilhelm et al. (171 citations), and Ciccullo et al. (161 citations).

The study conducted by Eriksen et al. (2021) examines the results of interventions funded by international organizations that aim to reduce vulnerability. The authors emphasize how certain interventions inadvertently increase vulnerability, often due to a shallow understanding of contextual vulnerabilities and inequitable stakeholder participation in both design and implementation processes. Similarly, Wilhelm et al. (2016) and Ciccullo et al. (2018) highlight the importance of social sustainability in the supply chain for corporate stakeholders.

The year of publication, however, affects the total number of citations. We related the number of citations to the years that have passed from the publication of the article to today, as a recently published article may have had less time to spread. The relative data allows us to understand the real contribution of the article. Considering this index, the three top articles are written by Eriksen, et al. (81,66), Ciccullo et al.. (26,83) and Sharma et al (25,4). This last paper focuses on the adoption of circular economy and social sustainability aspects in developing nations.

Table 2 Documents by citation

n.	Authors	Title	Year	Source	Total Citation	Citation/ Year
1	Eriksen, et al.	Adaptation interventions and their effect on vulnerability in developing countries: Help, hindrance or irrelevance?	2021	World Development	**245**	**81,66**
2	Wilhelm et al.	Implementing sustainability in multi-tier supply chains: Strategies and contingencies in managing sub-suppliers	2016	International Journal of Production Economics	**171**	**21,37**
3	Ciccullo et al.	Integrating the environmental and social sustainability pillars into the lean and agile supply chain management paradigms: A literature review and future research directions	2018	Journal of Cleaner Production	**161**	**26,83**
4	Sharma et al.	When challenges impede the process: For circular economy-driven sustainability practices in food supply chain	2019	Management Decision	**127**	**25,4**
5	Sodhi and Tang	Corporate social sustainability in supply chains: a thematic analysis of the literature	2018	International Journal of Production Research	**104**	**17,33**
6	De Luca et al.	Evaluation of sustainable innovations in olive growing systems: A Life Cycle Sustainability Assessment case study in southern Italy	2018	Journal of Cleaner Production	**104**	**17,33**
7	Almahmoud and Doloi	Assessment of social sustainability in construction projects using social network analysis	2015	Facilities	**95**	**10,55**
8	Beltagui et al.	The role of 3D printing and open design on adoption of socially sustainable supply chain innovation	2020	International Journal of Production Economics	**88**	**22**
9	Belal and Owen	The rise and fall of stand-alone social reporting in a multinational subsidiary in Bangladesh: A case study	2015	Accounting, Auditing & Accountability Journal	**64**	**7,11**
10	Liu and Qian	Evaluation of social life-cycle performance of buildings: Theoretical framework and impact assessment approach	2019	Journal of Cleaner Production	**63**	**12,6**

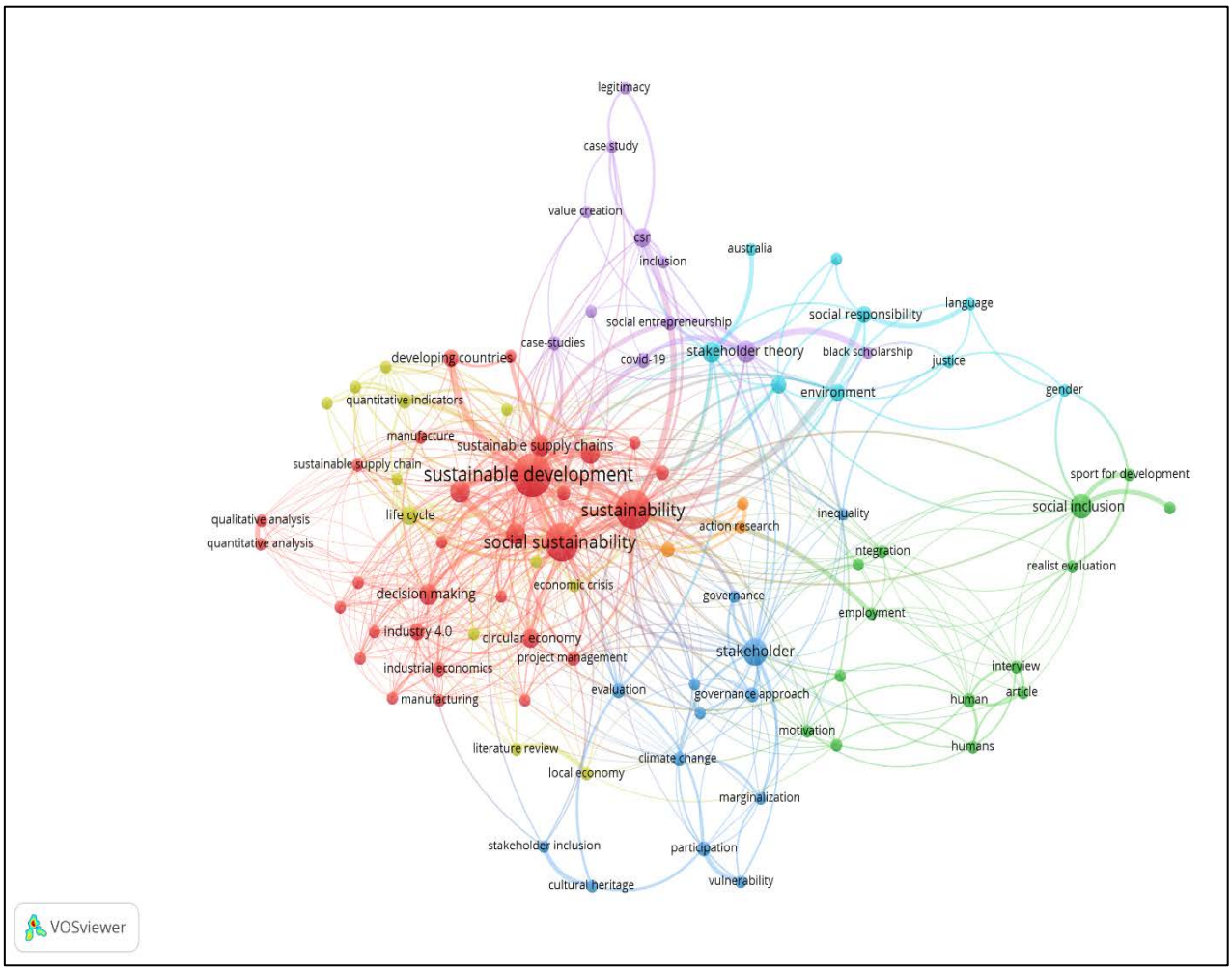
Source: our elaboration

3.1.5 Keyword Co-occurrence Analysis

A comprehensive descriptive analysis also encompasses an exploration of keywords. They serve as a guide for the researcher toward the focal points of the paper. The analysis of keyword co-occurrence is a lens through which clusters of words that share contextual proximity (Secundo *et al.*, 2020). These clusters offer a perspective on the semantic landscape and define the contours of the topic under review. The clusters created with the VOSviewer software are shown in the figure 7 and in the Table 3.

The most recurring words are: in the Cluster 1, sustainable development (64), sustainability (59) and social sustainability (53); in the Cluster 2, integration (17), thematic analysis (17) and social inclusion (14); in the Cluster 3, stakeholder (33), climate change (19), evaluation (10) and governance approach (10); in the Cluster 4, life cycle (25), environmental impact (17), economic crises (15) and environmental and social sustainability; in the Cluster 5, stakeholder theory (15), csr (12) and case-studies (11); in the Cluster 6, corporate social responsibility (16), stakeholders (15) and environment (14); and finally in the Cluster 7, environmental sustainability (22), action research (3) and humanitarian logistics (3).

Fig. 7 Keywords network visualization



Source: VOSviewer

Tab. 3: Keyword co-occurrence analysis

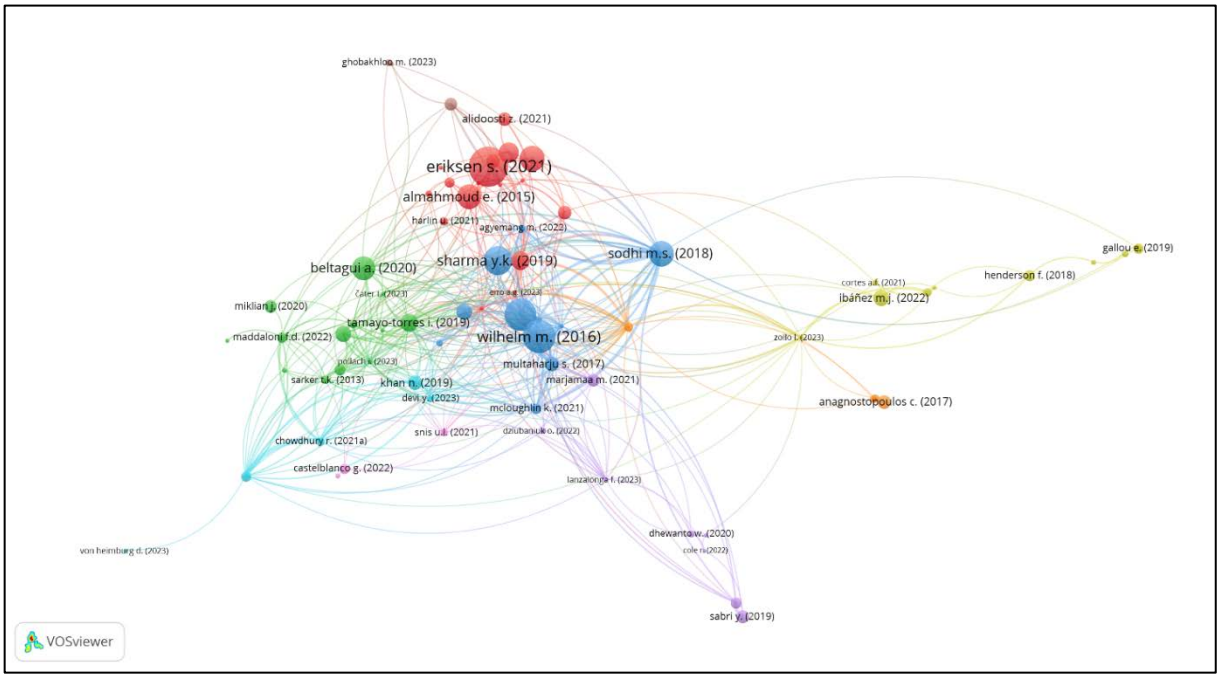
	KEYWORD CO-OCCURRENCE ANALYSIS
CLUSTER 1 - RED (30 KEYWORDS)	sustainable development; sustainability; social sustainability; economic and; social effects; decision making; sustainable supply chains; industry 4.0; supply chain management; supply chains; circular economy; environmental economics; industrial technology; industrial economics; manufacturing technological development; social aspects; sustainability assessment sustainable supply chain; sustainable supply chain management; social performance; triple bottom line; sustainable manufacturing; qualitative analysis; quantitative analysis; project management; commerce; developing countries; manufacture; stakeholder engagement; corporate social responsibility
CLUSTER 2 -GREEN (14 KEYWORDS)	Integration; thematic analysis; social inclusion; human; perception; article; employment; interview; motivation; realist evaluation; qualitative research; Humans; sport for development; intersectionality
CLUSTER 3 - BLUE (13 KEYWORDS)	Stakeholder; climate change; evaluation; governance approach; governance; inequality; participation; ecotourism; tourism development; marginalization; stakeholder inclusion; vulnerability; cultural heritage
CLUSTER 4 - YELLOW (12 KEYWORDS)	Agriculture; economic crisis; environmental and social sustainability; environmental impact; environmental management; life cycle; life cycle assessment (lca); literature review; local economy; quantitative indicators; social sustainability assessment; surveys
CLUSTER 5 - VIOLET (11 KEYWORDS)	black scholarship; case study; case-studies; covid-19; csr; inclusion; legitimacy; partnerships; social entrepreneurship; stakeholder theory; value creation
CLUSTER 6 - LIGHT BLUE (9 KEYWORDS)	corporate social responsibility; stakeholders; environment; justice; social responsibility; gender; language; stakeholder management; Australia
CLUSTER 7 - ORANGE (3 KEYWORDS)	environmental sustainability; action research; humanitarian logistics

Source: our elaboration

3.2 Clustering and content analysis

We performed bibliographic coupling using the VOSviewer software to classify the reviewed papers into homogeneous clusters. For each 101 documents, the total strength of the bibliographic coupling links with other documents have been calculated. Indeed, this analysis links together articles that cite the same documents. In detail, the largest set of connected papers consists of 74 documents divided into 9 clusters.

Fig. 8: Bibliographic coupling analysis



Source: VOSviewer

The researchers performed a content analysis of the 74 papers to identify the main research areas. Each researcher conducted the analysis individually, resulting in a better classification of the documents and identification of the main research topics. A final discussion led to the identification of nine themes (Table 4).

Tab. 4: Clusters of papers

	AUTHORS
CLUSTER 1 **(17 DOCUMENTS)** "*SOCIAL SUSTAINABILITY INDEX PERFORMANCE PROJECT*"	Alidoosti *et al.*, 2021; Almahmoud and Doloi, 2015; De Luca *et al.*, 2018; Eriksen *et al.*, 2021; Erro *et al.*, 2023; García-Muiña *et al.*, 2021; Silva *et al.*, 2022; Gugerell *et al.*, 2023; Harlin and Berglund, 2021; Kallmuenzer, 2023; Khan *et al.*, 2021; Liu and Qian, 2019; Meyer *et al.*, 2022; Pilati and Di Stradis, 2024; Popovic *et al.*, 2017; Purvis and Genovese, 2023; Richter *et al.*, 2023
CLUSTER 2 **(13 DOCUMENTS)** "*STAKEHOLDERS' ENGAGEMENT FOR A CHANGE TOWARD SOCIAL SUSTAINABILITY PRACTICES*"	Beltagui *et al.*, 2020; Boesso *et al.*, 2013, Cater *et al.*, 2023; Forcadell and Aracil, 2021; Liedtka and Locatelli, 2023; Di Maddaloni and Sabini, 2022; Miklian and Medina Bickel, 2020; Pollach and Schaper, 2023; Pradhan, 2016; Qian *et al.*, 2023; Sarker, 2013; Siaw *et al.*, 2022; Tamayo-Torres *et al.*, 2019.
CLUSTER 3 **(11 DOCUMENTS)** "*SOCIALLY SUSTAINABLE SUPPLY CHAIN MANAGEMENT*"	Agyemang *et al.*, 2022; Ciccullo *et al.*, 2018; Jadhav *et al.*, 2020; Mcloughlin and Meehan, 2021; Multaharju *et al.*, 2017; Pimenta *et al.*,2021; Roman Pais Seles *et al.*, 2018; Sharma *et al.*, 2019; Sodhi and Tang, 2018; Toussaint *et al.*,2021; Wilhelm *et al.*, 2016.
CLUSTER 4 **(10 DOCUMENTS)** "*QUALITATIVE METHODS APPROACH IN SOCIAL IMPACT EVALUATION*"	Au *et al.*,2020; Ciccarino *et al.*, 2022; Cortes and Lee, 2021; Gallou and Fouseki, 2019; Henderson *et al.*,2018; Ibáñez *et al.*,2022; Jonsson and Goicolea, 2020; Vázquez-Maguirre and Portales, 2018; Verkooijen *et al.*, 2020; Zollo *et al.*, 2023.
CLUSTER 5 **(8 DOCUMENTS)** **"***HUMANITARIAN SUPPLY CHAINS***"**	Cole *et al.*, 2022; Dhewanto *et al.*, 2020; Dziubaniuk *et al.*, 2022; Lanzalonga *et al.*, 2023; Luiz and Guchu, 2022; Marjamaa *et al.*, 2021; Sabri *et al.*, 2019; Zarei *et al.*, 2019.
CLUSTER 6 **(5 DOCUMENTS)** "*EMPOWERING MARGINALIZED STAKEHOLDERS*"	Chowdhury, 2021a; Chowdhury, 2021b; Devi *et al.*, 2023; Khan *et al.*, 2019; Von heimburg *et al.*, 2023.
CLUSTER 7 **(4 DOCUMENTS)** "*STAKEHOLDERS' BEHAVIORS*"	Anagnostopoulos *et al.*, 2017; Hanson *et al.*, 2015; Venkatesh *et al.*, 2021; Vukovic *et al.*, 2023
CLUSTER 8 **(3 DOCUMENTS)** "*INDUSTRY TECHNOLOGY*"	Duan *et al.*, 2024; Ghobakhloo *et al.*, 2023; Mastrocinque *et al.*, 2022.
CLUSTER 9 **(3 DOCUMENTS)** "*PUBLIC-PRIVATE PARTNERSHIP*"	Castelblanco *et al.*, 2022; Mcquaid, 2019; Snis *et al.*, 2021.

Source: our elaboration

A more detailed argument of each of the thematic areas is provided.

1. *Social sustainability index performance project*

The primary focus of most sustainability assessment research has been on the environmental and economic dimensions, while the social dimension has been largely overlooked (Alidoosti *et al.*, 2021). A dynamic assessment model has been devised to evaluate project contributions in a social context, drawing upon sustainability and equity theories (Gugerell *et al.*, 2023). Utilizing social network analysis, the model integrates multiple stakeholders and their diverse interests associated with construction projects (Almahmoud *et al.*, 2015). In this intricate context, conscientious consumers are increasingly demanding qualities such as environmental protection, social equity, and economic viability (Silva *et al.*, 2022). Consequently, the digitization of production processes plays a key role in comprehending social performance and identifying a social dimension within the circular economy (Kallmuenzer, 2023; García-Muiña *et al.*, 2021). Companies are actively seeking innovative solutions (Harlin *et al.*, 2021) to fulfill the requirements of conscientious consumers who seek sustainable products and services (Erro *et al.*, 2023; Pilati, 2024). To address these demands, Life

Cycle Assessment, Costing, and Social Life Cycle Assessment are integrated through a multi-criteria (De Luca *et al.,* 2018). Organizations are progressively restructuring their supply chains (Khan *et al.,* 2021) and adopting technologies and logistics measures to enhance their social sustainability (Meyer *et al.,* 2022; Liu *et al.,* 2019). However, insufficient information can lead to gaps in social sustainability, often due to a lack of appropriate quantitative indicators (Popovic *et al.,* 2017; Purvis *et al.,* 2023; Richter *et al.,* 2023).

2. *Stakeholders' engagement for a change toward social sustainability practices*

The strategic shift towards social sustainability entails a fundamental change in prevailing business practices (Beltagui *et al.,* 2020), aligning them with principles that not only improve performance (Boesso *et al.,* 2013; Qian *et al.,* 2023; Pradhan, 2016) but also elevate social visibility through transparent disclosure (Pollach and Schaper, 2023), and fortify reputation (Pradhan, 2016; Tamayo-Torres *et al.,* 2019) and company ratings (Siaw *et al.,* 2022). This requires a greater engagement of corporate stakeholders through open design processes and distributed production patterns (Beltagui *et al.,* 2020), incorporating design thinking into operational processes (Liedtka and Locatelli, 2023), prioritizing stakeholder involvement (Forcadell and Aracil, 2021) throughout project management (Di Maddaloni and Sabini, 2022), addressing the needs of stakeholders should guide these revamped business practices (Čater *et al.,* 2023; Sarker, 2013), building partnerships and leveraging the dynamic capabilities of internal stakeholders further reinforces the transformative impact of these changes (Forcadell and Aracil, 2021).

3. *Socially sustainable supply chain management*

The prevailing logic in supply chain management is shaped by multi-stakeholder perceptions, with growing expectations for comprehensive sustainability (Mcloughlin and Meehan, 2021; Pimenta *et al.,* 2021; Wilhelm *et al.,* 2016; Roman Pais Seles *et al.,* 2018). Ensuring a sustainable supply chain within SMEs needs a holistic focus on product quality, workers' rights, production traceability, and the elimination of child labor and exploitation (Agyemang *et al.,* 2022; Jadhav *et al.,* 2020). Product responsibility emphases ethical and transparent practices (Multaharju *et al.,* 2017). For example, certifications are recommended to address social abuse practices, as consumers struggle to access information. However, the supply chains must also be lean and agile, balancing social sustainability with efficiency and effectiveness (Ciccullo *et al.,* 2018). Stakeholder theory emphasizes the influence and pressure of various parties (Sodhi and Tang, 2018; Wilhelm *et al.,* 2016); NGOs, government policies, and technology partners play a pivotal role (Sharma *et al.,* 2019). Opinion leaders, including retailers, wholesalers, unions and media can enhance awareness in developing countries (Toussaint *et al.,* 2021).

4. *Qualitative methods approach in Social Impact Evaluation*

In order to receive support (Ciccarino *et al.,* 2022), social initiatives must disclose their results. However, there lacks theoretical consensus regarding the optimal disclosure approach. Qualitative methodology facilitates a contextualized, bottom-up impact assessment, incorporating the perspectives of diverse stakeholders (Gallou *et al.,* 2019). Given that social initiatives may or may not prioritize economic objectives, it becomes imperative to grasp the generated value (Zollo *et al.,* 2023). Studies based on small sample sizes yield findings that are not easily generalizable (Au *et al.,* 2020; Cortes, 2021), often striving to amplify marginalized voices. Several studies aim to understand how and under what circumstances (re)engagement initiatives (Henderson *et al.,* 2018) promote social inclusion (Verkooijen *et al.,* 2020) to address the lack of knowledge on interventions targeting 'NEET' (Jonsson, 2022) or heritage management (Gallou *et al.,* 2019). Given the dearth of robust evaluations, realist studies are imperative. These interventions endeavor to improve the well-being of marginalized cohorts, engaging them in employment or education through capacity-building and fostering confidence within a supportive and collaborative framework (Ibáñez M.J. *et al.,* 2022; Vázquez-Maguirre *et al.,* 2018).

5. *Humanitarian Supply Chains*

Stakeholders prioritize economic and ecological interest, while humanitarian supply chains, particularly from a broader global social sustainability perspective, receive less attention, particularly among companies and certain industrial organizations (Marjamaa *et al.,* 2021). Challenges in stakeholder interaction may arise due to disparities in process management methods employed by international stakeholders involved in projects and contextual factors within countries, such as corruption, inadequate national regulations, cultural nuances, climate change effects, and considerations of environmental and social sustainability (Dziubaniuk *et al.,* 2022; Luiz *et al.,* 2022). Understanding how paradigm shifts like drone transport can enhance patient engagement and address transportation barriers is critical (Lanzalonga *et al.,* 2023).

In addition, by empowering health care providers and facilitating knowledge translation and system integration, this transition can also broaden stakeholder engagement.

Rurality, remoteness, security concerns, and resistance from field staff against change represent major challenges for supply chain researchers seeking to engage in collaborative research within the humanitarian sector (Sabri *et al.,* 2019; Dhewanto *et al.,* 2020; Cole *et al.,* 2022). While humanitarian supply chains (HSCs) inherently contribute to social sustainability by mitigating the suffering of affected communities, their unintentional adverse environmental impacts have been largely overlooked thus far (Zarei *et al.,* 2019).

6. *Empowering Marginalized Stakeholders*

Some social issues, including employee health and safety, psychological well-being, potential supplier, job loss, discrimination, gender inequality, forced migration, and youth unemployment (NEET), underscore the multifaceted challenges faced by marginalized communities (Devi *et al.,* 2023). For example, among these, people with disabilities encounter persistent barriers in the labor market and corporate inclusion (Khan *et al.,* 2019). Empowering marginalized groups involves facilitating their self-representation. A key argument theorizes that by reconstructing their understanding of themselves marginalized groups gain a deeper insight into their capabilities, fostering empowerment (Chowdhury, 2021a). Employing a sensitive theory of marginalized stakeholders becomes imperative to mitigate the risk of multinational corporations causing violence on vulnerable people to pursue profit maximization (Chowdhury, 2021b). The imperative lies in developing strategies to include marginalized citizens and users, providing them a voice in deliberating public value (Von Heimburg *et al.,* 2023).

7. *Stakeholders' behaviors*

The Theory of Reasoned Action and the Theory of Planned Behavior, have been influential in understanding and predicting human behavior (Venkatesh *et al.,* 2021). For not-for-profit organizations, to gain support, it is crucial to communicate their mission and activities effectively to different stakeholders (Anagnostopoulos *et al.,* 2017). Hanson *et al.,* (2015) instead analyzed the motivations of vulnerable populations such as incarcerated individuals, children, and those with mental disabilities to participate as the sample in scientific research. The primary motivators include a desire to contribute to society, altruism, gaining knowledge, receiving incentives, and obtaining social support, and coercion. Furthermore, the social forms, including conventions, laws, rules, and norms, along with economic indicators, contribute to distinct behavioral patterns (Vukovic *et al.,* 2023).

8. *Industry Technology*

Policymakers interested in understanding the utilization of technologies for the creation of sustainable products would find significant value in this type of assessment, which is imperative for fostering sustainable development (Duan W. *et al.,* 2024). Key implications of Industry 5.0 for sustainable manufacturing encompass value network integration, sustainable technology governance, innovative sustainable business models, and the development of sustainable skills, all of which serve

as driving forces and tangible outcomes (Mastrocinque *et al.,* 2022). Conversely, renewable integration and manufacturing resilience represent some of the most challenging and critical sustainable functions of Industry 5.0, necessitating substantial strategic collaboration among stakeholders for their realization (Globakhloo, 2023).

9. *Public-Private Partnership*

Public-Private Partnership (PPP) programs have been widely developed worldwide for over 30 years. The sustainability of these programs depends on achieving a balanced integration of economic, environmental, and social dimensions. However, attaining social legitimacy within PPP programs has been identified as a significant challenge (Castelblanco *et al.*, 2022). Furthermore, the full potential benefits of PPPs in delivering improved infrastructure and services may not be realized due to inherent incentives, behavioral biases, and implementation shortcomings. Robust and transparent regulatory and governance frameworks, dissemination of best practices among all stakeholders, exploration of alternative financing models, and provision of high-quality advice and training are needed to ensure critical support for PPPs (McQuaid, 2019). The inclusion of socially sustainable principles, equality, citizen needs, and quality of life considerations are essential dimensions for fostering democratic conditions that promote inclusion and community cohesion. Understanding the needs and expectations of individuals within the communities where they reside and work is fundamental for achieving these outcomes (Snis, 2021).

4. Discussion

This study contributes to the theoretical understanding of scholarly research through a multidisciplinary approach. Specifically, our bibliometric analysis results enhance comprehension of stakeholders' significance and social perspectives, uncovering both current and potential applications within the management research domain.

Notably, our findings highlight a flourishing trend in recent years, evident in the increased volume of scholarly documents and citations. This data underscores the timeliness and relevance of sustainability practices, particularly in elucidating their outcomes for communities. Additionally, the analysis highlights a significant correlation between the terms 'stakeholder' and 'social sustainability,' while the term 'sustainable development' appears frequently across several bibliographic coupling clusters. Clusters 2 and 3 are linked to corporate social sustainability practices, including supply chain management, circular economy initiatives, and stakeholder engagement to promote changes in business practices. Conversely, cluster 9 underscores the significance of Public-Private Partnership (PPP) collaborations as strategic drivers of social cohesion development. Clusters 5, 6, and 7 are characterized by their specific emphasis on stakeholder engagement, humanitarian efforts, and marginalized groups. Additionally, clusters 1 and 4 are dedicated to identifying metrics for assessing social inclusion, particularly through qualitative methods and small-scale studies. Cluster 8 serves as a unifying element, highlighting technology's role as a common thread that intersects with all clusters. This observation suggests a growing interest in understanding the impact of social projects across various contexts.

The bibliometric findings reaffirm the interdisciplinary nature of research efforts aimed at measuring the impact of social inclusion initiatives on marginalized groups. Consequently, future research endeavors should explore strategies to leverage this dynamic field effectively.

Moreover, the paper suggests some practical implications: advocate for an integrated stakeholder management approach, emphasize collaborative partnerships, ethical supply chain practices, and effective communication, and encourage continuous learning and capacity building for impactful social projects.

5. Conclusion

This study has provided valuable insights into the importance of stakeholders and societal perspectives, shedding light on both current trends and potential applications within the field of management research. Particularly noteworthy are the results indicating an increase in the number of scholarly documents and citations in recent years, highlighting the growing importance and relevance of sustainability practices, particularly in terms of their impact on communities.

Overall, the findings of this study underscore the interdisciplinary nature of research efforts aimed at measuring the impact of social inclusion initiatives on marginalized groups. Future research efforts should aim to capitalize on this interdisciplinary approach by further exploring strategies to effectively leverage the dynamic field of social ventures in management research. Additionally, continued efforts are warranted to develop comprehensive metrics for assessing social inclusion and sustainability practices, as well as initiatives to foster collaboration and knowledge sharing among stakeholders across geographic regions. The present review shows some limitations that should be considered. Firstly, the search was limited to scientific documents written in English and excluded other languages. Secondly, in the preliminary search 27 articles were excluded from the analysis because connections were not detected, thereby diminishing the significance of the sample and still only open access articles were considered.

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Sostenibilità e performance nel settore vitivinicolo

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Abstract

Ambito della ricerca. *Sia in ambito accademico che nella vita quotidiana, è ormai accettata l'idea che le attività umane, inclusa quella imprenditoriale, debbano considerare il proprio impatto sull'ambiente e la società. La relazione tra attività imprenditoriale e sostenibilità socio-ambientale è più evidente per alcuni comparti, come quello agro-alimentare. Il segmento vitivinicolo, per la sua importanza nel contesto della produzione nazionale, rappresenta un caso di studio ideale per valutare la diffusione e gli effetti dell'adozione di iniziative di sostenibilità socio-ambientale da parte delle imprese.*

Se in passato il dibattito teorico propendeva per la prevalenza di relazioni di trade-off tra scelte sostenibilità socio-ambientale e performance economico-finanziaria dell'impresa, oggi l'orientamento è sempre più verso l'esistenza di relazioni di tipo win-win, in cui le due categorie di obiettivi sono perseguibili congiuntamente in modo vantaggioso, in logica strategica o di pura proposizione etica.

Obiettivi dell'articolo. *Lo studio proposto valuta, nell'ambito del comparto vitivinicolo, la diffusione delle iniziative di sostenibilità e la loro relazione (come percepita dagli operatori) con diverse misure di performance aziendale.*

Metodologia. *Dal punto di vista metodologico, l'analisi si basa sia su interviste di tipo qualitativo che su un'analisi statistico-econometrica dei dati raccolti tramite un questionario distribuito online alle aziende.*

Risultati. *Un primo risultato positivo è rappresentato da una certa diffusione, nell'ambito del gruppo di imprese considerate, di iniziative di sostenibilità di vario tipo. In secondo luogo, tale adozione può essere o non essere trainata da benefici economico-finanziari. In particolare, il perseguimento di obiettivi strategici è più evidente per le iniziative collegate ad attività orientate verso "l'esterno" dell'impresa, percepibili direttamente da qualche categoria di stakeholders. Non risulta invece evidente in caso di iniziative collegate ad attività "core" svolte all'interno del perimetro aziendale, in quanto, pur presentando livelli di adesione alti, esse non risultano correlate significativamente con i benefici percepiti in termini di performance dell'impresa. Appare quindi ragionevole ritenere che tali iniziative siano implementate per motivazioni puramente sociali. Diverse imprese, inoltre, segnalano la difficoltà di comunicare efficacemente al pubblico il proprio impegno sociale o ambientale.*

L'efficacia delle misure di sostenibilità in termini di miglioramento percepito delle performance aziendali mostra inoltre una relazione positiva con la dimensione dell'impresa (misurata in termini di output prodotto) e negativa con l'età della stessa.

Limitazioni della ricerca. *Il campione è di dimensione relativamente limitata e non può essere considerato rappresentativo del territorio di riferimento.*

Implicazioni manageriali. *L'adozione di iniziative di sostenibilità socio-ambientale non è sempre spinta da obiettivi strategici. Tuttavia, in alcuni casi, le imprese percepiscono un impatto positivo su alcune dimensioni della loro performance economica. I vantaggi maggiori sono percepiti dalle imprese di grandi dimensioni, suggerendo un vantaggio "di scala" nell'adozione delle misure considerate, e dalle imprese giovani, che sono nella fase di costruzione dell'identità del proprio marchio e non hanno ancora consolidato i propri processi produttivi.*

Originalità del paper. *Il paper studia il ruolo delle iniziative di sostenibilità ambientale nel settore vitivinicolo valutandone gli effetti percepiti su diverse misure di performance delle imprese.*

Key words: *sostenibilità; performance; settore vitivinicolo*

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1. Introduzione: sostenibilità e settore vitivinicolo.

Il cambiamento climatico, la qualità dell'aria, dell'acqua e del suolo, la salubrità dei prodotti destinati all'alimentazione umana, la disponibilità di risorse per le future generazioni, nella prospettiva di sostenibilità proposta dal rapporto Brundtland (1987), e il legame di quest'ultima con il benessere degli individui (O' Mahony, 2022) sono problematiche che guadagnano sempre maggiore interesse da parte della società nel suo complesso, oltre ad alimentare un crescente dibattito accademico.

È ormai diffusa la convinzione che le attività umane, compresa l'attività d'impresa, non possano prescindere dal considerare, nell'ambito dei loro processi decisionali, le conseguenze delle loro scelte sull'ambiente e sulla società. L'idea che l'attività d'impresa possa, o debba, prendere in considerazione la propria responsabilità nei confronti della società stessa, e quindi il concetto di *Corporate Social Responsibility*, trova origini accademiche lontane (Bowen, 1953), ma è a partire dagli anni Novanta che inizia a fondersi con il concetto di sostenibilità come descritto dal rapporto Brundtland (1987), in un'ottica volta a cercare almeno un contemperamento, se non una relazione sinergica, tra le sempre più pressanti esigenze di salvaguardia ambientale e gli obiettivi di creazione di valore per gli azionisti e per gli altri stakeholders. In questo contesto è possibile collocare il paradigma della Triple Bottom Line (Elkington e Rowlands, 1999), i cui tre pilastri, *Profit*, *Planet*, *People*, richiedono una valorizzazione simultanea.

La stretta interazione tra attività imprenditoriale e sostenibilità è ancora più evidente nel caso di attività agro-alimentari, di cui quella vitivinicola costituisce un esempio. Infatti, se da un lato l'attività e le scelte degli operatori del settore presentano un impatto diretto sul territorio, dall'altro lato è altrettanto diretto l'impatto delle condizioni ambientali attuali e future sulla possibilità delle imprese del comparto di operare, con successo, nel lungo termine (Bandinelli *et al.*, 2020). Questo legame "a doppio filo" appare di importanza ancora maggiore nel nostro paese, in relazione al ruolo chiave giocato dal settore vitivinicolo. Secondo l'Organizzazione Internazionale della Vigna e del Vino (OIV, 2023), nel 2022 l'Italia è risultata il primo produttore di vino a livello mondiale, in termini di volumi. La produzione italiana sommata a quella di Francia e Spagna rappresenta il 51% della produzione mondiale. Spostando il focus sulla situazione nazionale, il Piemonte si classifica al sesto posto tra le regioni italiane per volumi di vino e mosto prodotti, con il 5% della produzione nazionale, nel 2022 (Ismea, 2023).

In questo contesto, come sottolineato in Bandinelli *et al.* (2020), la maggiore attenzione da parte del pubblico rispetto alle questioni ambientali rende le iniziative di sostenibilità un valido strumento di supporto all'immagine aziendale percepita da clienti e partners (Arcese *et al.*, 2015; Del Giudice, 2019).

Questo punto si ricollega alla necessità di una corretta comunicazione al pubblico delle pratiche di sostenibilità adottate (Siano, 2012). A questo scopo appare utile discutere, nell'ambito del comparto vitivinicolo (ma i concetti sono largamente estendibili anche al di fuori di esso), il ruolo delle certificazioni, che garantiscono la rigorosa adesione del soggetto possessore a determinati principi o a buone pratiche. Le certificazioni esistenti collegate alla tematica della sostenibilità sono molteplici, di natura sia vincolante (come VIA, Valutazione di Impatto Ambientale o VAS, Valutazione Ambientale Strategica) che volontaria (tra cui, ad esempio ISO 14000, 50001, 45001; EMAS; Ecolabel, Certificazione Biologica Europea; oppure, a livello nazionale, VIVA ed Equalitas). La garanzia fornita dalle certificazioni in merito al rispetto di determinati standard svolge, tra le altre, l'importante funzione di tutelare e garantire il consumatore da pratiche scorrette come il *greenwashing*.

Questo lavoro si pone l'obiettivo di analizzare il ruolo della sostenibilità ambientale e sociale nell'ambito delle attività delle imprese vitivinicole. Dopo aver discusso la relazione tra sostenibilità e performance economiche delle imprese, il lavoro presenta un'indagine empirica svolta su operatori del settore vitivinicolo, principalmente attivi nel territorio piemontese. L'indagine, svolta con strumenti qualitativi (interviste) e quantitativi (analisi statistico-econometriche sui risultati di una survey online) si appoggia sull'approccio basato sul *Life Cycle Assessment* (LCA) proposto in

Bandinelli *et al.* (2020), che organizza le iniziative di sostenibilità ambientale per fase della filiera di produzione. In questo lavoro verranno considerate, in aggiunta, iniziative di sostenibilità sociale ed economica. Oltre a valutare il grado di adozione delle diverse iniziative considerate, come nel citato contributo di Bandinelli, lo studio approfondisce la relazione tra l'adozione di tali iniziative e il loro beneficio percepito, in termini di performance dell'impresa; l'analisi si estende inoltre ad approfondire il legame tra quest'ultimo e alcune caratteristiche delle imprese stesse. Viene inoltre discusso il punto di vista delle imprese in relazione agli ostacoli nell'adozione di pratiche sostenibili.

2. Relazione tra sostenibilità ambientale e performance economica

La sostenibilità è un concetto multi-dimensionale dal momento che può essere declinata sia in termini socio-ambientali che in termini puramente economici. Le due dimensioni naturalmente interagiscono e lo fanno in una pluralità di modi, potendo esse configurarsi in una relazione di trade-off o in una relazione del tipo win-win. Nel primo caso la massimizzazione di un tipo di sostenibilità può andare a detrimento dell'altro, mentre nel secondo caso le due dimensioni si integrano e si alimentano vicendevolmente. Il dibattito teorico in merito al costrutto di sostenibilità, se in origine si basava maggiormente sul profilo del trade-off, oggi è sempre più orientato ad una visione win-win, alimentata da una logica strategica o di mera proposizione etica. Tali due logiche sono sostanzialmente diverse: infatti, la prima individua nel perseguimento di obiettivi socio-ambientali la chiave per una maggiore legittimazione sui mercati con il conseguente ottenimento di valori di performance economica più elevati, la seconda, invece, vede nel perseguimento di obiettivi socio-ambientali un obiettivo etico in sé, sovraordinato rispetto al raggiungimento di target economici e anzi disgiunto da questi ultimi.

Questa distinzione tra sostenibilità socio-ambientale intesa come volano della performance economico-finanziaria da un punto di vista strategico e intesa come pura proposta di valore etico definisce gli estremi di un continuum di soluzioni intermedie. I due estremi di questo continuum possono essere interpretati alla luce di alcune teorie o concettualizzazioni che la teoria economico-aziendale ha sviluppato. Se la visione strategica, infatti, si può ancora dispiegare all'interno di una prospettiva shareholder-oriented, la visione meramente etica può essere racchiusa ed interpretata nell'ambito di una visione purpose-oriented, come definita da Caselli *et al.* (2023). In quest'ultima prospettiva, la sostenibilità socio-economica non veste i panni di veicolo strumentale al raggiungimento di target economici, ma rappresenta la ragion d'essere ultima dell'impresa. Tra i due estremi, come si diceva, possono innestarsi situazioni e soluzioni intermedie, interpretabili alla luce della cosiddetta prospettiva stakeholder-oriented. Più specificatamente, l'adesione all'idea di massimizzazione del valore per una platea di stakeholder piuttosto che dei soli shareholder consente di allargare gradualmente il campo degli obiettivi dell'impresa e di sfumare mano a mano gli elementi di strumentalità propri della shareholder view.

D'altro canto, alcuni autori (Kitzmueller e Shimshack, 2012) sottolineano come, quando gli stakeholders diversi dagli azionisti mostrano preferenze di tipo sociale, le iniziative sociali dell'impresa (in termini di Corporate Social Responsibility) possono assumere sia valenze puramente sociali, sia valenze strategiche, a seconda degli orientamenti (sociali o al profitto) che manifesta la proprietà. È quindi possibile, e ragionevole, attendersi che, nell'ambito del ventaglio di iniziative di sostenibilità socio-ambientale intraprese da un'organizzazione, alcune possano essere trainate da motivazioni puramente etiche, come l'attenzione all'ambiente, mentre altre possano essere collegate alla ricerca di un ritorno economico, potenzialmente conseguibile anche grazie all'incontro con i valori di alcune categorie di stakeholders, come clienti e istituzioni. Il ruolo del potere e della pressione esercitabili dagli stakeholders esterni, complementare alle motivazioni di tipo puramente etico, nel guidare l'adesione a pratiche sostenibili appare supportato anche empiricamente (si veda ad esempio il contributo di Buffa *et al.*, 2019, con focus sul settore alberghiero).

Questa visione appare coerente con la prospettiva di creazione di "valore condiviso" introdotta da Porter e Kramer (2011), che propongono di superare la visione di trade-off tra risultati economici e orientamento sociale, in quanto l'impegno in quest'ultima direzione viene visto come non necessariamente costoso; al contrario, esso potrebbe essere un veicolo per introdurre diverse forme di innovazione, potenzialmente benefiche in termini di produttività o di rapporti con il mercato. La creazione di valore condiviso è coerente (ma probabilmente supera) la prospettiva proposta da Carrol già nel 1979, che, attraverso la nota "piramide", propone le responsabilità legali, etiche e filantropiche come subordinate (nell'ordine elencato) a quella di tipo economico legata al conseguimento dei profitti, vitali per la sopravvivenza dell'impresa.

3. Indagine empirica

L'indagine sul campo che caratterizza questo studio integra interviste qualitative semi-strutturate svolte con operatori del settore ad un'analisi quantitativa effettuata sui dati raccolti tramite un questionario standardizzato. Il punto di vista, le percezioni e gli atteggiamenti degli operatori del settore in relazione alle iniziative di sostenibilità si rivelano preziosi per la comprensione della portata del loro contributo attuale e della relativa futura evoluzione. Tale contributo risulta, come si è detto, fondamentale per due ordini di motivi. Da un lato è proprio a questi soggetti, perché collocati nelle primissime fasi della filiera, vengono demandate numerose responsabilità, in termini di cura del suolo, utilizzo delle risorse naturali, qualità e sicurezza del prodotto. Dall'altro lato, le scelte socialmente responsabili degli operatori, e degli imprenditori in genere, hanno effetti sul successo e sulla sopravvivenza futura delle imprese e possono presentare anche una valenza strategica per l'impresa stessa, nella misura in cui i mercati siano disponibili ad apprezzare, riconoscere e remunerare questo tipo di impegno (Kitzmueller e Shimshack, 2012; Bandinelli *et al.*, 2020).

3.1 Indagine qualitativa: interviste agli operatori del settore

Questa parte dello studio si basa su interviste semi-strutturate effettuate nel mese di settembre 2023, che hanno coinvolto otto aziende[4] del settore che si sono distinte per un atteggiamento particolarmente virtuoso in termini di adozione di iniziative green oppure di responsabilità sociale. Le interviste sono state svolte in presenza, telefonicamente oppure online, a seconda delle preferenze degli intervistati, anche tenendo conto del periodo particolare, che vedeva in corso l'attività di vendemmia. Gli elementi approfonditi nell'ambito dell'intervista riguardano le caratteristiche dell'impresa e la sua storia, le iniziative di sostenibilità adottate (articolate secondo la logica LCA proposta in Bandinelli *et al.*, 2020, ma includendo anche elementi economici e sociali) e la loro interazione con l'attività. E' sempre stato lasciato spazio per considerazioni e opinioni del rispondente, anche in merito alle eventuali criticità.

Tutte le imprese intervistate sono in possesso di certificazioni ambientali: The Green Experience, SQNPI (Sistema di Qualità Nazionale per la Produzione Integrata), VIVA (sostenibilità della viticoltura in Italia), Equalitas, Biologico, tranne una, che però ha deciso di intraprendere un percorso in questo senso. Inoltre, la maggior parte delle imprese intervistate ha adottato una pluralità (due o più) di iniziative di sostenibilità. Quelle menzionate più frequentemente sono legate alla fase di viticoltura vera e propria e riguardano l'adozione della viticoltura integrata e l'utilizzo della tecnica del sovescio. La tecnica del sovescio consiste nella semina, tra i filari della vigna, di un miscuglio di diverse specie di piante. L'obiettivo non è quello di raccoglierne il prodotto, ma di interrare la biomassa prodotta al fine di aumentare la fertilità del suolo, migliorando così la resa delle viti. La viticoltura integrata implica l'impiego di diverse tecniche di difesa per la vite, comprendendo approcci di tipo agronomico, biologico e, solo se necessario, chimico. L'obiettivo primario è promuovere uno stato ottimale della vite, riservando l'uso di prodotti sintetici come ultima opzione.

[4] Le aziende che hanno partecipato all'indagine qualitativa sono XXXXX.

Altre iniziative riguardano le scelte di tipo energetico (installazione di impianto fotovoltaico, utilizzo di biocarburanti per i trattori), oppure scelte legate alle fasi successive (ad esempio utilizzo di strutture sotterranee per le cantine).

Gli investimenti nel fotovoltaico sono spesso menzionati anche tra le iniziative di sostenibilità economica, insieme ai corsi di formazione e all'uso di contratti a lungo termine (si sono definite scelte di sostenibilità economica le iniziative di tipo economico a supporto delle scelte di sostenibilità). Infine, dal punto di vista delle scelte di sostenibilità sociale, si menzionano frequentemente contributi ad iniziative di rilevanza sociale e collaborazioni a livello locale, anche se l'iniziativa più menzionata è legata all'enoturismo sostenibile. In un caso si citano anche iniziative di "wellbeing aziendale".

Tra le criticità legate all'implementazione di iniziative di sostenibilità, si menzionano principalmente difficoltà legate a complessità burocratiche e assenza di sussidi. Anche i costi elevati vengono menzionati tra i problemi, oltre alla difficoltà di comunicare efficacemente il proprio impegno al consumatore. Inoltre, la difficoltà di confrontare efficacemente le imprese sostenibili, legata alle disomogeneità esistenti tra le imprese e alla relativa scarsità di parametri oggettivi di comparazione, viene percepito come un ulteriore ostacolo. Infine, è presente una percezione comune in tema di atteggiamento da parte del mercato. È diffusa infatti la convinzione che il prodotto sostenibile, in termini ambientali o sociali, sia apprezzato più facilmente nei mercati del Nord Europa rispetto ai mercati locali. Tuttavia, queste aziende confermano il loro orientamento alla sostenibilità, sia in relazione alla loro filosofia e cultura aziendale, con obiettivi di attenzione all'ambiente, sia in termini strategici; infatti, la valutazione delle iniziative è comunque sempre effettuata in un'ottica di valutazione del ritorno dell'investimento: in linea con la visione di Carroll (1979), gli intervistati sostengono che nessuna iniziativa possa mai prescindere dalla propria sostenibilità economica.

Tab. 1: Principali risultati delle interviste semi-strutturate

INIZIATIVE	OPPORTUNITA'	CRITICITA'
Sostenibilità Ambientale: • Viticoltura integrata • Sovescio • Utilizzo di fonti di energia rinnovabili • Strutture sotterranee • Compost da residui di potatura • Relamping • Sistemi a protezione inquinamento puntiforme • Comunicazione digitale • Uso prodotti "cruelty free" • Casette per insetti tra i filari Sostenibilità Economica: • Investimenti impianti fotovoltaici • Contratti a lungo termine • Corsi di formazione su sostenibilità Sostenibilità sociale: • Enoturismo sostenibile • Contributo a iniziative sociali • Collaborazioni locali • "Wellbeing aziendale"	• Certificazioni • Coerenza con la propria cultura aziendale • Riconoscimento dell'impegno in termini di sostenibilità da parte di alcuni mercati (Nord Europa) • Attenzione al ritorno futuro dell'investimento, a tutela della sua sostenibilità economica nel lungo termine	• Complessità burocratiche • Assenza di sussidi • Costi elevati • Difficoltà di comunicazione al consumatore dell'impegno in iniziative di sostenibilità • Difficoltà di confronto efficace tra le imprese sul mercato • Scarso apprezzamento delle caratteristiche di sostenibilità nel prodotto da parte del mercato locale

Fonte: elaborazione propria

3.2 Indagine quantitativa

3.2.1 Il questionario

Il questionario è stato creato come Form di Google e distribuito, attraverso la circolazione del relativo link, alle imprese. Alcuni enti con forti legami con le imprese vitivinicole piemontesi hanno collaborato alla diffusione del questionario, permettendo di raggiungere 1500 imprese nel periodo tra settembre e la prima metà di ottobre 2023. Si sono ottenute 121 risposte (tasso pari all'8% circa, non elevato ma relativamente soddisfacente in considerazione della concomitante vendemmia). Si noti che il questionario è stato somministrato anche alle imprese che hanno partecipato all'indagine

qualitativa. Il questionario si è articolato in 5 sezioni. Nella prima sono state richieste informazioni relative alle caratteristiche dell'impresa rispondente. Le successive 3 sezioni erano focalizzate sulle iniziative adottate in termini di sostenibilità ambientale, economica e sociale, rispettivamente. L'ultima sezione richiedeva alcune considerazioni conclusive.

In merito alle caratteristiche delle imprese, si riscontra che quasi l'80% delle imprese intervistate risulta come impresa proprietaria di vigneti. Le rimanenti imprese acquistano uve da terzi o rientrano nelle categorie di cooperativa o di consorzio. Una sola impresa si occupa del solo imbottigliamento e una ha vigneti in comodato d'uso.

Dal punto di vista dimensionale, la situazione è piuttosto variegata, con una prevalenza di imprese di dimensione medio-piccola. Circa il 74% delle imprese intervistate, infatti, si colloca entro i 10 dipendenti, un ulteriore 20% si colloca tra 11 e 50. Solo il 6% circa supera i 50 dipendenti. Dal punto di vista del fatturato, l'89% delle imprese non supera i 10 milioni, il 6% tra 10 e 50 milioni e il 5% si colloca oltre questa soglia. Infine, è stato possibile pervenire ad una misura "fisica" dell'output prodotto, in termini di numero di bottiglie. L'11% delle imprese produce fino a 5 mila bottiglie annue, il 12% tra 5 e 10 mila, il 27% tra 10 e 50 mila, il 13% tra 50 e 100 mila. Dal punto di vista di questa variabile, tuttavia, la categoria più rappresentata è quella con output oltre le 100 mila bottiglie, con più del 35% delle imprese partecipanti che si colloca in questa fascia.

Dal punto di vista geografico, le imprese sono attive prevalentemente in Piemonte (sono inclusi anche 3 rispondenti localizzati in aree limitrofe: Liguria, Lombardia, Canton Ticino) e spesso operano in più aree della regione. La maggior parte delle imprese rispondenti è attiva, comunque, nelle zone delle Langhe (34%), del Monferrato (57%) e del Roero (8%). Si noti nella Tabella 2, che sintetizza le caratteristiche delle imprese, in relazione a questo punto si riscontra che la somma delle percentuali riportate eccede il 100% perché molte imprese sono attive in più di una zona. Tra le "altre zone" in cui operano i rispondenti troviamo, oltre alle menzionate regioni limitrofe, il tortonese, i colli Saluzzesi e Torinesi, il Canavese, i Colli Rivolesi, i colli Astiani, l'Alto Piemonte.

Molte delle imprese del campione possiedono una lunga storia aziendale e in alcuni casi sono addirittura antiche: il 6% delle imprese ha oltre 200 anni di età, mentre la fascia di più rappresentata è quelle tra i 50 e i 100 anni (34%). Solo il 5% delle imprese ha meno di 5 anni.

Tab. 2: Caratteristiche delle imprese che hanno risposto al questionario

Caratteristica	media	Caratteristica	media
Proprietà vigneti	0,79	Zona	
Numero dipendenti		Langhe	0,34
0-10	0,74	Monferrato	0,57
11-50	0,2	Roero	0,08
>50	0,06	Altra zona	0,17
Fatturato		Età	
0-50 mila	0,19	0-5 anni	0,05
50-200 mila	0,22	5-20 anni	0,18
200-500 mila	0,17	20-50 anni	0,25
500 mila - 2 milioni	0,19	50-100 anni	0,34
2-10 milioni	0,12	100-200 anni	0,12
10-50 milioni	0,06	oltre 200 anni	0,06
>50 milioni	0,05		
Numero bottiglie			
0-5 mila	0,12		
5-10 mila	0,12		
10-50 mila	0,27		
50-100 mila	0,13		
oltre 100 mila	0,36		

Fonte: elaborazione propria

Spostando l'attenzione alle sezioni relative alle diverse accezioni di sostenibilità, emerge come la maggior parte delle aziende rispondenti possieda almeno una certificazione (le più diffuse sono SQNPI, Equalitas e Certificazione Biologica Europea. 38 imprese su 121 dichiarano di non possederne nessuna, rappresentando una minoranza non trascurabile dei rispondenti. Al contrario, le certificazioni di prodotto sono molto meno diffuse: ben 106 imprese su 121 non ne possiedono. Un

risultato simile emerge in relazione all'ottenimento di certificazioni di impronta sociale, con 107 imprese che dichiarano di non esserne in possesso.

E' stato inoltre richiesto di indicare, in un set predefinito, quali iniziative di sostenibilità l'azienda ha implementato, non ha implementato o intende implementare in futuro. Le iniziative di sostenibilità sono state proposte raggruppate per fase di attività: viticoltura; vinificazione e cantina, imbottigliamento e distribuzione. In aggiunta, è poi stato chiesto di procedere analogamente in merito ad azioni di sostenibilità economica e sociale. La tabella sottostante riporta i tassi di adesione a ciascuna iniziativa nell'ambito del campione considerato (sono state considerate come "aderenti" ad una certa iniziativa le imprese che hanno dichiarato di averla adottata o che intendono adottarla in futuro; l'obiettivo è includere tutte le tipologie di interventi finora valutati positivamente dalle aziende, piuttosto che quelli effettivamente implementati). Come si è detto, la classificazione e la definizione degli *item* considerati riprendono quelle proposte in Bandinelli *et al.* (2020), elaborate sulla base della logica LCA; un ulteriore riferimento, per questo studio, è vinra.it.

È interessante notare che i tassi di adesione sono particolarmente elevati (oltre l'80%) per molte delle iniziative collegate all'attività in campo (fase della viticoltura), in particolare in relazione alla conservazione della biodiversità e alla riduzione dei trattamenti fitosanitari. Per la fase di vinificazione e cantina, i valori più elevati si collegano alla riduzione dell'utilizzo di sanitizzanti, detergenti, additivi e coadiuvanti, oltre all'aspetto energetico. Nella fase di imbottigliamento e distribuzione, molta attenzione è riservata alla sostenibilità del packaging, alla comunicazione digitale e alla ricerca. Rispetto alle iniziative di sostenibilità economica e sociale, l'adesione risulta in generale molto elevata, con la maggioranza dei valori oltre l'80%.

Tab. 3: Iniziative di sostenibilità e tassi di adesione

Iniziative	Tasso di adesione	Iniziative	Tasso di adesione
Sostenibilità ambientale: viticoltura		Sostenibilità ambientale: imbottigliamento e distribuzione	
Agricoltura Biologica	0,52	Packaging sostenibile	0,86
Macchine Agricole Intelligenti	0,61	Etichetta realizzata con materiali riciclati	0,6
Protezione del territorio	0,9	Comunicazione digitale	0,89
Tutela del patrimonio paesaggistico	0,89	Trasporto km zero	0,6
Riduzione dei consumi idrici e/o microirrigazione	0,83	Ricerca e innovazione	0,83
Riduzione dell'inquinamento idrico	0,88	Trasporto sostenibile	0,67
Riduzione dell'inquinamento puntiforme	0,833	Sostenibilità economica	
Gestione verde del suolo	0,89	Sistema di pianificazione	0,84
Conserva e tutela delle zone boschive	0,81	Investimenti per incrementare la sostenibilità	0,88
Conservazione della biodiversità	0,91	Formazione del personale	0,88
Riduzione dell'utilizzo di fertilizzanti	0,86	Stipula di contratti a lungo termine	0,69
Riduzione dell'utilizzo di trattamenti fitosanitari	0,9	Sistema di controllo di gestione	0,74
Produzione di compost da residui di potatura	0,55	Sostenibilità sociale	
Riduzione delle lavorazioni profonde del terreno	0,074	Creazione di occupazione locale	0,85
Sostenibilità ambientale: vinificazione e cantina		Piano di crescita dei lavoratori	0,85
Riduzione dell'utilizzo di detergenti e sanitizzanti	0,89	Sicurezza e salute dei lavoratori	0,97
Riduzione dell'utilizzo di additivi e coadiuvanti	0,9	Promozione enoturismo ecosostenibile	0,88
Tecniche di bio-edilizia e bio-architettura	0,62	Rispetto e valorizzazione cultura e storia locali	0,95
Economia circolare e recupero rifiuti in cantina	0,79	Sviluppo di relazioni con attività locali	0,9
Riduzione dell'inquinamento atmosferico	0,83	Contributo alla crescita della comunità locale	0,91
Riutilizzo sottoprodotti di vinificazione	0,78	Sicurezza e salute della comunità	0,86
Adozione di energia pulita e/o riduzione consumi energetici	0,93	Anticorruzione aziendale	0,8
Misurazione e valutazione dell'impronta carbonica/climatica	0,64		
Misurazione e valutazione dell'impronta idrica	0,63		
Filtraggio acqua piovana	0,53		
Costruzione di strutture sotterranee	0,51		

Fonte: elaborazione propria

In analogia con le interviste, anche nell'ambito del questionario è stato richiesto ai partecipanti di indicare le principali difficoltà incontrate in merito al processo di accreditamento della sostenibilità

in azienda. Solo 20 imprese dichiarano una completa assenza di criticità. Negli altri casi le criticità più menzionate riguardano le complessità burocratiche e le informazioni a supporto non abbastanza chiare, la scarsità di contributi pubblici per far fronte alle relative spese o a eventi imprevisti, i tempi di attesa lunghi.

Altro elemento di interesse è la percezione dell'efficacia dell'implementazione di iniziative di sostenibilità rispetto ad alcuni aspetti della performance aziendale. Le valutazioni di efficacia, richieste per ciascuno di questi aspetti, sono state fornite su una scala da 1 a 5 (con 5 che corrisponde all'efficacia massima). La tabella 4 riporta i punteggi medi in merito all'efficacia percepita dell'adozione di iniziative di sostenibilità rispetto alle diverse misure di performance aziendale.

Tab. 4: Efficacia percepita delle iniziative di sostenibilità in termini di performance

Performance	efficacia percepita (media)
Miglioramento immagine aziendale	3,83
Incremento fatturato	2,82
Incremento vendite	2,99
Aumento fedeltà dei consumatori	3,26
Maggiore facilità ad entrare in nuovi mercati	3,37
Giustificare un prezzo più alto per il prodotto (premium price)	3,02
Riduzione di costi/risparmio di risorse	2,8
Maggiore efficienza operativa	2,9
Minori costi e tasse	2,26
Ottimizzazione della catena di fornitura	2,85
Facilità nell'accesso a fonti di finanziamento	2,9
Minori rischi legali e/o finanziari e/o operativi	2,31

Fonte: elaborazione propria

Dalla tabella è interessante notare come le prime sei misure di performance aziendale siano relative alle relazioni tra le imprese e i propri clienti o i mercati di sbocco. Per tali indicatori, i punteggi medi di efficacia percepita delle misure di sostenibilità risultano più alti, soprattutto in relazione agli indicatori più strettamente collegati all'immagine aziendale (il più elevato è il primo, proprio riferito all'immagine; anche i punteggi medi relativi alla fedeltà dei clienti, alla facilità di entrare in nuovi mercati e alla possibilità di ottenere un *premium price* risultano comunque tutti superiori a 3). Punteggi inferiori si riscontrano per gli elementi legati all'efficienza e alla riduzione dei costi (soprattutto nella voce che include anche l'aspetto fiscale). Infine, il valore 2,9 legato alla facilità di accesso alle fonti di finanziamento sembra suggerire un atteggiamento positivo dei soggetti finanziatori nei confronti delle imprese sostenibili, mentre meno incoraggiante è la percezione, da parte delle imprese, dell'effetto in termini di riduzioni dei rischi.

Tra le imprese intervistate, 72 riscontrano con sicurezza un incremento della domanda di prodotti sostenibili sul mercato, mentre 35 dichiarano certamente di non riscontrarla. I rimanenti rispondenti si collocano a livelli intermedi segnalando di non riscontrare incrementi per il momento, oppure segnalano incrementi insufficienti o limitati ad alcuni mercati. Infine, la maggioranza delle imprese intervistate (90) ritiene importante comunicare il proprio impegno in termini di sostenibilità.

3.2.2 Analisi dei dati

Alla luce delle risposte ottenute appare interessante verificare l'esistenza di relazioni sistematiche tra l'implementazione di iniziative di sostenibilità e la scelta di ottenere certificazioni di sostenibilità e l'efficacia percepita di queste misure in termini di performance aziendale.

Per fare questo, possiamo trattare le misure di efficacia percepita in modo aggregato, calcolandone la media. Definiamo quindi la variabile *eff_media* come la media dei punteggi assegnati dai rispondenti rispetto alle 12 misure di performance elencate nella tabella 4. Questa variabile presenta un valore medio pari a 2.94, un valore minimo pari a 1, un valore massimo pari a 5 (tra i rispondenti sono infatti presenti imprese che hanno valutato sempre 1 o sempre 5, rispettivamente, l'impatto delle iniziative

di sostenibilità sulle misure di performance considerate. È presente quindi una certa variabilità nell'efficacia percepita). La deviazione standard è pari a 0,87.
Sorprendentemente, la variabile considerata assume un valore medio leggermente più elevato nel gruppo dei soggetti sprovvisti di certificazioni di sostenibilità, rispetto al gruppo dei soggetti che ne possiede almeno una (3,00 *vs* 2,92). Tuttavia, sulla base di un t-test, tale differenza non risulta statisticamente significativa. Questo suggerisce che l'acquisizione di certificazioni ambientali non è strettamente legata ai benefici (attesi o effettivi) sulle misure di performance considerate.
Altro elemento interessante da indagare è la presenza di correlazione tra la variabile considerata e il numero di misure di sostenibilità adottate. Si riporta nella tabella 5 la matrice di correlazione, in cui il numero di misure di sostenibilità adottate è disaggregato sulla base delle categorie considerate nella tabella 3.

Tab. 5: Matrice di correlazione tra efficacia percepita e numero di iniziative di sostenibilità adottate

	Eff_media	Tot. Iniz. viticoltura	Tot. Iniz. vinificazione e cantina	Tot. Iniz. Imbottigl. e distribuzione	Tot. Iniz. Sost. Economica	Tot. Iniz. Sost. Sociale
Eff_media	1					
Tot. Iniz. viticoltura	0,09	1				
Tot. Iniz. vinificazione e cantina	0,15	0,53***	1			
Tot. Iniz. Imbottigl. e distribuzione	0,27***	0,48***	0,57***	1		
Tot. Iniz. Sost. Economica	0,23**	0,43***	0,57***	0,58***	1	
Tot. Iniz. Sost. Sociale	0,30***	0,49***	0,44***	0,53***	0,52***	1
Significatività statistica: * 10%, ** 5%, *** 1%						

Fonte: elaborazione propria

Come emerge dalla matrice di correlazione, le varie misure di sostenibilità, sia ambientale che economica e sociale, presentano tra loro coefficienti di correlazione rilevanti benché non estremamente alti (non si raggiunge mail il 60%). Si riscontra tuttavia sempre un'elevata significatività statistica di tali coefficienti. Conseguentemente, possiamo desumere una certa tendenza ad implementare "insieme" le misure di sostenibilità appartenenti a diverse categorie (ambientale, economica e sociale) e, con riferimento alle misure di sostenibilità ambientale, a diverse fasi del processo produttivo.

L'efficacia percepita delle misure implementate sulla performance (catturata, come si è detto, dalla variabile *eff_media*), risulta significativamente correlata ad alcune categorie di iniziative (iniziative di sostenibilità ambientale applicate alle fasi di imbottigliamento e distribuzione, iniziative di sostenibilità economica e sociale). Questo risultato sembra suggerire che le iniziative di sostenibilità ambientale relative alle fasi strettamente produttive siano trainate da motivazioni diverse rispetto al miglioramento delle performance o, se vogliamo, da motivazioni non necessariamente "strategiche". Il ruolo dell'efficacia delle misure appare più rilevante se si considerano gli aspetti logistici, oppure economico-sociali. Appare quindi possibile affermare che l'adozione di iniziative di sostenibilità appare indotta (o quantomeno correlata) almeno parzialmente dalle percezioni dell'impresa in merito ai potenziali benefici che tali iniziative possono portare alla performance aziendale. Ciò vale, in particolare, per alcune categorie di iniziative, la cui implementazione non è esclusivamente "interna" al perimetro aziendale, ma coinvolge (fisicamente o dal punto di vista relazionale) anche alcuni gruppi di stakeholders esterni (fornitori, clienti, istituzioni, dipendenti, comunità).

A questo punto, si ritiene utile verificare se l'efficacia percepita delle misure di sostenibilità, che abbiamo visto essere piuttosto diversificata tra le imprese rispondenti, presenti relazioni sistematiche con le caratteristiche delle imprese stesse. In particolare, verranno considerate le seguenti caratteristiche:

- La proprietà dei vigneti, espressa come variabile dummy (dicotomica) che assume valore 1 se l'impresa è proprietaria (*proprietà_vign*);
- Dimensione dell'impresa, espressa in termini di numero di bottiglie. La dimensione è catturata da quattro variabili dummies che assumono, ciascuna, valore uno quando l'impresa si trova in una certa classe dimensionale, e zero altrimenti. Le quattro variabili dummies considerate sono: *nbot5_10k*, *nbot10_50k*, *nbot50_100k*, *nbot_oltre100k*, che assumono valore pari ad uno quando l'impresa presenta una produzione annuale tra 5 e 10 mila bottiglie, tra 10 e 50 mila, tra 50 e 100 mila e oltre 100 mila, rispettivamente. La categoria base, omessa per evitare il problema della multicollinearità, è la classe di produzione fino a 5 mila bottiglie.
- Zona geografica, catturata da 4 variabili dummy (non mutualmente esclusive): *monferrato*, *langhe*, *roero*, *altra_zona*;
- Età dell'impresa, catturata da cinque variabili dummy indicanti la fascia di età di appartenenza: *5_20anni*, *20_50anni*, *50_100anni*, *100_200anni*, *oltre_200anni*. La categoria base omessa raccoglie le imprese attive da meno di 5 anni.

Queste variabili saranno usate come regressori al fine di verificarne l'impatto sulla percezione di efficacia delle iniziative di sostenibilità, sia a livello aggregato, considerandone l'effetto sulla variabile *eff_media*, sia a livello di singole misure di performance. Data la diversa natura delle variabili di risposta, verranno utilizzati due modelli di regressione diversi. In particolare, la variabile *eff_media* è una variabile continua (in quanto determinata come media dei punteggi assegnati alle singole misure di performance), ma censurata sia inferiormente che superiormente in corrispondenza dei valori 1 e 5. Per questo motivo, le relazioni tra le caratteristiche delle imprese e questa variabile saranno studiate utilizzando un modello Tobit.

Le valutazioni di efficienza percepita rispetto alle singole misure di performance sono invece espresse in termini di punteggio su una scala 1-5. Si presentano pertanto come variabili discrete ordinate; l'effetto delle caratteristiche dell'impresa sarà pertanto studiato utilizzando modelli ordered logit. Tale effetto è valutato rispetto alla probabilità di ottenere un determinato punteggio. La tabella 6 riporta i risultati dei diversi modelli.

In merito al modello Tobit, che utilizza come variabile dipendente la media dei punteggi di efficacia percepita, si nota che questa non risulta significativamente influenzata dal fatto che l'impresa sia proprietaria dei vigneti. Al contrario, la dimensione sembra avere un ruolo: a parte la classe di produzione 5-10 mila bottiglie, che non differisce significativamente dalla categoria base (meno di 5 mila), le altre classi presentano coefficienti significativi e crescenti al crescere della dimensione. Sono quindi le imprese più grandi a percepire i benefici maggiori, in termini di performance, derivanti dall'implementazione di misure di sostenibilità, suggerendo l'esistenza di una sorta di vantaggio di scala in questo senso. Risulta inoltre positivo e significativo l'effetto di due dummies geografiche (*monferrato* e *langhe*), che con tutta probabilità ospitano le produzioni di maggior pregio. Infine, risulta altamente significativo e negativo (e con tendenza crescente in valore assoluto) l'effetto delle dummies di età. Rispetto alla categoria base, rappresentata da imprese molto "giovani" in quanto in attività da meno di cinque anni, al crescere dell'età dell'impresa diminuisce l'efficacia percepita dalle misure di sostenibilità. Questo può essere collegato sia ai benefici "marketing oriented" derivanti dall'adozione di pratiche sostenibili, sia ai potenziali benefici sull'efficienza produttiva. È infatti probabile che essi siano più evidenti per le imprese giovani e meno rilevanti per cantine con decenni o addirittura secoli di storia, che possono vantare un'alta riconoscibilità del marchio e prassi produttive consolidate e radicate nella tradizione. La stima non presenta uno pseudo-R2 molto elevato, ma il p-value del Likelihood Ratio Chi2 test è molto basso, a supporto della validità del modello.

Nelle colonne successive si riportano i coefficienti dei modelli ordered logit che utilizzano come variabili di risposta le singole misure di performance aziendale, espresse su una scala da 1 a 5. Anche in questo caso, i modelli non presentano pseudo-R2 molto alti, ma la maggior parte presenta p-value del Likelihood Ratio Chi2 ben al di sotto della soglia del 5%. Non possono invece essere ritenuti sufficientemente affidabili i modelli in cui questa soglia viene superata (si tratta dei modelli riportati nella terza, nella quinta, nella sesta, nella quattordicesima e nella quindicesima colonna della tabella,

che utilizzano come variabili di risposta il miglioramento dell'immagine aziendale, l'incremento delle vendite, della fedeltà dei consumatori, la facilità di accesso alle fonti di finanziamento e la riduzione dei rischi, rispettivamente). Si eviterà quindi di interpretare i relativi risultati.

Rispetto ai modelli considerati affidabili, molti dei risultati discussi per il modello precedente risultano confermati. La proprietà dei vigneti non sembra avere un ruolo significativo (se non nel caso del coefficiente negativo e debolmente significativo che compare nel modello relativo all' "ingresso in nuovi mercati"). Il ruolo positivo e significativo della dimensione appare confermato, almeno per la classe dimensionale maggiore (oltre le 100 mila bottiglie), ma talvolta anche per alcune delle classi intermedie. Quindi trovarsi nella classe dimensionale maggiore rende più probabile ottenere un punteggio più elevato di efficacia percepita delle misure di sostenibilità in relazione a tutte le misure di performance considerate. L'effetto delle dummies geografiche è significativo solo in alcuni modelli, confermando nella maggior parte di questi casi il ruolo positivo della presenza nelle aree di Langhe e Monferrato[5], dove si collocano le produzioni di maggior pregio. Risulta infine confermato, in tutti i modelli, l'effetto significativo e negativo delle dummies che catturano l'età dell'impresa. Tale effetto dimostra una tendenza, non netta ma comunque evidente, a crescere in valore assoluto all'aumentare dell'età stessa. Ciò vale sia per i modelli che vedono variabili di risposta collegate a performance "di mercato" (incremento del fatturato, ingresso in nuovi mercati, premium price) sia a performance "di efficienza" (che coinvolgono i costi o la supply chain). Questo suggerisce che l'adozione di iniziative di sostenibilità sia percepita come una strategia più adatta per le imprese giovani, non ancora conosciute e con prassi produttive non ancora consolidate.

Tab. 6: Efficacia percepita e caratteristiche dell'impresa

Variabili	Tobit Eff_media	Ord. Logit Immagine aziendale	Ord. Logit Incremento fatturato	Ord. Logit Incremento vendite	Ord. Logit Fedeltà dei consum.	Ord. Logit Ingresso in nuovi mercati	Ord. Logit Premium price	Ord. Logit Riduzione costi/risparmio risorse	Ord. Logit Efficienza operativa	Ord. Logit Minori costi e tasse	Ord. Logit Ottimizz. catena di fornitura	Ord. Logit Accesso fonti di finanz.	Ord. Logit Minori rischi
proprietà_vign	0.0626	0.0923	-0.366	-0.471	0.689	-0.853*	0.562	0.398	0.328	0.281	0.0699	-0.126	0.338
nbot5_10k	0.441	1.304*	1.094	0.733	0.899	1.188	1.516**	1.587**	0.490	-0.0106	0.329	0.696	0.0161
nbot10_50k	0.515*	1.602**	1.031	0.941	1.333**	1.635**	1.073*	0.871	0.977	0.104	1.181*	0.451	0.00897
nbot50_100k	0.528*	1.842**	1.160	1.147	1.025	0.999	0.324	1.361*	1.223	0.0123	1.687**	0.873	0.0194
nbotoltre_100k	0.946***	2.207***	1.689**	1.304*	1.987***	2.532***	1.137*	2.015***	2.030***	1.137*	2.275***	1.418**	1.077
monferrato	0.397*	0.523	0.685	0.875	0.166	-0.292	1.043*	0.746	0.389	0.729	1.027*	0.296	0.810
langhe	0.469**	0.102	0.884*	1.335**	0.399	0.164	1.525***	0.999*	0.489	1.155**	1.197**	0.668	0.629
roero	-0.153	-0.359	-0.240	-0.193	-0.120	-0.738	1.048	-0.0392	0.546	-0.122	-0.134	-0.596	0.255
altra_zona	0.438	0.720	0.658	1.482**	0.517	-0.441	0.918	0.446	0.368	0.380	1.538**	0.740	0.594
5_20anni	-1.112***	-1.883**	-1.942**	-1.868**	-2.054**	-1.923**	-3.096***	-1.548*	-1.843**	-1.737**	-1.677*	-1.717*	-1.874**
20_50anni	-1.395***	-1.551*	-2.730***	-2.270***	-2.707***	-1.773**	-3.547***	-2.752***	-2.242***	-2.601***	-2.333***	-1.857**	-1.862**
50_100anni	-1.231***	-1.149	-1.914**	-1.622**	-2.298***	-1.861**	-3.231***	-2.300***	-2.229***	-2.212***	-2.450***	-1.846**	-2.309***
100_200anni	-1.493***	-1.319	-2.888***	-2.313**	-2.744***	-2.139**	-3.692***	-2.577***	-2.728***	-3.146***	-3.245***	-2.072**	-3.104***
oltre_200anni	-1.562***	-0.568	-2.423**	-1.954*	-1.827*	-2.719**	-3.297***	-2.007*	-3.935***	-3.865***	-3.783***	-2.626**	-3.488***
/cut1		-1.970*	-2.798***	-2.505**	-2.877***	-3.876***	-2.830***	-1.569	-2.437**	-1.633	-1.815*	-2.263**	-1.538
/cut2		-1.231	-1.107	-1.193	-1.538	-2.630**	-1.518	-0.0891	-1.012	-0.197	-0.442	-1.076	-0.292
/cut3		-0.0693	0.822	1.042	0.131	-1.156	0.220	1.365	0.758	1.244	1.587	-0.0280	1.061
/cut4		1.624	2.517**	2.799***	2.422**	0.791	2.497**	3.206***	2.610**	2.299**	3.650***	1.890*	2.272**
Constant	3.080***												
LR chi2 prob.	0.0048	0.1376	0.0396	0.0908	0.0671	0.0086	0.0021	0.0066	0.0379	0.0105	0.0060	0.4091	0.0527
Pseudo-R2	0.0978	0.0588	0.0699	0.0631	0.0652	0.0819	0.0944	0.0823	0.0689	0.0828	0.0876	0.0388	0.0658
Osservazioni	121	121	121	121	121	121	121	121	121	121	121	121	121

*** p<0.01, ** p<0.05, * p<0.1

Fonte: elaborazione propria

4. Conclusioni

L'idea che le attività umane, inclusa quella imprenditoriale, non possano trascurare di considerare il proprio impatto sull'ambiente e la società è ormai ampiamente accettata sia dall'opinione pubblica che nell'ambito del dibattito accademico. L'interazione tra attività imprenditoriale e sostenibilità è

[5] In un solo caso (ottimizzazione della catena di fornitura) è significativa e positiva anche la presenza in "altra zona"; tuttavia, poiché questa variabile ha natura residuale e aggrega aree diverse, tale risultato risulta di difficile interpretazione.

particolarmente evidente nel settore agroalimentare, di cui il comparto vitivinicolo rappresenta un segmento chiave, per il nostro paese. Tale interazione risulta bidirezionale, poiché, se da un lato l'attività degli operatori ha innegabili ricadute sul territorio, d'altro canto la redditività e la sopravvivenza di questi sono indissolubilmente legate al territorio stesso (Bandinelli *et al.*, 2020). Il comparto vitivinicolo rappresenta quindi un campo di indagine ideale per valutare la diffusione e gli effetti dell'adozione di iniziative di sostenibilità socio-ambientale da parte delle imprese.

In linea teorica, le scelte di sostenibilità socio-ambientale possono relazionarsi in modo diverso con la performance dell'impresa che le adotta. Se la relazione è di trade-off, gli obiettivi socio-ambientali ed economico-finanziari possono entrare in conflitto, mentre se la relazione è di tipo win-win, le due categorie risultano complementari e possono essere integrate in modo vantaggioso. Il dibattito teorico relativo a questo tema propendeva in passato per la prevalenza di relazioni di trade-off, ma oggi è sempre più orientato ad una visione win-win, associata ad una logica strategica o di pura proposizione etica.

Lo studio proposto valuta, nell'ambito del comparto vitivinicolo, la diffusione delle iniziative di sostenibilità e la loro relazione (come percepita dagli operatori) con la performance aziendale. Dal punto di vista metodologico, l'analisi si basa sia su interviste di tipo qualitativo, che su un'analisi statistico econometrica di dati raccolti tramite un questionario distribuito online alle aziende.

Dall'integrazione dei risultati delle due analisi svolte, qualitativa e quantitativa, emergono alcuni spunti di riflessione interessanti.

In primo luogo, è certamente positivo riscontrare che l'adozione di iniziative di sostenibilità, di vario tipo, risulta piuttosto diffusa sia nel campione di soggetti che hanno risposto al questionario, sia tra gli operatori che sono stati intervistati direttamente. Ciò si verifica nonostante la percezione generale sia che tali iniziative siano costose e non semplici da implementare e l'accreditamento sia impegnativo in termini di costi, tempi e complessità burocratiche. Il supporto pubblico in questo senso è percepito come limitato o insufficiente.

In secondo luogo, appare confermato che l'adozione di iniziative di sostenibilità può essere effettuata in un'ottica purpose-oriented (Caselli *et al.*, 2023), e quindi può essere intesa come come azione di CRS non orientata al profitto, ma può anche assumere valenza strategica (Kitzmueller e Shimshack, 2012). In particolare, gli obiettivi di tipo strategico sono più evidenti rispetto alle azioni orientate verso "l'esterno" dell'impresa, ossia che risultano direttamente percepibili da qualche categoria di stakeholders. Questo punto è confermato dal fatto che la numerosità di queste iniziative risulta correlata con i benefici percepiti rispetto alla performance dell'impresa. Tale correlazione risulta invece assente quando si considerino attività strettamente produttive, svolte interamente all'interno del perimetro aziendale, che tuttavia presentano comunque tassi di adozione alti. Non essendo evidente la correlazione con i benefici percepiti rispetto alla performance, appare ragionevole ritenere che tali iniziative siano implementate per motivazioni puramente sociali.

Alcuni degli intervistati sottolineano tuttavia che la fattibilità economica delle iniziative è un elemento che non può essere trascurato.

Il fatto che l'implementazione di iniziative di sostenibilità non sia sempre correlata con percezioni di miglioramento della performance, soprattutto quando tali iniziative riguardano attività interne al perimetro aziendale, può essere anche visto alla luce della difficoltà, segnalata da alcuni operatori, di comunicare efficacemente al pubblico il proprio impegno sociale o ambientale. D'altro canto, per un'impresa che persegua obiettivi socio-ambientali, uno sforzo di implementazione di azioni strategiche in merito alla comunicazione appare imprescindibile (Siano, 2012). Un supporto valido e accessibile, in questo senso, può essere rappresentato dalla comunicazione digitale, che risulta ampiamente adottata nell'ambito del campione considerato. Anche lo strumento delle certificazioni sarebbe, in linea di principio, orientato alla comunicazione dell'impegno dell'impresa in iniziative sostenibili. Tuttavia, anche se nell'ambito del campione risulta piuttosto diffusa l'adozione di certificazioni ambientali (meno interesse sembrano riscuotere invece le certificazioni sociali), alcune imprese lamentano come questo strumento possa non essere sufficiente per effettuare efficaci confronti tra imprese. Quindi lo strumento non sembrerebbe particolarmente utile a supporto di una strategia di differenziazione. In effetti, la scelta di possedere almeno una certificazione non presenta

relazioni sistematiche con l'efficacia percepita delle iniziative di sostenibilità in termini di performance aziendale.

Quest'ultimo elemento, la percezione dell'efficacia sulla performance, mostra invece una relazione positiva con la dimensione dell'impresa (misurata in termini di output prodotto), suggerendo un vantaggio "di scala" nell'adozione delle misure considerate (che conseguentemente appaiono meno "accessibili" per le imprese più piccole). Infine, l'adozione di iniziative sostenibili è ritenuta più efficace dalle imprese più giovani, e meno dalle imprese presenti sul mercato e sul territorio da lungo tempo. E' del resto ragionevole immaginare che le cantine storiche fondino il loro vantaggio competitivo su un marchio conosciuto e con un'identità consolidata, oltre che su processi produttivi tradizionali. Rispetto a questa categoria di produttori, quindi, un maggiore orientamento alla sostenibilità potrebbe non essere associato a benefici percepibili.

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Exploring fans' social identities, emotional attachment and subjective identity: A social identity approach to Italian football consumer-brand identity

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Abstract

Frame of the research. *Emotions are crucial elements in sports spectatorship and understanding in-depth how they characterized stakeholders' experiences is crucial for better addressing marketing and communication strategies.*

Purpose of the paper. *Adopting the social identity approach, this study explores the intense role of emotional attachment in football fans concerning the identification with the team (i.e. fanship) and with the fellow fans (i.e. fandom); fans' subjective well-being perceptions is also investigated here.*

Methodology. *22 semi-structured interviews were individually conducted with fans of two Italian Serie A teams. Both convenience and snowball sampling were performed to recruit diverse participants. A manual coding was conducted via NVivo 14 software.*

Results. *No major discrepancies between fans of the two teams were observed in terms of fanship, except for a sense of higher identification with the city for fans of the team sharing the name with the hometown. Although one team expressed more considerations relatively to other fellow fans, these considerations were frequently oriented to detaching from specific political sub-groups. Fans of both teams underline both the positive and negative emotions attached to the beloved teams; obsessive and irrational attitudes are highlighted and refer to the feeling of feeling protected and safe with respect to the problems of daily life (i.e., sheltered) and the need to vent.*

Managerial implications. *Understanding how fans personally communicate their distinct identifications either with the team or with the surrounding fan community as well as the peculiarities of their emotional attachment to the team might be highly beneficial for marketers and managers working in the football industry.*

Originality of the paper. *This study investigates both fanship and fandom and explores the role of emotions in team identification through in-depth qualitative research methods. Furthermore, it fills the gaps concerning team identification research in the Italian football-centric sports system.*

Key words: *social identity approach; fanship; fandom; brand identity; emotional attachment to the team; subjective well-being.*

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1. Theoretical Background

1.1 Social identity approach, sports fanship and fandom

Drawing from both self-categorization and social identity theory (Tajfel, 1981; Tajfel & Turner, 1979), the Social Identity Approach (SIA) assumes that individuals internally aim for their self-concept to be favourable. Since personal and social identities coexist within the self-concept, groups are crucial social platform for this aspiration; more precisely, the self-concept is shaped and enriched by social identities emerging from memberships in groups in which individuals feel and desire to belong to (Tajfel & Turner, 1979). According to the SIA, group identity is defined as "that part of the individuals' self-concept which derives from their knowledge of their membership of a social group/s together with the value and emotional significance of that membership" (Tajfel, 1981 p. 255). This description of social identities evokes (a) the cognitive, (b) the evaluative, and (c) the emotional dimension of group identification.

Groups are distinguishable if four criteria are met: (a) a common identity is perceived to be shared; (b) a perception of being part of the same collective is shared as well; (c) interchangeability with other members is perceived; (d) two or more individuals are in line with the previous points (Turner *et al.*, 1987). Activating the relative identity, group membership, participation and activities enhance the possibility for members to distinguish from out-group individuals and stimulating the creation of 'us' and 'them' identification divide.

Within the broader sports industry, teams and relative fan communities are evident examples of groups as interpreted by the SIA (Reysen *et al.*, 2017, 2022; Reysen & Branscombe, 2010). Specifically, the way individuals feel connected to their beloved teams has been investigated through the theoretical lenses of the SIA, recognizing team identification as a proper group identity (Inoue *et al.*, 2017, 2019; Lock *et al.*, 2014; Lock & Heere, 2017); indeed, in the last three decades, team identification research has captured relevant academic attention in the sports management and marketing field (Lock & Heere, 2017) in relation to an extremely wide variety of variables including among other: (a) brand loyalty (Bauer *et al.*, 2005, 2008; Sato *et al.*, 2023); (b) perceived emotions and emotional support (Biscaia *et al.*, 2012; Inoue *et al.*, 2019). (a) fans' wellbeing (Inoue *et al.*, 2017, 2019; Yoshida *et al.*, 2023).

When applying the SIA, different sport consumer researchers place significant emphasis on the two-folded conceptualization of fan-team and fan-to-fan identifications (Lock & Heere, 2017). Reysen and Branscombe (2010) found a correlation and distinguished between fanship (degree of identification with the team) and fandom (degree of identification with fellow fans and the broader fan community of the team); particularly, the authors assumed fanship to be a personal identity - supported by the personal connection to the team according to the authors - and fandom to be a group identity. Different works from Reysen and colleagues found positive correlations between fandom and different forms of well-being (e.g., subjective, and psychological) (Reysen *et al.*, 2017, 2022). Although referring to attachment conceptualization, Yoshida and colleagues (2015b) reported a positive association between fans' bonding with the surrounding fan community and behavioural loyalty.

Differently from previous works (Reysen *et al.*, 2017, 2022; Reysen & Branscombe, 2010), we argue that reflecting fanship the most traditional understanding of team identification both fanship and fandom shall consider group identities. For the purposes of the current research, the labels of the two constructs will be retained, notwithstanding the theory-based different proposition. Group identities are here conceptualized as multidimensional in nature and be composed of behavioural involvement, cognitive awareness, interdependence and self in public and private evaluation. This study answers to previous call for further investigation of and comparison between fanship and fandom (Reysen *et al.*, 2022). Extant literature lacks a qualitative exploration of the two constructs and an extensive understanding of fanship and fandom within the Italian sport fan context; the current study aims at filling these gaps.

1.2 SIA, emotional attachment and subjective well-being in sports industry

SIA posits that group identification involves a significant degree of motional value and significance (Tajfel, 1981; Tajfel & Turner, 1979) and that as the identification with the group increases so does the degree of emotional attachment to the group (Bergami & Bagozzi, 2000; Paxton & Moody, 2003). Groups are deemed to offer opportunities for consumers to fulfil emotional attachment needs which are complementary to needs of belonging to a group (or brand) (Bhattacharya & Sen, 2003). Emotional attachment to a team appears to consist in: (a) the cognitive involvement of an individual toward the group (i.e., investment); and (b) the emotional perceptions received from the group (i.e., dividend) (Dwyer *et al.*, 2015; Paxton & Moody, 2003).

Emotional attachment is a supporting element in the identification process of sports fans with a team or more broadly with a sports-related consumptive object. Indeed, in the Psychological Continuum Model (Funk & James, 2001) attachment is a fundamental stage in fans' cognitive connection to the team, with affective dimensions distinguishing attraction from attachment.

Furthermore, perceived emotions are crucial elements in the development of the emotional attachment of sports fans (Dwyer *et al.*, 2015; Paxton & Moody, 2003). Several empirical studies affirm the impact of discrete emotions (Biscaia *et al.*, 2012) and emotional support (Inoue *et al.*, 2019) on the relationship fanship and well-being. Inoue and colleagues (2017) noted that life satisfaction is influenced by both sports event attendance and emotional support mediating team identification. Inoue, Wann, Lock and colleagues (2019) observed that, together with sense of belonging, SWB was enhanced by perceived emotional support among American older adults; in turn, fanship and match attendance were investigated and confirmed as drivers of emotional support perceptions (Inoue *et al.*, 2019).

Being group identification and membership driven by self-esteem-enhancing desires (Tajfel, 1981; Tajfel & Turner, 1982), the positive association between sports-related fanship and socio-psychological wellbeing does not come as a surprise (Wann, 2006; Inoue 2017, 2019). Importantly, it has been underlined the crucial mediating role of social activities and interactions (e.g. live game attendance) in strengthening of this association (Inoue *et al.*, 2017, 2019; Reysen *et al.*, 2017, 2022; Wann, 2006). These findings support the SIA-based research on health and well-being which is grounded on the concept that group and relative identifications provide psychological resources and mechanisms (including related experiential opportunities) for coping with detrimental, stressful, or disastrous situations (Jetten *et al.*, 2017)

Concerning fandom, earlier work from Reysen and Branscombe (2010) indicated a positive correlation between both fanship and fandom with happiness perceptions; however, recent research found only fandom to significantly associate with psychological well-being through the mediation of friendship volume and participating in social activities (Reysen *et al.* 2022).

Since Reysen and colleagues (2022) highlighted the research gap surrounding fandom and well-being, this research aims at extending this line of research by qualitatively exploring not only fandom- but also fanship-induced well-being perceptions. Moreover, the current study answers previous calls for expanding the scientific knowledge concerning sports fans' emotional attachment to the team and the relative connections with their identification processes (Dwyer *et al.*, 2015)

1.3 Brand identification, emotional attachment to the brand and consumer well-being

Drawing both from the SIA, a line of research has been exploring the connections between fanship, fandom and brand identification (Heere *et al.*, 2011; Heere & James, 2007; Yoshida et al 2015a, 2015b). In the beginning, this research stream focused on the effects of multiple associated group identities on fanship and consequential behavioural outcomes (Heere *et al.*, 2011; Heere & James, 2007). Furthermore, different works have explored antecedents and consequences of fan community identification (in this study, fandom) (Yoshida *et al.* 2015a, 2015b). In the contexts of Japanese professional football and baseball, fan community identification had a significant association with

team brand equity and four behavioural consequences: positive word-of mouth, fan community engagement, member responsibility, and customized product use (Yoshida *et al.*, 2015a).

Bauer and colleagues (2005; 2008) found that football club fanship stands as most significant symbolic brand benefit predicting loyal attitudes toward the team brand (2005). Stadium attendance, news media consumption, club-related merchandise purchasing and wearing club colours appeared to be the most consistent loyal among football fans (2008). The specific motions connected to football brands need to be considered as key experiential benefits (Bauer 2005; 2008).

Furthermore, rooted in attachment theory (Bowlby, 1982), brand attachment has been conceptualized and investigated as "an emotion-laden target-specific bond" between a consumer and a brand (Thomson *et al.*, 2005) p. 78). Previous studies identified a strengthening effect of emotional attachment to the brand in the relationship between brand identification and customer loyalty (Hallberg, 2003). In particular, in conditions of high cognitive investment with a club is expected to positively influence consistent behavioural loyalty suggesting an irrational, sacrifice-like engagement to the team (Dwyer *et al.*, 2015; Ladhari *et al.*, 2015).

Loyal behaviours of consumers were found to be predicted by the interaction between consumers' identification with the brand and satisfaction with the sports products and services (Bodet & Bernache-Assollant, 2011; Matsuoka *et al.*, 2003). Satisfied consumers tend to witness high level of consumer well-being (Lee *et al.*, 2002) and, in turn, engage more with the brand. Being spectatorship fundamentally based on experiential products and services, these last considerations are heavily amplified among identified fans. Indeed, Sato and colleagues (2023) recently investigated the relationship football fans' identification with supported brands and perceived happiness. Findings underlined a positive association particularly through direct event experience (Sato *et al.*, 2023). Similarly, a study focusing on football fans in Portuguese La Liga reported a positive direct association between feelings of joy and advantageous behavioural intentions towards the team (Biscaia *et al.*, 2012); satisfaction and behaviours were found positively associated as well. (Biscaia *et al.*, 2012).

This study draws from existing literature for exploring football brand identification and brand fan community as intertwined with fanship and fandom and interacting with fans' emotional attachment to the team (brand) and well-being. In particular, it is in the purpose of this research to identify specific emotions attached to football brands and how these emotions affect the shared perception of clubs (Lee *et al.*, 2018).

1.4 Football fans in Italy

In the Italian sports context, football represents by far the most practiced sport with 26% of registered athletes belonging to the Federazione Italiana Giuoco Calcio (FIGC) (CONI, 2020). This percentage places Italy well above (by 17 percentage points) the average interest of the populations of the thirteen major world nations/economies (FIGC, 2023). Within the approximately 34 million stakeholders, just over 24 million are people who can call themselves 'fans' (Stage Up/Ipsos, 2023). It seems clear, then, how in Italy soccer no longer represents just a game but has become a form of culture and impersonation of values and bonds, not forgetting the relational aspect that makes it an easy topic of discussion in any context (Deloitte, 2023). In addition, this sport creates a strong bond between the people, the territory, and the communities in which the fan and his or her team fit. Ultimately, this sector has a significant socio-economic impact benefiting the country Italy, which can be estimated at over 4.5 billion euros, with total direct revenues of 5 billion euros and an estimated impact on GDP of over 11.1 billion euros (FIGC, 2023).

2. Research questions

Building on the assumptions just reviewed, we asked the following research questions:

1. How do fans describe themselves in terms of fanship and fandom? Which are the common

features?
2. In terms of emotional attachment, how do football fans perceive to emotionally invest in and receive from the supported team?
3. What are the emotions associated with the identified team/brand)?
4. How do football fans describe themselves in terms of subjective well-being (SWB)?

3. Methods

We used an exploratory, qualitative study design based on the administration of semi-structured interviews. Italian SS Lazio and AS Roma fans were interviewed on topics such as identity, emotional attachment, and well-being. Participants were recruited using the convenience sampling method and then using the snowball sampling. Table 1 shows participants recruited by convenience methodology as known (K) and those recruited by snowball methodology as unknown (U). Beginning in March 2023, fans were contacted direct call and were informed about the research information and how the interview was administered. Those contacted were asked not to provide a telephone response, but to send confirmation of willingness to participate by message. Of the thirty people contacted, nineteen agreed to be interviewed, while the other eleven declined the invitation or sent no message. Since January 2024, to equalize the number of interviews between the two groups analysed, a message was sent to an additional four AS Roma fans using the previously mentioned methodologies; three of them responded positively and the second step of interviews could then proceed.

3.1 Sampling and Participant

In the framework outlined above on the Italian sports context, we decided to interview SS Lazio and AS Roma fans who together, in the 2022/2023 season, represent about 10% of the total number of fans in Italy (SS Lazio fans: 684,000; AS Roma fans: 1,804,000) (Stage Up/Ipsos, 2023). The choice of these two clubs was dictated by several factors. First, as we have seen, SS Lazio and AS Roma are two of the top six teams by number of fans in Italy. The two selected clubs, being from Rome, therefore share the same environment and community representing a valid element to compare the two groups of fans. Both, then, share a similar sports history of few victories: SS Lazio, born in 1900, has won a total of 17 national and international trophies, while AS Roma, born in 1927, 18 national and international trophies. They do, however, have in common that they won their last Scudetto at the turn of the 2000s, in the 1999-2000 and 2000-2001 seasons, respectively. These commonalities are contrasted by some differences that have emerged in recent decades: in particular, SS Lazio has been led since 2004 by Italian businessman Claudio Lotito, while AS Roma since the 2011-2012 season has alternated between different groups of U.S. businessmen as owners.

The 22 participants who agreed to participate in the study are fans born and raised in the province of Rome. At the occupational level, among the respondents we have: eleven full-time employees, two part-time employees, two part-time independent contractor employees, one full-time independent contractor, three students, one freelance consultant, one freelance manager, and one sports contributor. Of the fans interviewed, sixteen were male and six were female, ranging in age from 22 to 64 years (mean age 35.4 years). The data of the participants and the date of their interview are shown in Table 1.

Tab. 1: Study participant

Participant Team/N°	Age	Gender	Known/Unknown	Occupation	Interview date
SS Lazio/1	28	M	K	Full-time employee	07/03/2023
SS Lazio/2	44	M	K	Full-time employee	07/05/2023
SS Lazio/3	29	F	K	Part-time/Independent contractor	07/05/2023
SS Lazio/4	31	M	K	Full-time employee	07/07/2023
SS Lazio/5	56	M	K	Independent contractor	07/08/2023
SS Lazio/6	56	F	K	Full-time employee	07-16-2023
SS Lazio/7	29	M	K	Full-time employee	07-19-2023
SS Lazio/8	28	M	K	Full-time employee	07-24-2023
SS Lazio/9	26	M	U	Student	10/08/2023
SS Lazio/10	50	M	U	Freelance/Consultant	10-16-2023
SS Lazio/11	52	M	U	Full-time employee	10-16-2023
AS Roma/1	29	M	K	Full-time employee	07/06/2023
AS Roma/2	58	M	K	Freelance manager	07/07/2023
AS Roma/3	64	M	K	Full-time employee	07/08/2023
AS Roma/4	26	F	K	Part-time employee	07/10/2023
AS Roma/5	28	M	U	Part-time employee	07/12/2023
AS Roma/6	26	F	U	Student	07-24-2023
AS Roma/7	22	F	U	Part-time/Independent contractor	08-16-2023
AS Roma/8	24	M	U	Student	08-16-2023
AS Roma/9	24	F	K	Full-time employee	01/09/2024
AS Roma/10	25	M	U	Full-time employee	01/09/2024
AS Roma/11	23	M	K	Sports associate	01/10/2024

Source: author' self-draft

3.2 Interview instrument

Semi-structured interviews were conducted for the study. The research team developed questions that reflected the themes analysed in line with the research questions. The questions were structured to learn about (1) participants' motivations for becoming a fan of their team, (2) the degree of personal identification with the team and identification with their team's fan community, (3) the degree of emotional attachment in terms of what one gives to the team and what one receives from the team, and (4) the level of well-being as a fan of their team and personally. All interviews were conducted between March 2023 and January 2024 by the first author except for the last three (all in January 2024) which were conduct-ed by the second author. The second author had been able to follow up on the last four interviews conducted by the first author to improve consistency. All interviews lasted between 20 and 55 minutes and were conducted digitally in Italian through Microsoft Teams. The interviews were all conducted individually, except for the Rome/7 and Rome/8 interviews, which were conducted in pairs. Each interview was recorded with the participant's permission.

3.3 Content analysis

The interviews were transcribed by the first and second authors and then subjected to cross-review to assess any errors or structural differences.

For the analysis of the emotions that fans give to and receive from their team, a frequency analysis was performed following the 7-factor model proposed by Lee *et al.* (Lee *et al.*, 2018). In a first step, the authors transcribed the emotions into a table and then proceeded to classify them into the 7 categories indicated by the authors.

To analyse the content of the interviews, 13 categories describing each construct taken into analysis were identified in the literature divided as follows: six categories for the Social Identity theme, two for the Emotional Attachment theme, and five for the Subjective Well-Being theme. In a first stage, for each category, the authors identified, discussed, and coded several subcategories using NVivo14 qualitative data management software. In a second stage, one of the two authors proceeded to check all identified references to exclude typos or errors. In agreement with Pereira and colleagues (Pereira, 2021), each piece of content included in a subcategory is defined as an "answer unit". In a third stage, the authors proceeded to eliminate from the analysis those subcategories that were reported by less than 20 percent of the fans. The threshold for each subcategory is 5 out of 22 fans

had to have talked about it.

In the results section we present, explain, and exemplify the 13 categories and corresponding subcategories that constitute the analysis system. The frequency of coded data is also specified for each category.

4. Results

4.1 Data analysis and findings

A total of 355 answer units were coded, including 151 for the Social Identity construct, 135 for Emotional Attachment, and 69 for Subjective Well-Being. For each construct we will report tables with the total number of answer units in each category and subcategory and the number of fans whose answers are included in each subcategory.

4.2 Results on Social Identity and Discussion

This research relies on a multidimension conceptualization of group (and social) identity (Heere *et al.*, 2011); in line with data concerning fanship and fandom are here framed in terms of: (a) behavioural involvement; (b) cognitive awareness; (c) interconnection of self with the group; (d) private evaluation; (e) public evaluation; (f) sense of interdependence with the group. Table 2 (Tab. 2) schematizes the response units and the number of fans whose responses are included in each subcategory regarding the fanship construct. Table 3 (Tab. 3) does the same regarding the fandom construct.

Behavioural Involvement refers to "the degree to which an individual engages in actions that directly implicate the group identity" (Heere *et al.*, p.413). In both fanship and fandom two subcategories consistently emerged, namely G*roup Participation* and S*tadium Attendance*. The former relates to the broad set of activities fans perceive to engage in the expression of their distinct social identities and this subcategory appears stable in both fanship (4 answer units in 3 Lazio fans, 2 answer units in 2 Roma fans) and fandom (1 answer units in 1 Lazio fan, 3 answer units in 3 Roma fans). *Stadium Attendance* was coded as the thematical set of considerations concerning the activities and involvement related to live game attendance. This subcategory appears strong in fanship-related behavioural involvement of fans transversally in both teams (4 answer units in 3 Lazio fans, 5 answer units in 4 Roma fans). Concerning fandom, *Stadium Attendance* subcategory emerged 4 times in 4 interviews with Roma fans and never with Lazio fans.

> "To me supporting Roma is going there, being with the people at the stadium, with the people I love or with people I can even meet directly there" (Roma/6, Fandom, *Stadium Attendance*).

While Behavioural Involvement appears to retain rather similar connotations in both fanship and fandom, these constructs diverge in terms of *Cognitive Awareness*. The latter has been defined as "the general awareness (or knowledge) that an individual has of the group" (Heere *et al.*, p.413). In fact, if for the construct of fanship we find similar values in the subcategories of *Being part of something bigger*, that is, identifying oneself through the team in something bigger than the individual self (for both fans 2 answer units in 2 fans), and *Leadership*, that is, identifying oneself in team members with particular charisma (5 answer units in 3 Lazio fans, 4 answer units in 4 Roma fans), it is in fandom that we find the greatest differences. Here, in fact, Lazio fans declare a strong identification with the fan group by referring to a real sense of *Family* (11 answer units in 6 Lazio fans versus 4 answer units in 3 Roma fans). The subcategory *Being part of something bigger* was also coded in fandom but, again, without differences (2 answer units in 1 Lazio fan, 3 answer units in 3 Roma fans. Last, the subcategory of *Identity Change* was coded as referring to the possibility of changing one's identity

as a fan due to personal or contextual factors. This subcategory does not show differences between the two fans (4 answer units in 2 Lazio fans, 3 answer units in 3 Roma fans), but it is interesting that more than 20% of the fans report this aspect.

> "Usually, it works the other way around, because in your youth you are agitated and then as the years go by, when family, work and other difficulties take over it tends to decrease, but for me it wasn't like that. Over the years, emotions have certainly increased" (Roma/3, Fanship, *Identity Change*)

> "There is a union and this also enriches being together, with the family, which can also be social with the family, if it belonged to some group; let's say my Lazio group, it's more of a family group than the group it was when I was twenty years old when I went to the North, to the Curva group" (Lazio/11, Fandom, *Family*)

In the category *Interconnectedness of Self*, i.e. "the degree to which the individual feels the group is a part of him- or herself" (Heere *et al.*, p.413), reference answer units were coded, but these did not meet the inclusion threshold specified by the authors in the methodology.

According to Heere *et al.*, *Private Evaluation* refers to "the positive or negative attitude an individual personally has toward the group" (Heere *et al.*, p. 143). Concerning fanship, the response units for the subcategory of *Identity Change* are similar for the two fans (5 response units in 4 Lazio fans, 6 response units in 3 Roma fans), while we note significant differences in the subcategory *Sport Results*, which is the level of identification with the team based on sports results. As many as 8 Lazio fans (12 response units) state that their level of identification is related to the results achieved; this aspect is also present among Roma fans but with lower values (6 response units in 4 fans). For Roma fans, a strong element of identification in the team is closely related to the city of Rome. The *City Identification* category was coded at 12 response units for 7 Roma fans and in no case for Lazio fans. For what is identification with fellow supporters, i.e., fandom, Lazio fans report a significant *Minority/Majority* sentiment, i.e., that related to identification in a particular group caused by a minority or majority feeling compared to others; in fact, we find 9 response units in 4 Lazio fans, while no response units for Roma. Notably, the coded response units always refer to the sense of minority that Lazio fans perceive; this feeling is in line with the data on the number of soccer fans in Italy presented by Stage and Ipsos in August 2023, which place Lazio in sixth place overall (behind Juventus, Inter, Milan, Napoli, and Roma) with an estimated 684,000 fans (or about 3 percent of the total) (Stage Up/Ipsos, 2023). Of particular interest is the analysis of the subcategory *Outgroup Derogation*, i.e., the tendency to show negative, sometimes deviant behaviour toward members of an identified outgroup. From this point of view, in Lazio fans, 5 response units were coded in 5 different fans, compared to the single response unit in Roma fans. This aspect may be related to the minority sentiment mentioned earlier.

> "Being a fan of A.S. Roma is like loving the city of Rome; for me the two things are profoundly related" (Roma/6, Fanship, *City Identification*).

> "When I was a boy, we were always inferior in numbers. This thing gave me more pride the fact of being inferior in numbers." (Lazio/11, Fandom, *Minority/Majority*).

> "Lazio fans benefit from the club history and from being an historical multisport club; on the other hand, Roma fans are very attached to game results and hold absurd expectations which often are actually crazy. Roma fans are indeed only ordinary fans" (Lazio/4, Fandom, *Outgroup Derogation*).

Public Evaluation refers to "the perceived positive or negative attitude of non-members toward the groups by the individual" (Heere *et al.*, p.413). For the team identification aspect, Lazio and Roma fans also report a *Minority/Majority* feeling here. Referring to a different construct, this subcategory modifies its meaning by referring to identification in a particular team caused by a minority or majority feeling compared to other teams. With this meaning, the subcategory is minimally present for both fans (2 response units in 2 Lazio fans and 1 response unit in 1 Roma fan). Regarding fandom,

we find an interesting result. Lazio fans alone, in fact, declare a detachment from what are the group dynamics related to the fan group. In this sense, the subcategory *Detachment from the ultras*, was coded with 14 the response units in 4 fans, with references mainly to the extremist political current and their sexist behaviours within the curve.

> "I feel like a Lazio fan, as everyone feels, but I don't feel like it when we start talking about political ideology which unfortunately they put on the field in the stands every Sunday" (Lazio/1, Fandom, *Detachment from the ultras*)

The last category analysed is Sense of Interdependence with the Group, which is based on an ingroup members' awareness of having a shared fate and belonging to the same social group (Heere and James 2007; Heere *et al.*, 2011). For the subcategory *Shared Fate*, which is when members of a group recognize that they have a common path and when they recognize that they are treated equally within the group, similar numbers were coded for the fanship construct (4 answer units in 2 Lazio fans and 3 answer units in 3 Roma fans). In the fandom construct, on the other hand, the aspect of sharing a common path and within the group is an element coded for Roma fanship only (4 answer units in 3 fans). It is evident, then, how both fans identify with their team's path, while only the Roma fans identify with their own fan group. This aspect is in line with the analysis of the *Detachment from the ultras* subcategory done in the *Public Evaluation* category of the fandom construct.

In aggregate terms, for fans' identification with their team (fanship), the answer units are similarly distributed (36 for Lazio fans and 43 for Roma fans). The main differences can be seen in the *Private Evaluation* category with Lazio fans identifying more with their team's results and Roma fans identifying more with the strong connection in terms of name, colours, and symbols with their hometown. In contrast, regarding fans' identification with the group (fandom), we note a clear prevalence of answer units in Lazio fans (46 for Lazio fans and 23 for Roma fans). This prevalence is generated in the *Private Evaluation* and *Public Evaluation* categories. Lazio fans state that their identification with the fan group depends on feeling that they are in a minority situation compared to other teams, plus they do not identify with the attitudes of other fan groups. At the same time, however, Lazio fans distance themselves from certain behaviours that part of their fan base disavows, such as joining political groups or sexist initiatives at the stadium.

Tab. 2: Social Identities - Fanship

		SS Lazio		AS Roma	
Construct	Categories	Subcategories	n° answer units/fans	Subcategories	n° answer units/fans
Social Identity - Fanship	Behavioural Involvement	*1) Group Participation* *2) Stadium Attendance*	*4/3* *4/3*	*1) Group Participation* *2) Stadium Attendance*	*2/2* *5/4*
	Cognitive Awareness	*1) Being part of something bigger* *2) Leadership*	*2/1* *5/3*	*1) Being part of something bigger* *2) Leadership*	*2/1* *4/4*
	Interconnection of Self		----		----
	Private Evaluation	*1) Identity Change* *2) Sport Results*	*5/4* *12/8*	*1) Identity Change* *2) Sport Results* *3) City Identification*	*6/3* *6/4* *12/7*
	Public Evaluation	*1) Minority/Majority*	*2/2*	*1) Minority/Majority*	*1/1*
	Sens of Interdependence	*1) Shared Fate*	*4/2*	*1) Shared Fate*	*3/3*
		Subtotal of answer units	**36**	**Subtotal of answer units**	**43**

Source: author' self-draft

Tab. 3: Social Identities - Fandom

		SS Lazio		AS Roma	
Construct	Categories	Subcategories	n° answer units/fans	Subcategories	n° answer units/fans
Social Identity - Fandom	Behavioural Involvement	*1) Group Participation*	*1/1*	*1) Group Participation* *2) Stadium Attendance*	*3/3* *4/4*
	Cognitive Awareness	*1) Being part of something bigger* *2) Family* *3) Identity Change*	*2/1* *11/6*	*1) Being part of something bigger* *2) Family* *3) Identity Change*	*3/3* *4/3*
	Interconnection of Self		*4/2* ----		*3/3* ----
	Private Evaluation	*1) Outgroup Derogation* *2) Minority/Majority*	*5/5* *9/4*	*1) Outgroup Derogation*	*1/1*
	Public Evaluation	*1) Detachment from the Ultras*	*14/4* ----		----
	Sens of Interdependence		----	*1) Shared Fate*	*4/3*
		Subtotal of answer units	**46**	**Subtotal of answer units**	**23**

Source: author' self-draft

4.3 Results on Emotional Attachment and Discussion

As outlined in theoretical review, emotional attachment to the team has been framed in terms of two factors which this works refers to, namely emotional investment and dividend (Dwyer *et al.* 2015). Emotional investment consists of the "cognitive feelings a fan puts into the team" (Dwyer *et al.* 2015, p. 575). From this point of view, as visualized in Table 4 (Tab. 4) there was a greater investment of feelings by Lazio fans with 54 answer units compared to 33 by Roma fans. The answer units were coded into 3 subcategories.

Tab. 4: Emotional Attachment - Investment

		SS Lazio		AS Roma	
Construct	Category	Subcategories	n° answer units/fans	Subcategories	n° answer units/fans
Emotional Attachment	Investment	*1) Game-Related* • Pre-Game • In-Game • Post-Game *2) Group-Related* • Stadium Attendance • Group Participation *3) Person-Related* • Obsession • Time • Expectations	*12/5* 7/4 4/3 1/1 *7/4* 5/3 2/2 *35/10* 22/7 7/4 6/3	*1) Game-Related* • Pre-Game • In-Game • Post-Game *2) Group-Related* • Stadium Attendance • Group Participation *3) Person-Related* • Obsession • Time • Expectations	*18/7* 7/4 4/3 7/4 *5/3* 3/1 2/2 *10/6* 4/3 2/2 4/2
		Subtotal of answer units	**54**	**Subtotal of answer units**	**33**

Source: author' self-draft

The first subcategory is *Game-Related* and to team results, that is, the feelings that each fan feels invested in their team before, during, or after a game or after a series of specific results or events. As can be seen from Table 4, the difference between the two fans (12 answer units in 5 Lazio fans, 18 answer units in 7 Roma fans) is due to an involvement of Roma fans in the *Post-Game* phases, while in the *Pre-Game* and *In-Game* phases the response units do not differ.

"The match is a situation where you can allow yourself to rejoice and suffer freely, not like in other social contexts" (Roma/1, *In-Game*)

The second coded subcategory is related to *Group-Related* emotional investment, that is, the feelings each fan shows toward their team in relation to group involvement situations. In this subcategory we note a slight majority of answer units in Lazio fans (7 answer units in 4 Lazio fans, 5 answer units in 3 Roma fans). *Group Participation* dynamics do not differ, while Lazio fans invest feelings when experiencing stadium dynamics (*Stadium Attendance*).

"There are emotions I felt at the stadium that I would have a hard time describing to you, but I haven't felt those emotions anywhere else" (Lazio/1, *Stadium Attendance*).

The third subcategory is the one called *Person-Related*, which is the one related to emotional investment linked to personal motivations toward the team. The differences in this subcategory are obvious: the answer units coded for Lazio are significantly higher than those for Roma (35 in 10 Lazio fans, 10 in 6 Roma fans). This discrepancy is evident in the section called *Obsession*, which is the feeling of true obsession that fans feel toward their team, but it is also evident in the other two sections, *Time* and *Expectations*. The most eye-popping result, however, is the fact that 10 out of 11 Lazio fans surveyed fall into this subcategory, denoting a strong personal aspect in what is Lazio fans' investment in their team.

"However, being a fan is a bit sick. As when you are in love and sometimes you don't realize that there it is an irrational part. Sometimes you ask yourself why I have to feel so bad?" (Lazio/10, *Obsession*).

Dividend refers to the "affective feelings derived from the team" (Dwyer *et al.* 2015, p. 575). In this category, however, coding of the interviews showed that Roma fans receive more feelings from their team than Lazio fans (29 Roma answer units versus 19 Lazio) (Tab. 5). As with emotional investment, response units have been coded into subcategories, but the subcategory *Person-Related* does not appear and we have added, only for Roma, the subcategory *City Identification*.

Tab. 5: Emotional Attachment - Dividend

		SS Lazio		AS Roma	
Construct	Category	Subcategories	n° answer units/fans	Subcategories	n° answer units/fans
Emotional Attachment	Dividend	*1) Game-Related*	*9/6*	*1) Game-Related*	*13/8*
		• In-Game	1/1	• In-Game	
		• Post-Game	8/6	• Post-Game	2/2
		2) Group-Related		*2) Group-Related*	11/8
		• Family	*10/6*	• Family	
		• Group Participation		• Group Participation	*12/4*
			7/4	*3) City-Identification*	
			3/2		4/2
					9/4
					4/3
		Subtotal of answer units	**19**	**Subtotal of answer units**	**29**

Source: author' self-draft

Again, the first subcategory is *Game-Related* and to the team's results. In line with what was seen in emotional investment, Roma fans report receiving more feelings from the team in the *In-Game* and *Post-Game* phases (13 answer units in 8 Roma fans, 9 answer units in 6 Lazio fans).

"I like sitting in front of the television and receiving feelings of tension, apprehension and joy which depend mainly on the result but sometimes also on the performance" (Roma/3, *Post-Game*).

The second subcategory is the one called *Group-Related*. In this subcategory in number of answer units differs little (10 answer units in 6 Lazio fans, 13 answer units in 4 Roma fans), but within it there are differences in sections. In particular, the dynamics related to the affective feelings received by Lazio fans turn out to be greater in terms of *Family*, i.e., the feelings in terms of a narrow sense of belonging, but less in terms of *Group Participation*.

> "Taking into account that I have passed on the tradition of Lazio and the relating passion to my son, sharing this passion and my emotions with him is intertwined a bit with my son's feelings" (Lazio/5, *Family*).

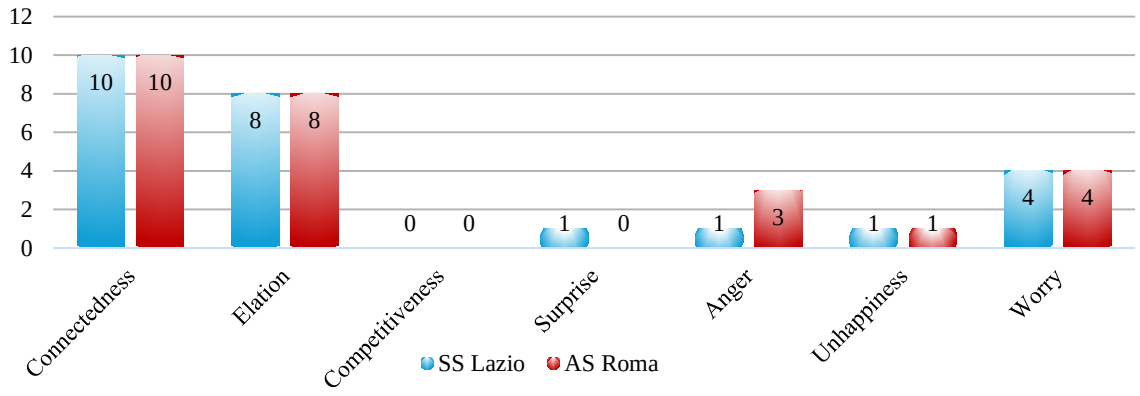
Finally, in the category of emotional dividend, coding has highlighted the subcategory of *City Identification*. As already seen for the Social Identity construct, this subcategory appears are among Roma fans (4 answer units in 3 Roma fans). Such evidence further highlights the strong connection to the city that Roma conveys to its fans.

> "Supporting Roma is like loving the city of Rome; for me the two things are profoundly related. [...] Whatever may happen I will always see in A.S. Roma the link with my city" (Roma/6, *City identification*).

From the results just presented, it is evident how there is a difference in what are the feelings that the two fans invest in their team (54 for Lazio fans and 33 for Roma fans). While Roma fans invest their emotions primarily around the match or a series of results, for Lazio fans they have a more personal emotional attachment to their team, to the point of obsession. Conversely, affective feelings derived from the team are higher among AS Roma fans (19 for Lazio fans and 29 for Roma fans). Underlying this result is greater involvement in *Game-Related* dynamics and the strong *City Identification* that the club conveys to its fans.

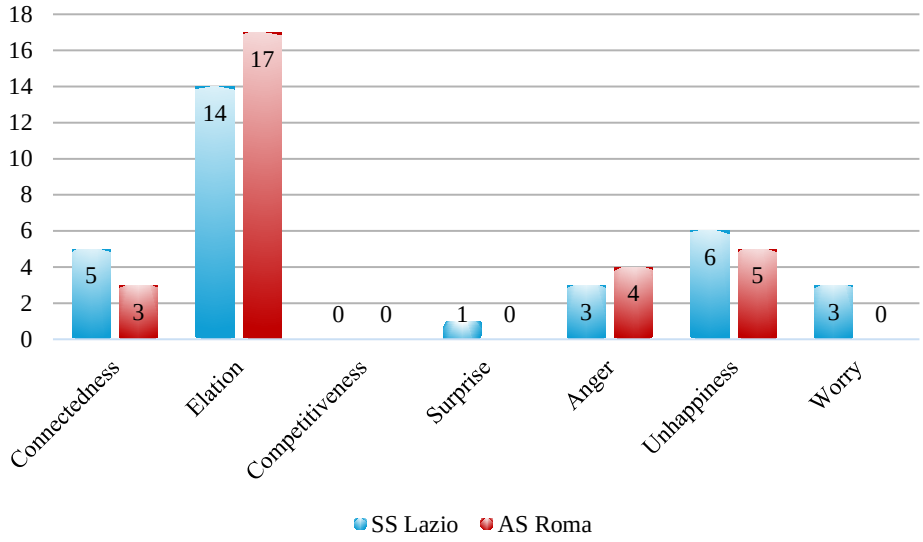
The analysis of the construct of emotional attachment, understood in its two categories of investment and dividend, offers an important insight into what emotions fans give and receive from their team. While a strong attachment to the city and match results shines through in Roma fans, Lazio fans show themselves to be more emotionally involved in personal dynamics with the team. To reinforce the expression of the fans' emotional investment and dividend, they were asked to describe the two categories with up to three emotions each. The classification of emotions was used proposed by Lee *et al.* (Lee *et al.*, 2018). This model consisted of 7 factors, each containing 24 emotions: connection (passion, longing, support, and connection), elation (happy, excited, satisfied, proud, optimistic, and amused), competitiveness (competitive and aggressive), surprise (amazed, surprised, and astonished), anger (annoyed, frustrated, and angry), unhappiness (suffering, sad, regretful, and disconsolate) and worry (fearful and anxious) (Lee *et al.*, 2018). All the emotions described by the fans fell within the distinctive ones in the proposed model, and the results in terms of frequency can be seen in Figure 1 for Investment and Figure 2 for Dividend.

Fig. 1: Fans' Emotions - Investment



Source: author' self-draft

Fig. 2: Fans' Emotions - Dividend



Source: author' self-draft

3.2 Results on Subjective Well-Being and Discussion

For what concerns SWB, Lui and Fernando (2018) provided a multidimensional conceptualization (and psychometric instrument) of the construct. This research relies on this framework and thus analyses the social, physical, financial, hedonic, and eudaimonic dimensions of SWB (Lui and Fernando, 2018). These dimensions were used in our research as analysis categories for each of which the relevant subcategories were coded (Tab. 6).

Tab. 6: Subjective Well-Being

		SS Lazio		AS Roma	
Construct	Categories	Subcategories	n° answer units/fans	Subcategories	n° answer units/fans
Subjective Well-Being	Social	*1) Family* *2) Group Participation*	*6/3* *2/2*	*1) Being part of something bigger* *2) Group Participation*	*2/2* *5/3*
	Physical		----		----
	Financial	*1) Expenditure Balance* *2) Work-Life Balance*	*2/2* *2/2*	*1) Expenditure Balance* *2) Work-Life Balance*	*2/2* *6/5*
	Hedonic	*1) Sheltering* *2) Sport Results* *3) Venting*	*5/2* *6/4*	*1) Sheltering* *2) Sport Results* *3) Venting*	*11/5* *6/6*
	Eudaimonic	*1) Habit*	*1/1* *6/4*	*1) Habit*	*4/3* *3/3*
		Subtotal of answer units	**30**	**Subtotal of answer units**	**39**

Source: author' self-draft

From the *Social* point of view, in line with the dynamics analysed above, we find differences between the two fans. Lazio fans declare social well-being mainly attributable to the subcategory *Family* (6 answer units in 3 fans) and minimally to the subcategory *Group Participation* (2 answer units in 2 fans). In contrast, Roma fans do not declare family well-being but, from a social point of view, find well-being from *Group Participation* (5 answer units in 3 fans) and *Being part of something bigger* (2 answer units in 2 fans).

In the category related to *Physical* Well-being, as was imaginable, reference answer units were coded, but these did not meet the inclusion threshold expected by the authors.

In the category related to *Financial* well-being, the two fans are very similar to each other on the level of *Expenditure Balance* (2 out of 2 answer units in both fans), but they differ regarding *Work-Life Balance* (2 out of 2 answer units in Lazio fans and 6 out of 5 in Roma fans). Roma fans, in fact, state that being a fan intervenes in some aspects of their work-life balance. This stems mainly from the weekly organization to follow the team in their sports commitments.

Hedonic Well-Being refers to the subjective evaluation of life circumstances and the balance between positive and negative emotions of each human being (Lui and Fernando, 2018). In this category, we identified three subcategories: *Sheltering*, *Sport Results*, and *Venting*. By *Sheltering* we mean the self-reported feeling of shelter and safety when cheering on their team. This aspect was coded into as many as 11 answer units in 5 different Roma fans compared to 5 answer units in 2 Lazio fans, indicating how for Roma fans this feeling plays a key role in their well-being as fans.

> "Once we start singing the anthem everything disappears for me. Even if I get to the stadium after I've had a bad day or it happens that I got angry at work or I'm sad, suddenly everything is cancelled out. [..] Going to the stadium it's as if I actually forget about my problems and I am able to enjoy the moment" (Roma/6, *Sheltering*)

More answer units were also coded in Roma fans (4 answer units versus only one in Lazio fans) in reference to *Venting* i.e., the feeling of venting that being a fan gives in terms of well-being.

> "At that point I was able to unload everything I had inside when I was at the stadium, and I let off steam; it was a real relief valve" (Roma/4, *Venting*)

As for *Sport Results*-dependent well-being, for both fans there were 6 answer units. It is evident how Roma fans associate well-being as fans with moments of venting and moments when they feel protected.

Eudaimonic well-being refers to the subjective experiences associated with eudaimonia or living a life of virtue in pursuit of human excellence (Niemiec, 2014). In this section, the fact that for four Lazio fans (for 6 answer units) and three Roma fans (in 3 answer units) consider they're being a fan a habit in their lives led us to include the *Habit* subcategory. Indeed, we believe that such activity that has become, precisely, habitual, gives value and meaning to the identity of the fans but also to their own lives.

> "It has now become a habit for me, something I am used to doing and every two Sundays, or rather now, with the midweek shift even more so. A part of who I am that I would definitely miss if it wasn't there" (Lazio/1, *Habit*).

In general, Roma fans most often link the level of well-being to their team (30 for Lazio fans and 39 for Roma fans). This is mainly realized in the *Hedonic* category. Here Roma fans report a greater sense of security and outlet in feeling like Roma fans, feelings also found in Lazio fans but to a lesser degree. The *Work-Life Balance* aspect also appears to be an important issue for Roma fans and less so for Lazio fans who instead see being a fan more as an established habit.

5. Implications, limitations, and future remarks

5.1 Theoretical Implications

The current research offers various elements of theoretical implications. To begin, contrary to existing literature concerning fanship and fandom which ad conceptualized fanship as a personal identification with team (Reysen & Branscombe, 2010; Reysen *et al.*, 2017, 2022), this study frames

and investigates both identifications as social identities; being fanship a mirroring construct of what has been broadly labelled as 'team identification' in sports consumer research (Wann, 2006; Reysen and Branscombe, 2010; Reysen *et al.*, 2022), this reconfiguration appears in line with the traditional SIA-based understanding of social identification with a team as developed in sports consumer research (Lock and Heere, 2017; Wann 2006). In addition, while previous studies on fanship and fandom have focused on structural equation modelling-based quantitative methodology, this study provides original in-depth qualitative understandings of these specific forms of sports consumers identifications, and the emotional values and significances attached to them (Tajfel &Turner, 1982). Thematic analysis followed a multidimensional conceptualization of group identity (Heere and James; Heere *et al.* 2011). Any significant subcategory (appearing in at least 5 interviews) was observed for interconnection of self; while previous studies this dimension has been considered under an affective understanding (Lock *et al.*, 2012), this research refers to a cognitive interpretation in line with existing research (Heere and James; Heere *et al.* 2011). Indeed, current results concerning the emotional attachment to the team denies the absence of the affective components in fans' social identities (Tajfel and Turner, 1982). Findings relative to sense of interdependence with the group highlight - although in a minimal way - that fans as ingroup members tend to hold an idea of shared purpose and fate. This confirms the idea that sense of interdependence is not a vital element of group identity, yet it may be part of it (Lock *et al.*, 2012).

Furthermore, this research answers previous calls for exploring emotional attachment to the team in the identification processes of sports fans (Dwyer *et al.*, 2015). as evidenced by the number of answer units as well as the number of emerged subcategories, this study outlines the significant preponderance of football fans to refer more to the (cognitive) investment side of emotional attachment with respect to the emotional dividend. Dwyer and colleagues (2015) suggested that this situation portrays an irrational form of attachment to the team which may be associated with enhanced consumptive behaviours as well as perceptions of personal sacrifice. This consideration is here supported by the emergence of O*bsession* as a consistent thematic subcategory, particularly among Lazio fans. In line with these findings, Vallerand and colleagues (2003) found that sports fans tend to retain obsessive passions and engagement even when they receive negative personal returns and sensations.

Finally, results highlight the fulfilment of venting and sheltering needs through fanship- and fandom-induced behavioural engagement. While sheltering might be translated into a superordinated aspirational need to belong to a group (Tajfel and Turner 1982), venting has been recently outlined as a coping strategy to diminish the effect of disadvantages outcomes Kim and Kim (2023). These findings support and extend SIA research to health and wellbeing which posits that group membership offers various psychological resources to cope with stressful and negative conditions (Jetten *et al.*, 2017).

5.2 Managerial Implications

As emotions and identifications are recognized as key brand benefits associated with football brands (Bauer, 2005, 2008), exploring and understanding these elements is fundamental in football club brand images. Clubs, marketers, and managers should profit from a strategic approach to fans' identification processes (symbolic benefit) and perceived emotions (experiential benefit), since positive emotions and strong identification are positively correlated with positive loyal behaviours toward the team (Bauer, 2005, 2008; Maderer *et al.*, 2016). The combination of interview-based data and frequency distribution of emotions concerned with personal cognitive investment and emotional dividend is here suggested as a research tool to provide in-depth knowledge relative to these key brand benefits.

Previous studies identified a strengthening effect of emotional attachment to the brand in the relationship between brand identification and customer loyalty (Hallberg *et al.*, 2003). In conditions of high cognitive investment with a club is expected to positively influence consistent behavioural

loyalty suggesting an irrational, sacrifice-like engagement to the team (Dwyer *et al.*, 2015; Ladhari *et al.*, 2015). Current findings extend existing knowledge concerning the cognitive-oriented investment and affective dividend of fans in the traditionally football-centric Italian sports industry. The overall predominance of cognitive investment dimension vis-à-vis the emotional dividend reflects mirrors the widespread behavioural (and financial) engagement with Italian fans and highlights (a) an implicit and widespread tendency to irrational engagement with the identified club (brand); and (b) a shared sensation of receiving back from the club less than the personal investment. Strategically targeting this sensation might positively develop clubs' shared image.

Clubs and managers are expected to aim at increasing perceived well-being of fans since service satisfaction was found to positively moderates (Matsuoka *et al.*, 2013) or even predict (Bodet and Bernache-Assollant, 2011) the relationship between brand identification and loyal attitudes of consumers. As highlighted in the findings, venting, and sheltering needs imply various opportunities managers and marketers can profit from. To stimulate emotional relief, both direct experiential (e.g. socialization and interactive areas around stadium area) and digital platforms (e.g. official social media pages) social connections might be promoted (Kim and Kim, 2023). Sharing emotional contents, reviving key moments, interfacing with fellow fans is expected not only expected to reduce negative emotions but also reinvigorate fanship and fandom (Kim and Kim, 2023; Reysen and Branscombe, 2010). Given the highly extended social visibility football clubs (particularly in Italy) benefit from, marketing and communication campaign might be focused on: (a) stimulating a sense of being 'sheltered', being protected by daily life problems, implicitly underlining a sense of belonging to the team and fans groups. (b) educating and promoting healthy ways to release emotional negativities after perceived disappointments. Monitoring social media platforms might be a functional way to capture the sentiment after key seasonal moments, events, or game-related negativities.

Finally, club specific emerging themes should be evaluated as threats and opportunities in the development of their brand images; for example, the presence of fans aligned with racist and neofascist fans within S.S. Lazio fanbase is perceived to obstacle fans' fandom and, consequently, the shared brand identity of the club. Targeting actual or potential problems in fanship and fandom perceptions is expected to ameliorate related brand identity. On the other hand, the strongly and widely perceived alignment between A.S. Roma club and the home city appears as a crucial asset enabling future marketing opportunities entailing multiple geographical group identities (e.g. city identification) (Heere and James, 2007).

5.3 Limitations and Future Research

The study has some limitations. The first concerns the sample since a low number of fans was reached in relation to the soccer fanbase in Italy. Future research should therefore verify the results obtained on a larger number of fans. A further limitation regarding the sample lies in the fact that the fans analysed share the same social, cultural, and especially urban context with the related commonalities and rivalries. Future research should analyse constructs among fans who do not share the same city and generate a comparison with other countries to see to what extent differences may exist on the issues of Social Identity, Emotional Attachment and Social Well-Being related to sports.

From a methodological point of view, one limitation lies in the manual coding and not through the automated software NVivo 14 because of the Italian language used in the interviews. In fact, the software does not provide automatic coding on Italian-language texts, so it was necessary to code answer units manually. The authors minimized possible discrepancies between the concepts of the constructs expressed in English and those expressed in Italian from the interviews.

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The interplay between perceived quality, sustainability attitudes, and consumers' modal choice in local transportation

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Abstract

Frame of the research. *Modal choice in urban and inter-urban mobility holds a significant potential impact on sustainable well-being across multiple dimensions (e.g., environmental impact, health, social equity). The reliance on private modes of transport has been associated with negative effects for individuals and society at large, but at the same time it is crucial to understand consumers' attitudes and their willingness to shift towards more environmentally friendly modes of transportation, such as for example local public transport.*

Purpose of the paper. *The purpose of the paper is to dig into motivations and strategies that may favour a modal shift from private cars to local public transport, focusing on the role of two main multidimensional and interconnected factors: perceived quality and individual sustainability attitudes. The consumers' perspective is integrated with the view of managers of the local public transport supply in order to derive meaningful implications.*

Methodology. *The research employed both quantitative and qualitative methods, including a self-reported survey targeting mobility consumers, from which 542 responses were collected. Additionally, 15 semi-structured interviews were conducted with operators of local public transport services.*

Results. *The findings suggest that perception of quality differs for high and low levels of sustainability attitudes. We also found differences in these attitudes for users and non-users. Environmental attitude also differed according to time preference. Strategies for modal shift were found to be heterogeneous and context-dependent. Our research findings can provide guidance for enhancing the appeal of local public transport for both current users and non-users with important implications in terms of sustainability and well-being for individuals and communities.*

Research limitations. *The empirical analysis can be extended by integrating revealed and stated preference techniques, allowing for a direct discrimination between the use of public and private modes, especially from the perspective of non-users.*

Managerial implications. *The current study presents an integrated approach, combining various managerial policies that concurrently promote improvements in service quality, use of sustainable approaches, and long-term planning. This approach aims to create a synergistic effect that facilitates modal shift.*

Originality of the paper. *The paper contributes to the general debate on how to promote well-being in a sustainable manner, highlighting the application of behavioural insights to the case of modal choice in local transportation. In particular, it proposes an empirical investigation that integrates the consumers' view with that of local public transport actors. To the best of our knowledge, this study represents one of the first attempts to examine at the same time perception of quality, sustainable attitudes, and time preference.*

Keywords: *modal shift; perceived quality; revealed preference; socio-environmental attitudes; sustainable well-being*

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1. Introduction

To date, air quality in European cities is increasing too slowly. The issue of air pollution extends beyond environmental concerns. Elevated concentrations of key air pollutants have been implicated in numerous health issues, contributing to overall population vulnerability and a deterioration in well-being for individuals and society at large. According to the European Environment Agency (2022a) "air pollution is the greatest single environmental health risk in the EU" and "around 96% of the EU's urban population remains exposed to levels of fine particulate matter that damage health". While there is no single cause, pollution from emissions is largely attributable to road transport and urban traffic, which still relies massively on private vehicles. According to the Organization for Economic Cooperation and Development (OECD, 2023, p. 3) "on average, energy industries generate 28% of greenhouse gase emissions in OECD countries, followed by transport (23%), manufacturing industries (12%), agriculture (10%), industrial processes (7%) and waste (3%). While the share of emissions from energy industries have slightly decreased since 2005, those from transport and agriculture increased".

At the same time, the use of the private car as a means of transport is linked to many negative aspects which are not limited to air pollution, but also have effects on the urban environment: congestion, use of physical space and consequent lack of parking, noise. For instance, excessive noise from transportation not only can have adverse effects on human health but is also disproportionately affecting those living in urban areas. According to the European Environment Agency (2022b), lower socio-economic individuals are more affected by pollution. This contributes to generate inequality in exposure to pollution and in turn negatively affects well-being (Fleurbaey *et al.*, 2014) and social justice (Hanratty & Farmer, 2012). The use of electric vehicles may not sufficiently support the reduction of these negative effects.

On the contrary, the use of public transport can reduce gas emission, relieve congestion, and enhance overall well-being as a broad concept: "a perspective on a good life that comprises access to basic materials for a good life, freedom and choice, health and physical well-being, good social relations, security, peace of mind and spiritual experience" (Díaz *et al.*, 2015, p 14). According to this view, well-being is regarded as a holistic concept that encompasses more than just the economic dimension of human development. Indeed, not only a strong connection between well-being, nature, and ecosystems exists (Roberts *et al.*, 2015) but individuals have also strong prosocial preferences (Bartolini, 2014; Bartolini & Sarracino, 2014; Camerer, 2011; Helliwell & Putnam, 2004). Innovative and sustainable business paradigms has been recently discussed by Kitchen (2020) and Tencati and Pogutz (2015). In present time, indeed, an integration of principles of sustainability within well-being is increasingly needed to balance the heterogeneity of needs of present and future generations with the preservation of the integrity of the natural resources. This have been recently define as *sustainable well-being* (Hellström *et al.*, 2015; Helne & Hirvilammi, 2015; O'Mahony, 2022).

Starting from this framework, different types of intervention need to be implemented to reduce the use of private vehicles and promote a modal shift to local public transport (LPT henceforth) which is considered here as a more sustainable means of transport, compared to private transport. In the present study, in particular, we investigated the relationship between modal shift, perceived quality, and sustainability attitudes in local public transport by means of both quantitative and qualitative data. First, we consider an efficient and high-quality transport system as an essential starting point for modal shift (Fraquelli, 2021). Moreover, we believe that pro-environmental and pro-social attitudes have a major role in the choice of less impact means of transport (Nilsson & Küller, 2000). An online survey was used to collect information regarding modal choice patterns and a revealed preference set of questions was used to explore the characteristics of LPT trips, particularly on the perceived quality of the service. In the online questionnaire, we also collected data about sustainability attitudes in terms of environmental and social well-being impacts of transfer modes. Furthermore, considering that the choice of transport mode can be strongly influenced by habit formation in consumption preferences, we included a time preference measure. Individuals with a low level of time preference may have greater self-control and in turn may be more available to delay gratification for sustainable

purposes. Next, we conducted semi-structed interviews among local public transport actors to deepen the reasons and motivations for modal shift towards LPT. Overall, our research findings can be of help in making the LPT more attractive for both actual users and non-users of the service with possible reduction of environmental impact and positive effects on sustainability and well-being for individuals and communities.

2. Literature review

Individual decision-making in the realm of transportation displays significant heterogeneity. According to classical theory, consumers are supposed to choose the mode of transfer that maximizes their utility, given their budget constraints and preferences. Nevertheless, the role of psychological, social, and environmental factors in shaping modal choice behaviour has become prominently in more recent year (Devika *et al.*, 2020; Mattauch *et al.*, 2016). Socio-demographic factors (such as age, income, etc.) can also have a role in consumption preference of transport (Muhtadi *et al.*, 2020).

Modal choice involves considering various factors (e.g., accessibility, costs, travel time, etc.) as well as understanding one's own preferences, which might be difficult to address. This can in turn give rise to possible cognitive bias negatively affecting the relationship between decision-making and well-being (Kahneman, 2003; Thaler & Sunstein, 2008). Furthermore, laboratory and field experiments had uncovered the importance of attitudes and behavioural patterns in predicting modal choice (John, 2017; Kahneman, 2003). Particularly, individuals may acquire habitual models based on past experiences and social influences (Duhigg, 2013) which can be difficult to break. Indeed, the demand for public transport services can be significantly influenced by various subjective factors. In this study, we will explore the impact of perceived service quality, sustainability attitudes, and time preference on individuals' choices.

To date, service quality attributes have been grouped into eight different areas: availability, accessibility, information, time, customer care, comfort, safety, and environmental impact (CEN, European Committee for Standardisation, 2002). These attributes have been extensively investigated (for a review see Ojo, 2019), particularly using stated and revealed preference methods (Bourgeat, 2015). The results showed that perceived service quality is of great importance in promoting and facilitating the use of public transport (Fraquelli, 2021) and, in association with certain attributes of the service such as timetables or comfort, is particularly helpful in engaging new users (Levinger & McGehee, 2008). Service quality has been also found to have influence on behavioural intentions or loyalty (de Oña, 2021). Nevertheless, subjective quality can significantly influence modal choice in absence of objective measures (Eboli & Mazzulla, 2012). Moreover, when a cognitive bias is involved, a change in the quality of services provided alone does not necessarily support the use of public transport. For instance, satisfaction in public transportation systems tends to be underestimated by car-use habits (Pedersen *et al.*, 2011). Heterogeneity between users and potential users' preferences have indeed been found (Bellizzi *et al.*, 2020).

The segmentation of travel consumers into groups sharing similar attitudes has been used to promote sustainable transport. For instance, Haustein and Hunecke (2013) showed that attitude-based segmentation can predict modal choice and support interventions for car-use reduction. More specifically, environmental and social attitudes seems to be connected with both use of personal transport and increase in public modes (Anable, 2005; Avineri & Goodwin, 2010; Cassar, 2023; Giubergia *et al.*, 2023; Nilsson & Küller, 2000). Pro-environmental individuals may be more likely to choose environmentally friendly transportation modes such as public transport, walking, or cycling especially when they are informed about the impacts of their transport choices (Lehner *et al.*, 2016). Anable (2005) reported that environmental attitudes and ecological norms can help in acceptance of car travel reduction and social value orientation have also a strong role in car use. High sustainability attitude may also enhance the use of LPT through service quality. Borhan *et al.* (2014) showed that

perception of quality differs for high and low levels of sustainability. One may suppose then that these attitudes may differ for users and non-users.

Finally, as noted earlier, low time preference may lead to increased engagement in long-term benefit plans (O'Donoghue & Rabin, 1999). This finding can have important implications in terms of sustainable modal choice, considering that future planning has typically a strong role in environmental and social well-being policies. On the contrary, high time preference can be related to present-bias and self-control issues which can promote assignment of greater weight to rewards that are closer in time and in turn affect cost-benefit analysis when considering the varying effort required by alternative transport modes (Mattauch *et al.*, 2016). Also, lack of self-control can prevent for time-consistent preference (Frederick *et al.*, 2002) and return to old habits is also possible considering that individuals often rely on default effects and are affected by inertia (Fujii & Kitamura, 2003) when choosing travel options. Please note that high- and low-level environmental concern individual may have different pattern of subjective time perception (Franzen & Vogl, 2013; Schaub, 2022).

Digging into the themes that have been presented, a deeper understanding of the factors that influence modal shift can be attained. This is essential for designing efficient and quality transportation systems that are also environmentally and socially sustainable, aiming to enhance overall well-being at individual, societal and institutional levels.

As underlined by Rasmussen *et al.* (2023, p. 2) "modal shifts take place when the decisions of individuals, known as behaviour, change […] promoting modal shifts by targeted policies requires an understanding of individual travellers' motives as preconditions for fulfilling needs and avoiding barriers". This study will particularly explore the relationship between modal shift and subjective factors. Understanding modal shift dynamics and identifying strategies to promote more sustainable transportation modes are essential for creating efficient, equitable, and environmentally sustainable transportation systems that meet the needs of present and future generations and designing effective communication.

3. Research methodology

3.1 Self-reported survey on mobility consumers

For this study, we used data from an online survey on LPT which we conducted among all members of the university community at an Italian University in the North of Italy.

The survey was administered by using Qualtric XM (https://www.qualtrics.com). Respondents received an invitation to participate via email using the newsletter of the staff and communication office. The survey remained open from June 26 to July 20, 2023. One reminder email to the survey invitation was sent approximately after two weeks. The questionnaire was completely anonymous and participation was entirely voluntary. The total number of subjects that completed the questionnaire was 542. The sample size is in line with that used in the field of transportation studies dealing with similar areas of research (e.g., Lizana *et al.*, 2021; Nesheli *et al.*, 2016).

3.2 Questionnaire design

To begin, all participants were presented with a disclaimer about the questionnaire and privacy policy. After the disclaimer was accepted, participants faced three different sections: modal choice and revealed preference survey on perceived quality, social-environmental sustainability attitudes and time perception, and socio-demographics. Data were analysed by using R x64 4.3.0 (R Core Team, 2023).

3.2.1 Modal choice and revealed preference survey on perceived quality

In the first part of the survey, participants were instructed to provide some basic information about their modal transfers and their level of satisfaction with them. We also asked all respondents to provide information about their use of LPT in the long-term (10-point Likert scale from 1 = not at all likely to 10 = extremely likely).

For participants who reported using LPT (we excluded those who stated that they never used the LPT and classified them as "non-users"), we also requested to report the type, reason, and satisfaction relative to the main mean of transport used. Then, we presented a revealed preference set of questions exploring the characteristics of their last LPT trip. More specifically, about their last trip assessment, respondents reported the (1) date, time, duration, and purpose for their last trip; (2) type of LPT and mean to source and from destination stops used; (3) type of ticket, (4) general level of satisfaction (10-point Likert scale from 1 = unsatisfied to 10 = very satisfied), and (5) evaluation of ten specific items that typically characterize the service quality: frequency, punctuality, comfort, cleanliness, personal security, information, staff, other passengers' behaviour, intermodality, and ticket's price (10-point Likert scale from 1 = not at all important to 10 = very important; from 1 = cheap to 10 = too expensive for ticket price). Regarding these ten different items, the subjects were required to evaluate the perceived service —that is, the satisfaction with the quality of the service provided on the last trip. As a result, we refer to these variables as perceived quality items (Fraquelli, 2021). We also had an additional item, disabled people services, which allowed as answer "not applicable". Since only around 50% of the subjects responded to this question, we analysed this item separately. At the end of the revealed preference section, the participants were questioned and asked to indicate the three most important parameters among the ten attributes.

Finally, for all subjects, including non-users, four open-ended items about the main reason for using and not using LPT and private transportation mode (i.e., car) concluded this section. The open-ended questions were intended for general feedback and, since non-users do not have experience with the use of LPT, they were surveyed about the reason that may them prefer an LPT over an individual transport mode rather than using LPT.

3.2.2 Sustainability attitudes and time perception

Firstly, an assessment of all participants' concerns about global warming was administered (10-point Likert scale from 1 = not at all concerned to 10 = very concerned). Secondly, the importance of the environmental as well as of the social well-being impact of the selected transfer mode was evaluated (10-point Likert scale from 1 = not at all important to 10 = very important). Thirdly, a time perception assessment, which was randomized across participants, ended this part of the survey. Particularly, respondents were invited to estimate the distance between today and the future (3 months, 1 year, or, alternatively, 3 years) on a 180-point scale (Zauberman *et al.*, 2009).

3.2.3 Socio-demographics

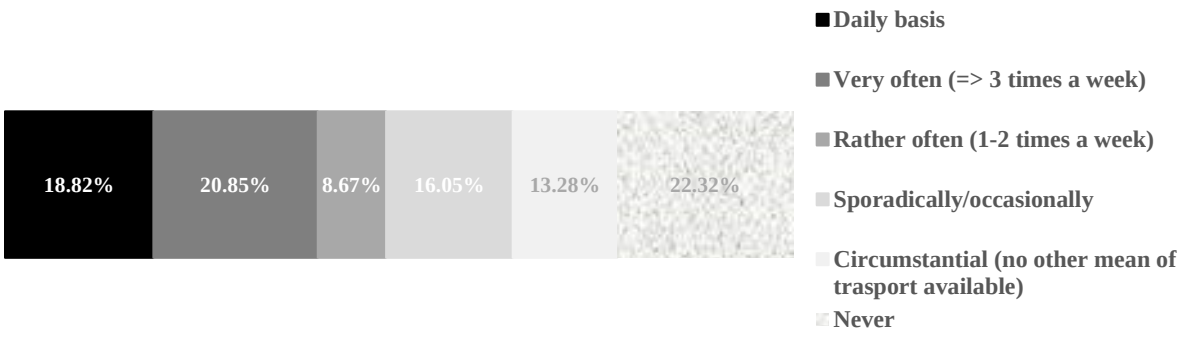
The final section of the questionnaire was mostly covered by standard socio-demographic and economic items (e.g., gender, age, education, and income). However, additional questions such as area of residence, use of smart working, and driver's license were included. Participants were also asked about their role in the university community. Table 1 presents the descriptive statistics. The sample is composed of 63% females and participants' mean age is 34.64 years (SD = 14.21). Furthermore, thirty-one percent come from periurban or rural areas and they mainly do not take remote work (53%), suggesting that they have to travel to their workplace. The sample is quite evenly distributed between students (56%) and non-students (professor, administrative staff, and others: 44%). Almost all participants have a driver's license (94%) and most of them are private car owners (68%). Moreover, the income level is mostly between low and medium (47%), whereas higher-level

education is prevalent (about 50%). Finally, as shown in Fig. 1, most of the participants can be considered frequent users. Indeed, the percentage of respondents who stated to use the LPT daily, very often, or rather often was 48.34%. The figure for those reporting occasional/circumstantial (i.e., sporadic users) or no use (i.e., non-users) of LPT was much lower (29.34% and 22.32%, respectively). The percentage of types of users (frequent, sporadic, and non-users) is reported in Table 1.

Tab. 1: Descriptive statistics of the socio-demographic variables of the sample

Characteristics	**Category**	**Statistics**
1. Area of residence	1 City Centre	32.47%
	2 Periphery	26.38%
	3 Suburban	9.96%
	4 Periurban/rural	31.18%
2. Time of residence	1 1 year	6.46%
	2 Between 2 and 5 years	9.23%
	3 Between 6 and 10 years	7.38%
	4 More than 10 years	76.94%
3. Gender	1 Female	62.73%
	2 Male	32.66%
	3 Non-binary	0.74%
	4 No answer	3.87%
4. Date of birth (number)		Mean = 34.64
		SD = 14.21
5. Educational level	1 Elementary school diploma	-
	2 Middle school diploma	0.55%
	3 High school diploma	43.54%
	4 Bachelor's degree	17.53%
	5 Master's degree	17.90%
	6 PhD	15.31%
	7 Other	4.98%
	8 No answer	0.18%
6. Employment status	1 Administrative staff	18.08%
	2 Professor	16.05%
	3 Student	55.72%
	4 Other	9.41%
	5 No answer	0.74%
7. Remote Working	1 Yes	8.30%
	2 No	52.95%
	3 Sporadically	16.42%
	4 Not applicable	22.14%
	5 No answer	0.18%
8. Family members	1 1	12.55%
	2 2	19.56%
	3 3	26.20%
	4 4	30.63%
	5 5 or more	10.70%
	6 No answer	0.37%
9. Drivers' license	1 Yes	93.73%
	2 No	6.27%
10. Private car	1 Yes	68.45%
	2 No	31.55%
11. Income level	1 Low	19.74%
	2 Between low and medium	47.23%
	3 Between medium and high	29.34%
	4 High	2.77%
	5 No answer	0.92%
12. Type of user (see Fig. 1)	1 Frequent users (daily, very often, rather often)	48.34%
	2 Sporadic users (occasionally, circumstantial)	29.34%
	3 Non-users (never)	22.32%

Fig. 1: Frequency of local public transport use



Source: our elaboration

3.3 Semi-structured interviews with LPT operators

We also developed a semi-structured interview to be administered to various local public transport actors: executives and managers of LPT companies (4 interviews); executives and managers of public administrations at various levels (municipal: 3 interviews; regional/provincial: 4 interviews); associations and LPT experts (4 interviews). The interviews were conducted in three cities located in the surroundings of the University. The interview protocol included five questions relating to: effectiveness/efficiency measures and cost management; service quality; reference to other realities and/or possible partnerships; strategies for potential new users; development plan. Given that the primary objective of the interviews was to uncover the reasons and motivations for modal shift towards LPT, our attention will be directed towards these findings. All interviewees signed a privacy disclaimer.

4. Results

4.1 Self-reported survey on mobility consumers

4.1.1 Modal choice results

In Fig. 2, we display the means of transport used by respondents (main, at the top of the panel, and all, at the bottom). Car, foot, and train have the most occurrences among all means of transport. As for the main means of transport, car and train were instead mostly selected.

The median level of satisfaction with the mean of transport used was 6.72 (SD = 2.35, mode = 7 (17.90%), 10-point scale). Moreover, as predictable, non-users will scarcely use LPT in the future (mean = 2.27, SD = 2.15, mode =1 (13.47%), 10-point scale). The use of LPT in the long-term was instead high for frequent users (mean = 7.39, SD = 2.28, mode = 10 (10.89%), 10-point scale) and medium for sporadic ones which seemed to be more undecided (mean = 5.24, SD = 2.15, mode = 6 (4.98%), 10-point scale).

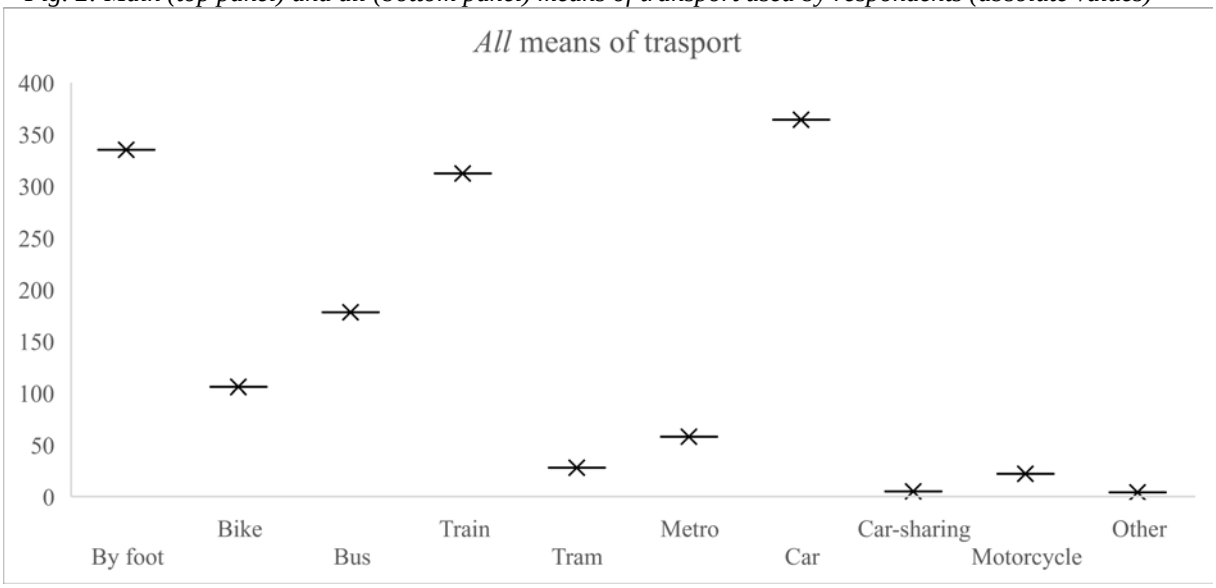
For participants who reported using LPT (N = 421 out of 542), the main purposes for use were study and work, whereas train and bus were the most frequently selected means of LPT. Alongside, the mean level of general satisfaction with the main means of TLP was 5.52 (SD = 2.08, mode = 6 (21.38%), 10-point scale). This finding suggests that the level of satisfaction is barely sufficient.

Lastly, all subjects were asked to report the main reasons for non-use of LPT and for using or non-using a private car. Frequent and sporadic users were also questioned about the purpose of using public transport, whereas non-users were surveyed about possible reasons for switching transfer mode (from private to public). The responses to these two last questions were combined into one (i.e., LPT use). As noted earlier, we used open-ended questions for general feedback and generated four

different word clouds, one for each open-ended question, to illustrate the main subjects' responses (Fig. 3; words with the largest size appeared most frequently). To generate the word clouds, the responses were pre-processed (Eldeeb *et al.*, 2023) by using: normalization, stop words and punctuation removal, tokenization, stemming, unnecessary words removal (e.g., city names, km, etc.), and Italian to English translation.

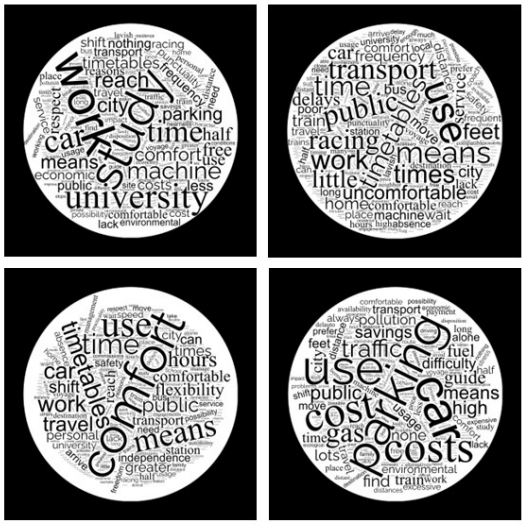
As for the non-use of LPT, respondents mainly refer to timetables and time in general underlying a general concern about being late and/or finding about finding their appropriate schedule. The use of the car is definitely tied with comfort, whereas its non-use seems to be connected with parking issues and maintenance costs. Finally, the use of LPT is reported in reference to work and study, suggesting that the participants prefer the local public transport to reach the university campus. Please note that, among the reasons for using LPT, one of the recurrent words is "nothing", indicating that some respondents (i.e., non-users) are struggling to find a simple or clear reason for using the local public services.

Fig. 2: Main (top panel) and all (bottom panel) means of transport used by respondents (absolute values)



Source: our elaboration

Fig. 3: World clouds for: (1) LPT use (left above panel); (2) LPT non-use (right above panel); (3) car use (left bottom panel); (4) car non-use (right bottom panel)



Source: our elaboration

4.1.2 Perceived quality results

As indicated earlier, for participants who reported using LPT, we administered a revealed preference survey about participants' last trip using local public transport. Three subjects were eliminated since they referred to a last trip which was not made by using LPT (i.e., car and foot). Table 2 displays the general characteristics of the last trip as described by respondents. The main purposes for the last trip resulted to be study and work, whereas the train was the means of transport most used, followed by bus, metro, and tram. These results are in line with the main purpose for general LPT use, as displayed before. The mean level of satisfaction with the last trip was 5.81 (SD = 2.00, mode = 6 (21.29%), 10-point scale). As for the disabled people services item, the mean score was 5.48 (SD = 2.44, mode = 6 (19.31%), 10-point scale).

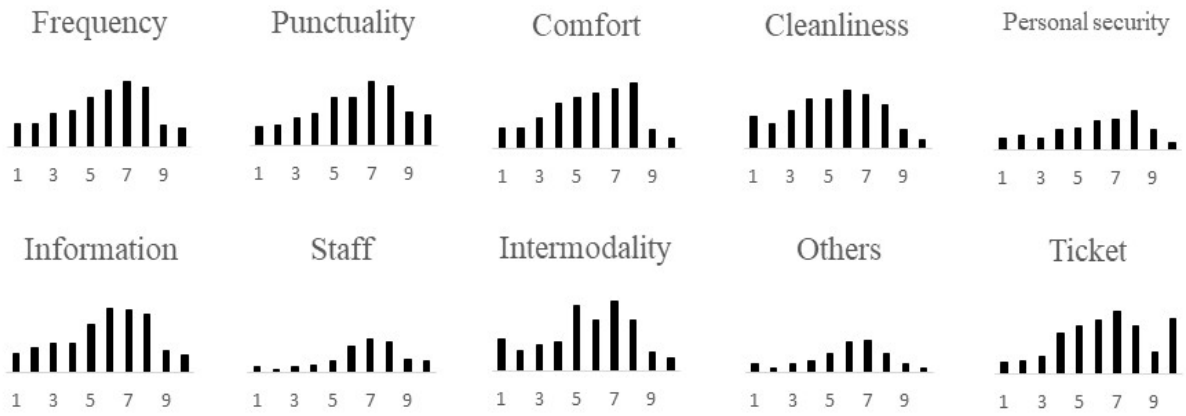
The summary statistics of the ten service quality attributes, as perceived by the respondents for their last trip, are presented in Table 3. We tested the quality of the items in the questionnaire by applying Cronbach's alpha as a measure of internal consistency which resulted equal to 0.90, thus indicating optimal internal consistency and reliability of the scale items. We also reported the distribution of the items in Fig. 4. The average rating for the different items was between 5.22 (cleanliness) and 6.65 (staff), with only three items achieving sufficiency (staff, ticket price, and punctuality). By using the ten perceived service items as regressors and the general level of satisfaction with the last trip as the dependent variable, we implemented an ordinal logistic model. Table 4 shows the output of the model. The base for the independent variables was set considering the mean value over the results obtained in Table 3 for the perceived quality items. Except for the variable staff, all items proved to be significant. The coefficients were all positive, except for price which has a negative effect on the dependent variable.

We also built a perceptual map to visually determine the critical gaps in the last trip experience (Fig. 5; for perceptual mapping as a marketing research tool see Palmatier & Crecelius, 2019; Schmalensee & Thisse, 1988). We set the relative importance of the ten perceived items on the vertical axis (%) and the mean level of satisfaction with them on the horizontal one (10-point score). The relative importance of the ten items was derived from participants' responses regarding the three most important parameters among the ten attributes. Please note that the score of the item ticket price was reversed (from 1 = too expensive to 10 = cheap) so that all items are represented in the map from lower to higher order. The map is divided into the following four quadrants: Invest, Communicate, Control, and Maintain. Invest and Communicate quadrants include crucial aspects that are not really appreciated and need investment (Invest) or are appreciated but require additional communication strategies (Communicate). In Control and Maintain, instead, we find aspects that need to be checked (Control) or preserved (Maintain).

As Fig. 5 illustrates, punctuality, frequency, and ticket price seem to be treated as different from the other seven items. These three items are indeed rated as the most important parameters (21.30%, 18.28%, and 14.47%, respectively; Tab. 3, last column) and appear to be visually distant from the other perceived quality attributes on the map. Firstly, punctuality is located between Communicate and Invest. This suggests that this quality attribute is important but not completely appreciated by the respondents. Prejudice about lack of punctuality in LPT services is common, however the survey reveals that this attribute achieves on average a sufficient score. Then, an investment in communication strategies may be a first step to reduce a-priori negative perceptions and increase the attractiveness of the public service. Frequency is the second most important attribute, and its evaluation is indeed below the reference point. As a result, it is the attribute where to concentrate the resources that could be invested. Thirdly, the ticket price is located between Control and Invest. On average, interviewees evaluate as too expensive the LPT services, despite alternative travel modes are usually more expensive. However, an intervention aimed at maintaining control over this quality attribute may be sufficient in this case. Implementing an intervention to improve frequency would be challenging to manage together with reducing ticket prices. Fourthly, the staff is the only item which is completely located in the Maintain quadrant. This result seems to be tied with the fact that this

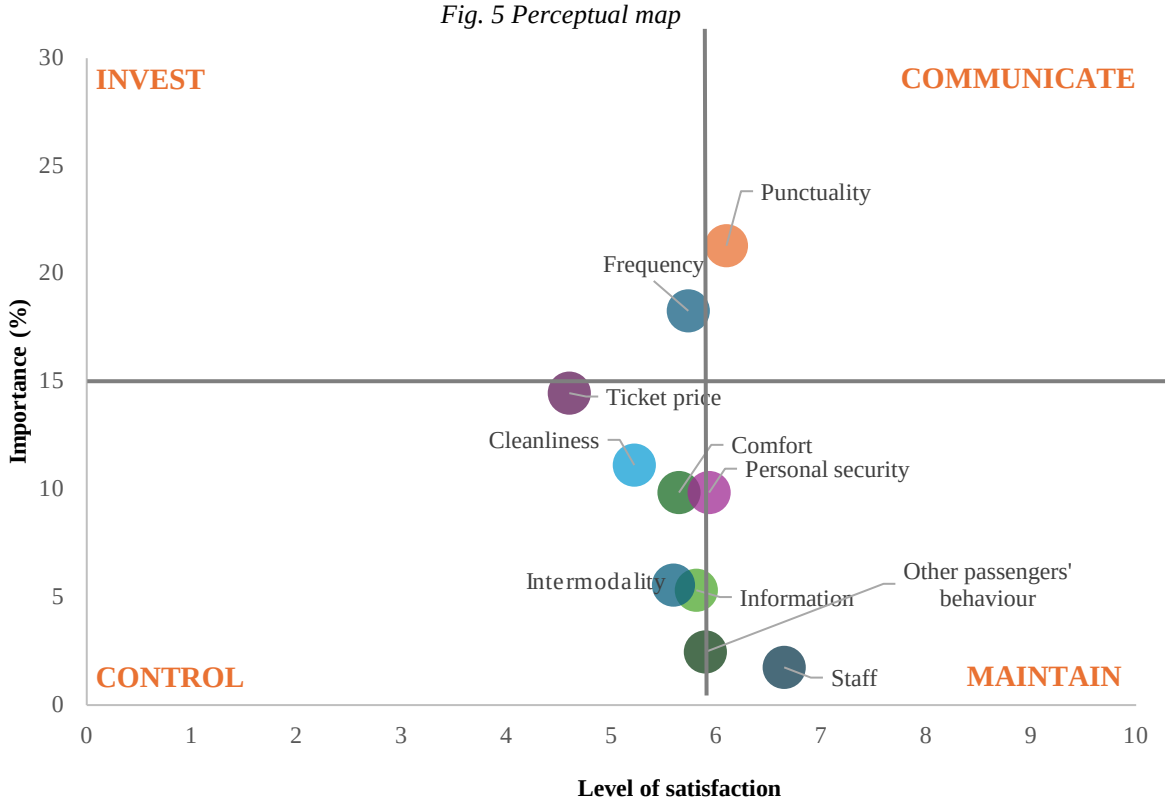
attribute did not seem to be of particular interest to the respondents (in both the regression and the question about the main important parameters) but it is evaluated the highest as a quality attribute (Tab. 3). In line with this view, it seems to be enough to maintain its actual level. Finally, despite being at different levels, the remaining items are in the Control quadrant suggesting that they all are to be considered as critical issues, especially cleanliness, comfort, and intermodality, and need to be checked. Personal security, information and other passengers' behaviour are instead near to Maintain and it would take a minimal effort to switch those attributes on the Maintain quadrant.

Fig. 4 Distribution of perceived quality items on the last trip (10-point scale)



Source: our elaboration

Fig. 5 Perceptual map



Source: our elaboration

Tab. 2: Last trip as described by respondents

Characteristics	Statistics
Date (main)	June and July, 2023
Time (main)	7:00 and 9:00 a.m.
Duration (main)	1 hour
Mean	Train: 62.44%% Bus: 30.62% Metro: 5.26% Tram: 0.72% Other: 0.96%
Main purpose	Work: 30.14% Study: 48.09% Family management: 4.78% Shopping: 0.48% Free time: 14.11% Other: 2.39%
Ticket	Single ticket: 32.20% Round-trip ticket: 26.08% One-day pass: 1.44% Season pass: 37.56% Other: 2.63%

Tab. 3: Summary statistics of the perceived quality items on the last trip (10-point scale)

Characteristics	Mean	SD	Mode	Mode %	Importance %[a]
1. Frequency	5.73	2.40	7	16.99	18.28
2. Punctuality	6.10	2.47	7	16.99	21.30
3. Comfort	5.64	2.28	8	17.22	9.86
4. Cleanliness	5.22	2.37	6	15.31	11.13
5. Personal security	5.93	2.43	8	19.14	9.86
6. Information	5.81	2.36	6	16.99	5.33
7. Staff	6.65	2.15	7	22.25	1.75
8. Other passengers' behaviour	5.89	2.16	7	21.77	2.46
9. Intermodality	5.59	2.38	7	18.66	5.56
10. Ticket price	6.40	2.42	7	16.75	14.47

[a] This column refers to the question on the three most important parameters among the ten attributes.

Tab. 4: Ordinal logistic model output (dependent variable = satisfaction with the last trip)

Perceived quality items (base = 1-6)	Coeff.	Std. Error	t-value	p-value
1. Frequency	1.48	0.27	5.57	<.001
2. Punctuality	1.40	0.26	5.40	<.001
3. Comfort	0.61	0.30	2.04	<.05
4. Cleanliness	1.06	0.30	3.54	<.001
5. Personal security	1.04	0.28	3.75	<.001
6. Information	1.18	0.25	4.74	<.001
7. Staff	0.25	0.25	1.03	=.30
8. Other passengers' behaviour	0.64	0.25	2.54	<.05
9. Intermodality	0.90	0.26	3.51	<.001
10. Ticket price	-0.54	0.18	-2.91	<.01
Residual Deviance	*1211.28*			
AIC	*1249.28*			
McFadden Pseudo R-squared	*0.30*			
N. Obs.	*418*			

4.1.3 Sustainability attitudes results

The sustainability attitudes were analysed by using three different approaches which will be addressed in the following sections. First, we further investigated the perceived quality of LPT services by jointly considering the role of respondents' attitudes in terms of social well-being and

environmental impact of the selected transfer mode. The global warming concern was also considered.

Moreover, we crossed the sustainability attitudes with the modal choice. Particularly, we check the type of user: frequent, sporadic, and non-users.

Finally, an exploratory analysis was carried out to assess the relationship between the environmental attitude of participants and their subjective time perception.

As noted earlier, sustainability attitudes may have a role in all the three different approaches used: (1) perception of quality may differ for high and low levels of sustainability attitudes; (2) sustainability attitudes may differ according to the type of user; (3) high- and low-level environmental concern individual may have a different pattern of subjective time perception.

4.1.3.1 Sustainability attitudes and perceived quality

To assess any relationship between the participants' overall evaluation of the ten perceived service quality items and the respondents' attitudes in terms of global warming concern and social well-being and environmental impact of the selected transfer mode, we used the mean value of the ten perceived quality items as dependent variable. At the same time, the participants were profiled about their sustainability attitudes. More specifically, they were treated as factors with two levels: high- or low-concern individuals, for global warming, and high- or low-importance individuals, for environmental and social well-being. Due to numerosity, the cut-off was set to 7 on a 10-point scale (summary statistics for sustainable attitudes are reported in Tab. 5). We then computed a non-parametric test of group differences (i.e., the Mann-Whitney U test) between the mean value and the three constructed dichotomous variables. The results are tabulated in Table 6. The results suggest that the fact to be more or less concerned about global warming did not influence the perceived quality results ($p = 0.19$). Nevertheless, the importance assigned to the environmental and social well-being of the selected transfer mode resulted in a significant influence on the overall perceived service quality ($p < .01$ and $p < .001$, respectively). Notably, for both environmental and social well-being attitudes, high-importance individuals tend to be more satisfied than low-importance ones (an average point difference). Particularly, for social well-being, high-importance subjects were more satisfied with all the perceived quality items, except for ticket price and punctuality which were evaluated the same by low- and high-importance individuals. As for the environmental variable, frequency, staff, comfort, and intermodality were more appreciated by high- than low-importance respondents.

Tab. 5: Summary statistics of the sustainability attitudes (10-point scale)

Characteristics	Mean	SD	Mode	Mode %
Global warming concern	8.12	1.88	10	31.58
Environmental impact	7.73	2.01	8	26.08
Social well-being impact	7.61	2.03	8	25.84

Tab. 6: Mann-Whitney U test results (dependent variable = mean value of perceived quality items)

Characteristics	p-value
Global warming concern	0.19
Environmental impact	<.01
Social well-being impact	<.001

4.1.3.2 Sustainability attitudes and modal choice

In this section, we investigated the sustainability attitude of respondents by type of user (Tab. 7). Concerning this subject, frequent and sporadic users seemed to be more concerned than non-users. First, non-users resulted to give less importance to the environmental impact of the selected transfer mode than frequent and sporadic users (mean values were 6.61, 7.62, and 7.90, respectively). The differences between non-users and frequent users and non-users and sporadic users were both found

to be significant ($p < .01$, in the first, case, and $p < .001$, in the second one; Mann-Whitney U test). For the social well-being variable, again, non-users were given less importance (mean = 6.77, for non-users, 7.52, for frequent users, and 7.72, for sporadic users) and the comparisons with frequent and sporadic users were significant ($p < .05$ and $p < .01$). The coherence of these results provides evidence that frequent users tend to be significantly more worried about the impacts of their choice of transport mode than non-users, but less worried compared to sporadic ones. At the same time, however, non-users did not significantly differ from the other two types of respondents in terms of more general issues, such as concern for global warming (and, indeed, for global warming, only the difference between frequent and sporadic users was significant at $p < .05$). Since global warming can be particularly challenging and definitely less controllable, the impact of individual behaviour might be regarded as a little incisive. In line with this view, people may decrease their involvement because they do not feel their choice can make a difference. This in turn may reduce the difference between non-users and the other two types of respondents.

Tab. 7: Sustainability attitudes by type of user

Characteristics	Mean	SD
Global warming:		
Frequent users	7.95	1.96
Sporadic users	8.36	1.77
Non-users	7.89	2.19
Environmental impact:		
Frequent users	7.62	2.07
Sporadic users	7.90	1.88
Non-users	6.61	2.75
Social well-being impact:		
Frequent users	7.52	2.07
Sporadic users	7.72	1.97
Non-users	6.77	2.68

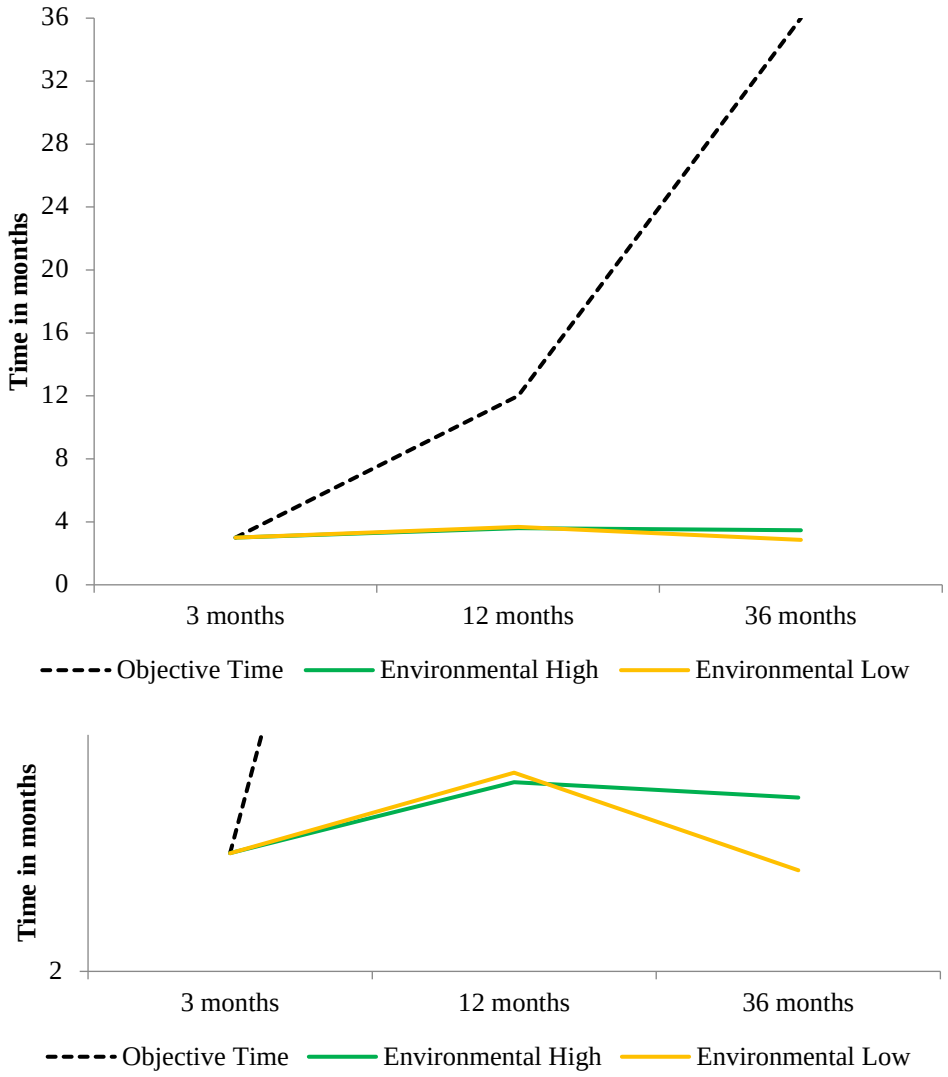
4.1.3.3 Environmental attitude and time perception

Following (Zauberman *et al.*, 2009), we examined the respondents' subjective time which is the individual estimate of duration between today and the future. A time perception task was randomized across participants. Respondents were asked to estimate the distance between today and the future (3 months, 1 year, or, alternatively, 3 years) on a 180-point scale. The task was particularly aimed to elicit the subjects' behavioural patterns, in terms of impatience, and combine the results with their environmental attitude. Pro-environmental behaviour has indeed been found to correlate with delay discounting and to have a role in intertemporal trade-off and time perspective (Hirsh *et al.*, 2015). To this end, as in section 4.1.3.1, participants were considered high- or low-importance individuals based on their responses about the importance of the environmental impact of the selected transfer mode. Ten subjects were eliminated because of non-responses or misunderstandings.

Fig. 6 (top panel) displays the results obtained for the estimates of duration between today and the future, as given by respondents according to their low- or high-level of importance. Compared to the objective time (i.e., 3, 12, and 36 months; dashed line), the subjective times appear to be less sensitive to change and, as we can see in the close-up figure (Fig. 6, bottom panel), this is especially true for high-importance participants. More specifically, for this group of respondents, compared with low-important ones, subjective time is lower at 12 months (not significant - Mann-Whitney U test) but also particularly higher at 36 months ($p < .05$). Also, for low-important individuals, the subjective time tend to be decreasing over time (between one and three years, $p < .05$; not significant for the high-importance group). These findings have been closely tied to the tendency of some individuals to assign greater weight to rewards that are closer in time (i.e., present-bias; O'Donoghue & Rabin, 1999). This present-bias attitude may prevent low-environmental concern individuals (or at least some of them) from a correct cost-benefit analysis of consumption, in general, and LPT use, in particular. Namely, present bias may lead to an underestimation of the benefits of LPT and an

overestimation of its costs with potential negative consequences on the perception of the service and the overall demand for public transport.

Fig. 6 Environmental attitude and time perception (top panel; close-up in the bottom panel)



Source: our elaboration

4.2 Semi-structured interviews with LPT operators[4]

A total of 15 interviews were carried out in the period July-December 2023, with an average duration of 45 minutes. Eight interviews were conducted in person, while the other seven were conducted online (MS Teams).

As noted earlier, the main aim of the interviews was to identify the reasons and motivations for modal shift towards LPT. To this end, the interviewees emphasised various strategies that can be categorised into several broad areas, comprising conventional and innovative approaches. The strategies appear heterogeneous for some characteristics, such as the type of users (e.g., systematic, sporadic, business) or the environment (i.e., urban and suburban), as an LPT expert made clear:

There is not a recipe, there are many elements that contribute to increasing the attractiveness of the public transport.

[4] All interview citations are provided in italics and translated from Italian.

Among the innovative strategies, we find everything related to technology and digitalisation, such as electronic ticketing and credit card validators. In a pay-per-use payment context, the single ticket will be less convenient for the user. By facilitating free movement inside the LPT network, all subscriptions should encourage users to increase their use of public transport, especially in urban environments. Strategies along this line should then consider the release of transport bonuses and the possibility of monthly subscriptions into paychecks. This may reduce LPT's costs through integrated welfare policies.

The second area is represented by information. Information will be increasingly digitised and in real-time through maps, social channels, apps, etc. This guarantees maximum accessibility and timeliness in an inclusive mobility framework. Please note that information also comes from traffic models and the simulation of mobility demand, particularly in frequency, availability, and distance. These models can provide timely information on the reasons and types of movement of users and non-users of the LPT and are likewise crucial in building an adequate offer based on mobility, including logistic mobility, in the area. Considering the heterogeneity in user mobility it is essential to create a range of offers divided by type of LPT recipient. For instance, senior citizens tend to make local trips and prefer the bus as a means of transport. In contrast, business users usually have a greater need for fast and more frequent means of transportation, such as the subway. Data-driven offer can adapt to the continuous evolution that presently characterises the request for LPT. Additionally, information plays a crucial role in both urban and suburban contexts, where waiting for public transport without timely information could lead to frustration and a general disaffection with LPT services. The lack of adequate information and fragmented access to the service are frequently cited as the primary obstacles to engaging with LPT. Therefore, real-time information is seen as a strategy to increase public transport use, especially among occasional users.

The third area is characterised by intermodal and sharing mobility, including all the services, urban and suburban, which tend to achieve integration and sharing of multiple services using an integrated ticket. Intermodal and sharing mobility, such as carpooling services or community car-sharing, tends to be declined according to the urban configuration, the population density, and the geographical location of the reference area, especially in suburban areas where accessibility is reduced. Among other things, intermodal services reduce the need for parking in high-traffic concentration areas. Intermodal and sharing mobility are increasingly prevalent in the urban context, where services like bike-sharing, free-floating, and electric charging points simplify mobility. This integrated offer encourages the use of multiple modes of transport and finds its peak in the Mobility as a Service business model: a flexible and territorially distributed LPT offer which integrates public and private modes of transportation. Integrated services appear crucial, especially for the first- and last-mile coverage, which typically represents a weakness of the LPT.

Another, more classical, strategy is to increase the quality of the LPT service. The interviewees mainly referred to capillarity and frequency but also accessibility (networks, infrastructures, better comfort at stops, etc.), punctuality and regularity of the service, cleanliness and comfort, crowding and safety (particularly for night lines). For metro stations, running auxiliary systems such as lift and stairlift services is also important. Effective and efficient local public transport is indeed essential for modal shift. Some interviewees underline that there has been a change in the perception of crowding since the pandemic. For instance, an LPT expert remarked that:

On the parameters linked to crowding, which is not the same as in 2019, […] we do not remember much more what the crowding levels were in 2019, compared to what we find now, and perhaps we are more inclined to consider, for example, a subway train carriage or a bus very full when we are at 75-80% and in 2019 we considered it to be at the same level of crowding when it was at 90%.

Therefore, the quality assessment also depends on the perceived quality rather than objective indicators. While some indicators, such as cleanliness, are more difficult to evaluate objectively, quantitative assessments exist for others, such as crowding. However, the user may still have a

different perception of these indicators. Another critical issue that needs to be addressed promptly pertains to the staff and their interactions with customers, the guidance of drivers, and recruitment. Over recent years, the competitiveness of pay has diminished, requirements for substantial hourly commitments (e.g., night shifts) have intensified, and concerns regarding drivers' safety due to potential aggression from users during interactions have emerged. The approaches implemented for improving the quality of the service can be different (alignment of timetables, general reprogramming of the service); however, given the lack of additional resources, an increase in service, as an action to expand it, is not feasible.

Other strategies that have been reported to be helpful for model transfer are the following: educational campaigns (e.g., European Mobility Week); the promotion of sustainability (a cleaner system in terms of emissions may lead to an increase in the use of LPT, especially considering the growing awareness of environmental issues); urban planning (securing the areas around schools, home-work travel plans, general improvement of the perception of the quality space) and reduction of alternatives to the LPT. LPT is made more competitive by removing space from private modes, limiting the number of parking spaces in central and high-traffic areas, and increasing parking rates. In reference to private transport, according to the president of an LPT association:

If I can't get to a place with my private car, or it becomes hyper-expensive, I can choose the [public] transport and I have to be tied to that.

Also, an LPT executive (public administrations, municipal level) emphasized that:

It would be better not to own a car because owning a car is a hidden cost that the citizen doesn't perceive (tyre changes, mechanic, all the maintenance that you never take into account).

As for sustainability policies, among the other things, the executive of a LPT company referred to the building of a

great-workplace, a workplace where all people have these values, these principles, and promote the principles of sustainability.

On the contrary, the reduction in service offerings and increase in local transport fares generally reduce users' satisfaction and, in turn, the demand for LPT more than proportionally.

The interviews also showed that peak hours have a different impact on LPT service than in the past. This is motivated by various reasons. First, there is a general decrease in demand due to the different ways of working (i.e., remote working) but especially to the substantial change in the use of mobility with an increase of movement which is not systematic (i.e., different from home-work plans). This can be considered a "regeneration" of lifestyle habits rather than a disaffection with LPT. Furthermore, peak hours now occur in conjunction with events (exhibitions, concerts, etc.) which are neither stable nor distributed over time.

5. Discussion and conclusions

Sustainable well-being is a complex and multidimensional construct that has only recently been integrated with its various components. In this new framework, well-being cannot be limited to economic needs but is widening to environmental, social, and relational needs. Particularly, despite well-being has been typically human centred, considering recent phenomena such as global warming and climate change, it is now more crucial than ever to promote well-being in a sustainable manner. This implies considering the environmental and social long-term impacts of individuals' decisions for present and future, given that the timeframe for recovery has shortened.

This paper contributes to this theme focusing on modal choice in urban and inter-urban mobility. This is an area of consumer decision-making holding significant potential impact on sustainable well-being from various perspectives, including environmental impact, health, quality of life, social equity, and interconnectedness between natural and social systems. More specifically, the paper investigates motivations and strategies that may favour a modal shift from private cars to local public transport, emphasizing the role of perceived quality and individual sustainability attitudes. To this end, both an online survey and a semi-structured interview were designed to complement the users' (and non-users') opinion with the LPT operators' perspective.

As for perceived quality, the semi-structured interviews with LPT actors highlighted the importance of users' perception, more than objective indicators, in the assessment of the quality of the service. Among others, the quality items that have been mostly reported during the interviews corroborate the ones that have been found to be mostly significant for the participants in the online survey, particularly frequency and punctuality. Overall, our findings suggest that indeed the most decisive intervention to improve the attractiveness of LPT should regard the frequency attribute. Since this requires huge structural investments, interviews with managers also stressed the role of information, as well as technology and digitalisation, and intermodal mobility.

Sustainability was also recurrent in both survey data and qualitative interviews. More specifically, the promotion of sustainability was identified as a strategy for modal shift by the experts. In line with this, in the online survey, we found that the importance assigned to the environmental impact of the selected transfer mode not only positively influenced the overall perceived service quality, but as well frequent users were more concerned than non-users about the environmental and the social well-being impacts of their transfer mode. In addition, individuals that are less worried about the environmental impact of the transfer mode showed a subjective time perception which was in line with a present-bias attitude. This implies a difficulty in delaying gratification in favour of immediate satisfaction and can affect a variety of decision-making situations, including in the environmental and sustainability area.

5.1 Theoretical implications

First, the present study may contribute to the sustainable well-being literature, particularly by integrating sustainability into well-being (O'Mahony, 2022). According to our survey, in the context of local public transport, we also found significant support to the idea that perception of service quality differs for high and low levels of sustainability attitudes (Borhan *et al.*, 2014). The study adds that differences in these attitudes are present when comparing LPT users with non-users, and environmental attitude differed according to time preference.

Moreover, the paper gives insights on the factors influencing modal choice, particularly the shift towards more sustainable transport modes. Our findings are consistent with previous results showing that personal transport can be modified through appropriate strategies (Avineri & Goodwin, 2010; Lehner *et al.*, 2016; Metcalfe & Dolan, 2012; Tørnblad *et al.*, 2014). In Lehner *et al.* (2016), strategies aimed at supporting modal shift, such as information dissemination and marketing, are discussed alongside behavioural approaches (Mattauch *et al.*, 2016; Steg & Vlek, 1997).

Finally, our insights can enrich intertemporal decision theory in modal choice by providing hypotheses for testing transport shifts over time. The role of intertemporal preference in modal choice is typically classified as a self-control issue which can arise in the cost-benefit analysis when considering alternative modes (Malmendier & Della Vigna, 2006; Mattauch *et al.*, 2016). Acquire travel information has indeed a cost in the short-term that returns benefits but only in the long run. This is turn may prevent to prioritize long-term goals such as environmental safety and social well-being.

5.2. Practical implications

Findings suggest several actions that managers can take to promote modal shift. These actions may include promoting active transportation, enhancing the quality and infrastructure of public transport, considering the heterogeneity of transport users, and reduce public transport alternatives by encouraging collaboration among the different stakeholders in local public transport. Implementing these actions could contribute to sustainable mobility and enhance long-term well-being for the environment and society.

The finding that individuals with stronger environmental and social attitudes tend to report higher satisfaction with quality items holds crucial managerial implications. On one hand, managers should consider these insights when designing communication strategies, ensuring that the messages are coherent across various communication channels. On the other hand, managers can implement targeted campaigns aimed at specific user groups, highlighting the environmental and social benefits of using LPT. Providing ongoing feedback on the sustainability status of LPT and how individuals can contribute to creating a more sustainable and liveable community can also be effective.

As for transport mode, education and training programs can be also involved in two ways. First, by empowering individuals to use public transport effectively and confidently and, second, by incorporating subjects' feedback into service enhancements and communication strategies. Drawing from behavioural studies, mobility managers can design, test, and implement interventions aimed at nudging individuals towards more sustainable transport choices. This approach may involve choice architecture, social norms, and other tools to encourage behavioural change. To this end, managers should acknowledge the diversity in attitudes and personal characteristics among those targeted for modal shift, tailoring information to provide timely and individualized insights into the benefits of choosing LPT travels. This can particularly facilitate long-term modal shift and contribute to the establishment of the "great-workplace" "where all people promote the principles of sustainability", to which one of the interviewed made reference, aligning with the concept of sustainable well-being.

Our findings suggest that sustainable transport can be promoted directly by managers through service quality improvements (also in terms of effective communication aimed at improving the consumers' perception), as well as indirectly through interventions targeting attitudes and perceptions of time. As a result, an integrated approach that combines various managerial policies simultaneously promoting sustainable approaches and long-term planning can have a synergistic effect on modal shift. At the same time, the results also showed that modal shift can be particularly challenging for non-users. According to the experts, managers of LPT companies must rely on the support of local policymakers to make the LPT more competitive by, for instance, limiting parking space and increasing parking rates and, more in general, removing space and convenience for private transport. Equally important, some interviewees underlined the idea that managers should also work at overcoming the classic concept of car use and ownership. To this end, everything that makes car ownership less necessary, particularly by promoting clean mobility, efficient means of transport, intermodality and sharing, can give a strong boost in this direction. In the near future, holders of service contracts for local public transport will be increasingly needed to provide appropriated offers within intermodal and sharing mobility. At the same time, they will be also preferred to meet sustainability criteria in tender specifications for procurement of goods, work, and services. Alongside, managers need to work particularly on simplifying the accessibility to local public transport. This should be realized in conjunction with the policymakers, associations, and all the key stakeholders (e.g., mobility managers) considering that, as underlined by the interviewees, these strategies are deeply related to urban planning and cities management which require time consuming regulatory change, consistency with municipal policies, plans and provincial regulations, and a concerted effort at different levels.

5.3. Limitations and future research

Future research will have to assess the extent to which time preference applies to modal shift by estimating subjective discount rates (Faralla *et al.*, 2017; Kirby *et al.*, 1999). Indeed, in this paper we used time preference which reflects individuals' attitudes towards the timing of receiving a payoff. Discount rates represent instead a personal assessment of the value of future outcomes and can be assessed in order to model decision in different areas, including transportation, in a more systematic approach.

Another limitation of the present study relates to the use of a self-selected sample for the online survey. However, the results were in line with both the literature and the qualitative data, suggesting the findings may be representative of a broader population. Also, in the online survey, we used a revealed preference approach. While the direct approach used in this study effectively elicits individuals' actual behaviour, future research could enhance our understanding of hypothetical scenarios related to LPT by combining it with a stated preference technique, possibly a discrete choice experiment which can directly discriminate between use of public and private mode. This approach could provide valuable insights, particularly regarding non-users' perspectives.

Overall, modal shift appears to be multidimensional and context-dependent. As we have seen for the crowding's perception reported earlier, the choice of transport mode can be strongly influenced by habit formation in consumption preferences and cognitive biases, which may lead to an overestimation or underestimation of the characteristics of the LPT. These biases can have negative consequences on the perception of service quality and on the demand for public transport. In these cases, the strategies presented are extremely useful, but may nevertheless prove to be insufficient in promoting the modal shift towards public transport for some specific groups of users. Future studies will need to investigate the heterogeneity of responses to modal shift towards public transport by employing behavioural approaches (Thaler & Sunstein, 2008) and conducting field experimentation (John, 2017) to develop tailored strategies.

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Track 6
Marketing

How Metaverse Creates Value for Luxury Brands

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Abstract

Frame of the research. *Metaverse is quickly attracting the attention of luxury brands. Different levels of understanding and adoption are currently being utilized by luxury companies, whose attitudes toward this technology range from skepticism to enthusiasm. While Metaverse has the potential to reshape the way luxury brands create value for their customers and other stakeholders, the ingredients to create successful business models are still under scrutiny. Many variables seem to co-exist, and the synergistic impact of the different Metaverse environments, along with their enabling features and supporting technologies on luxury remains a relatively unexplored domain.*

Purpose of the paper. *Introduce a new conceptualization of the Metaverse for luxury brands, offering a framework to assist in building value for customers and stakeholders*.

Metholodology. *Exploratory, qualitative research methodology, based on 14 in-depth structured interviews with top managers of luxury brands.*

Results. *The paper introduce a theoretical framework that links investments in Metaverse Technologies with customers' perception of luxury attributes, the influence across a wide spectrum of stakeholders, and the link with strategic objectives.*

Research limitations. *The sample of respondents, which represents the perspective of 14 top managers of the sector, might be enlarged in the future. Additionally, future research could develop quantitative analyses to structurally connects the different variables in the model.*

Managerial implications. *The research shows how luxury brands can unlock the full potential of the Metaverse to reinforce, re-generate, access, and engage relevant stakeholders, affecting a relevant set of luxury attributes, strengthening relationships with existing customers, and embracing new target audiences.*

Originality of the paper. *Introducing a new framework that connects Metaverse Technologies, with their impact on luxury attributes, stakeholders's audience and business objectives.*

Keywords: *luxury marketing, metaverse, immersive reality, value creation chain, martech, branding*

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1. Introduction

The Metaverse has been defined as a three-dimensional space where individuals can move, share, and interact using customized avatars (Hadi *et al.*, 2023). The term's origin lies in the Greek prefix "meta", suggesting transcending the boundaries of the physical realm, combined with the Latin suffix "verse", conveying entirety. In the evolving landscape of technology and digital innovation, the concept of the Metaverse has emerged as a groundbreaking paradigm, capturing the attention of individuals and industries alike.

This article takes inspiration from two trends of research that are relevant for analysing and evaluating the effects of new marketing technologies in generating impact in the very peculiar luxury sector: namely the *Value Creation Chain Model* and the *MarTech in Luxury*. The *Value Creation Chain*, as outlined by Keller and Lehmann (2003), delves into the intricate processes that underpin the generation of value for brands, connecting marketing investment choices, with customers' attitude formation and change, market performance and shareholder value. Concurrently, the research on *MarTech in Luxury* aim to forge links between emerging technologies (Javornik *et al.*, 2021; Bao *et al.*, 2024) and their influence on both traditional and novel traits, attributes and characteristics linked to luxury brands (Kapferer and Bastien, 2009; Wang, 2022).

This is particularly relevant in a context where, despite its 30-year history, the Metaverse appears to be still in full development, and there is still no consensus on its precise definition and boundaries of application, both among managers and researchers. To date, extensive research, and discussions on the Metaverse have yielded various interpretations, creating conceptual building-blocks that can serve to model how the Metaverse might affect the core industry attributes (Yoo *et al.*, 2023). In the context of luxury brands, where the experience is a pivotal element (Kapferer & Valette-Florence, 2019) crafted by offering consumers symbolic and experiential value alongside functional benefits (Pozharliev *et al.*, 2015), recent research argued that the Metaverse holds a huge potential for shaping the industry's future (Holmqvist *et al.*, 2020). Specifically, its capacity to evoke and enhance subjective and emotional experiences, encompass sensory, aesthetic, fun, fantasy, and emotions (Krishna, 2012). In addition, the virtual nature of the Metaverse offers a heightened level of immersion and new types of consumers' journeys (Schmitt *et al.*, 2015). Such journeys involve activities that create optimal experiences by integrating virtual and physical touchpoints (Swaminathan *et al.*, 2020), a concept already pioneered by top brands such as Bulgari, Gucci, and Dior (Jayawardena *et al.*, 2023).

Conversely, executives offer varying interpretations of the Metaverse, both in terms of its technological implications and the potential impact on business. Some view it as *"a world that speaks a gaming language and communicates with the youngest generation"* (Informant I), while others see it as a *"branding environment […] that can provide both reputational and real economic value"* (Informant F) or "*a set of immersive creative worlds that are contextually very beautiful and able to narrate the history of the brand"* (Informant B) that might *"evolve the traditional clienteling"* (Informant E) in a context that *"is very attentive to respect its brand equity and heritage and often must refrain from too dynamic test and learn approaches, typical of other related sectors"* (Informant E). Or even "*being a different way humans can interact among themselves in a different way from traditional ones, it generate new ways where people can socialize, collaborate, play, and buy in a virtual 3D space*" (Informant L). Simultaneously, some managers remain dubious about the positive impact of the Metaverse in luxury, citing general skepticism and refraining from adopting it *("The Metaverse is not our priority"*, Informant A; "*We are not into Metaverse*", Informant Q), confining it into *"a pure novel channel of communication without clear impact"* (Informant N) or "*irrelevant if only adds a layer of interaction with the client, without a strong technological backing in the development and systematization of product images and information*" (Informant E). If not properly executed, some view it as a potential weakening factor of brand DNA, expressing concern about the risk "*of confining ourselves to this digital realm*." For them, *"[…] a complete digital experience without a corresponding tactile counterpart holds no significance"* (as emphasized by Informant H), or *"if not well executed might hamper the uniqueness of luxury customer experience"* (Informant E).

As much of current managerial perspective and extant research has remained ambiguous to how the Metaverse can convey luxury attributes and ultimately generate value for those companies, a set of specific research gap might be identitifed to support the development of an integrated framework on "How Metaverse Boosts Luxury Brand Value Creation". Specifically, (a) Which Metaverse technologies are more (less) useful in elevating traditional and novel luxury attributes, (b) How companies might use these Metaverse technologies to expand access, increase engagement, affect and release value to different stakeholders, encompassing customers, employees, investors, suppliers and, as a consequence, (c) Why the Metaverse might be a game changer in helping luxury brands building a sustainable competitive advatange and in achieving their strategic objectives.

This paper addresses these uncertainties utilizing a discovery-oriented approach (Muninger, Hammedi and Mahr, 2019) through a set of in-depth interviews to top executives in the luxury industry. Accordingly, the authors present a theoretical framework that links investments in Metaverse Technologies with customers' perception of luxury attributes, the positive influence across a wide spectrum of stakeholders and strategic objectives.

2. Methodology

2.1 Research Design and Sample

The authors employed a qualitative research methodology, conducting in-depth interviews with industry experts to gain insights into the strategic utilization of the Metaverse by luxury brands. Embracing a discovery-oriented approach, as advocated by Muninger, Hammedi and Mahr (2019), the study aimed for a nuanced understanding of the subject matter, prioritizing participant insights. Since, current knowledge of Metaverse ecosystems is lacking, it was useful to study the phenomenon in a selected and information-rich setting (see Tan and Saraniemi, 2023). The authors proactively sought out key participants through their professional networks and industry contacts, employing specific criteria for selection. These criteria included individuals with management responsibilities, significant expertise in both digital technologies and the luxury sector, and a track record of active involvement in strategic decision-making processes. In-depth interviews were conducted with fourteen managers from Europe, whose profiles are detailed in Appendix 1. In line with prior literature, a semi-structured interview guide was formulated (McCracken, 1988). This methodological approach facilitated a comprehensive exploration of the strategic deployment of the Metaverse in the luxury sector.

2.2 Interviews and Data Analysis

We conducted semi-structuted video conferencing interviews with fourteen informants from Europe between September 2023 and January 2024. Given the complex nature of the phenomenon studied, this is a suitable way to boost the credibility of our findings.

The interviews commenced with an initial open-ended inquiry, delving into the managerial perspectives on what the interviewees perceive as the Metaverse and the technology they associate with it. This exploration progressed by inquiring about their strategic intention to utilize such technology in both current and future business models, with a focus on its potential long-term impact on the luxury attributes and its business model. Additionally, the discussions touched on the general priorities and challenges faced by luxury brands in the Metaverse. Subsequently, the discussion shifted towards exploring the existing landscape of performance metrics systems within the Metaverse, aiming to uncover insights into the current state, identify information gaps, and ascertain desired options. Following this, the study delved into the examination of how elements of brand identity are adapted, translated and executed into the virtual realm of the Metaverse. Lastly, executives were prompted to provide insights on the development of brand engagement within the

Metaverse and how sensorial elements can be integrated in such interaction. The interviews, averaging forty minutes in duration, were recorded and transcribed verbatim. We selected information-rich participants (Patton, 2002) by using the authors' networks and snowball sampling. The interviewees willingly participated in the research and granted permission for the interviews to be recorded in a video format. The number of participants was not determined beforehand, but we followed the principles of saturation and stopped collecting data when no new information was added (Gummesson, 2005).

In terms of data analysis, initially, the researchers employed an inductive approach, immersing themselves in the data by identifying and comparing thematic codes across all interviews, as recommended by scholars (Strauss and Corbin, 1997). In the analysis of the interview data, we familiarized ourselves with the interview data by repeatedly reviewing recordings with transcripts, documenting our thoughts, interpretations, and questions. All interview data were transcribed using MS Teams automatic transcription software. To enhance accuracy, all authors meticulously reviewed and corrected transcripts while re-watching the videos on different days (Nowell *et al.*, 2017).

Throughout this process, they engaged in discussions and exchanged analysis memos that encapsulated initial reflections. The overarching goal was to obtain a comprehensive interpretation of luxury brands' perceptions of the Metaverse. This involved understanding the role of novel technologies (e.g., AR, VR, Blockchain) for luxury brands and discerning its distinctions from other digital technologies. Subsequently, the team conducted a structured, in-depth analysis, with the authors leading the identification and interpretation of quotes related to managers' understanding of the Metaverse in the luxury context. This process involved linking these insights with existing theories. Moving forward, the analysis delved into scrutinizing how the strategic deployment of the Metaverse supports luxury brands. Simultaneously, the aim was to construct an integrative framework that could provide valuable guidance to executives in their pursuit of investments in the Metaverse.

3. Metaverse's Distinctive Characteristics and Their Importance for Luxury Brands

Building on existing literature, and supported by statements from company executives, four characteristics of the Metaverse are now recognized, acknowledged, and explored in the context of luxury brands.

3.1 Full Sensory Experience

Academics have emphasized the potential of the Metaverse to deliver a *fully sensory experience*, describing it as "a virtual world with immersive capabilities providing an experience forecast to parallel the real world" (Dwivedi *et al.*, 2022).

Full sensory experience refers then to the phenomenon in which mixed technologies can alter sensory inputs, thereby modifying real or virtual environments (Yoo *et al.*, 2023) and inducing a sense of presence within a digitalized space (Kim and Bae, 2023). The Metaverse is grounded in extended-reality technologies (XR) that facilitate multisensory interactions (Barrera and Shah, 2023), allowing individuals to engage with virtual environments, digital objects, and other participants. As noted by Informant B *"In a sensory experience, we engaged all the senses of our guests to convey the essence of our products"*. Hence, multiple sensory interactions and perceptions, such as visual, auditory, haptic, and kinesthetic experiences, are cultivated to foster heightened interactivity among users, thereby eliciting genuine participation and collaborative value creation among individuals (Krishna, 2012). As remarked by Informant A *"A real opportunity for luxury brands is to deliver a powerfully sensorial approach (…) and provide users with an extremely gratifying experience"*, despite "*we are not yet at the stage of having a truly pleasant, rewarding and enjoyable setting in the Metaverse that can stimulate long-term permanence, engagement and sales for different luxury targets"* (Informant E).

3.2 Real-time Interactivity

Real-time interactivity, defined as defining as "a technology-mediated network of extended reality environments to provide experiences characterized by their level of immersiveness, environmental fidelity, and sociability" (Barrera and Shah, 2023), refers to temporal synchronicity (Hoffman and Novak, 1996), and collaborative participation in the Metaverse (Barrera and Shah, 2023). In the context of luxury, brands like Gucci, Bulgari, and Louis Vuitton have introduced their virtual spaces and wearable assets on platforms such as Roblox, Zepeto, and Decentraland (Xi and Hamari, 2020). These platforms enable users to share the same experience simultaneously, make purchases and participate in real-time gamification activities within the brand's virtual stores (Hadi *et al.*, 2023). Furthermore, previous research on Metaverse's application in luxury focused on its potential to build brand engagement through gamification's activities (Xi and Hamari, 2020), enhance brand experience (Eppmann *et al.*, 2018) and augment brand image (Holmqvist *et al.*, 2020). As a result, marketers are offering virtually wearable garments that users may wear while playing characters in games like League of Legends or exploring the Metaverse for various reasons (e.g., entertainment, sociality, events). Moreover, real-time interactivity can enable the alignment between physical and virtual events (Javornik *et al.*, 2021). *"We organized a live streaming event within these platforms, allowing users to watch the actual fashion show. An impressive 8 million people connected. (…) This initiative served to capture the essence of the original spirit intended for the real-world fashion show and convey it within the virtual realm"* (Informant F). As a result, luxury brands are now directing their efforts towards providing high-quality product simulation and visualization (Javornik *et al.*, 2021), as Informant B explains *"Investing in technologies that ensure proper aesthetic and brand storytelling performance is crucial"*.

3.3 New Digital Assets

The Metaverse involves the creation of *unique digital assets* in "an online collaborative shared space built of 3D environments that leverage high consumer immersion techniques to reduce the perception of technological mediation". They connect with the creation of tradable digital media pieces with economic value within the Metaverse, where, for example, non-fungible tokens (NFTs) play a key role in representing the limited and exclusive use of digital products (Colicev, 2023). As stated by Informant F *"NFTs are like receipts, they ensure the digital ownership of a specific asset in a blockchain"*. This extends to virtual fashion and NFTs, offering novel avenues for consumers to engage in shopping, exchange goods, and assume digital identities through avatars (Hazan *et al.*, 2022). Moreover, the emergence of a new consumer generation has prompted luxury brands, including to collaborate with metaverse social platforms and introduce NFT luxury fashion items designed for virtual world game characters (Sung *et al.*, 2023). According to Informant C, *"NFTs are a medium of communication. Our approach to NFT projects initiates in the digital realm, but we extend the experience by translating them into physical and experiential dimensions. This strategy is designed to seamlessly immerse customers in the authentic reality of our brand"*. Such alignment is crucial for linking the virtual and the physical, and for enabling the creation of tight relationship between users and luxury brands, as Informant F highlights *"When we started (…) utilizing blockchain technology and NFTs, our primary objective was to engage with an audience that, up to that point, had not frequented Informant F stores or expressed any interest in the brand*". An audience, as Informant D highlighted, that *"…might either have the monetary possibility to buy luxury despite not currently interested in specific product category…or, on the opposite, very interested in getting closer to the luxury world and signaling their presence through affordable products and experiences"*.

3.4 Unique Co-creation

It pertains to the active engagement of customers in shaping brand values through their participation in various marketing interactions, including activities related to the brand or specific virtual products (Payne *et al.*, 2009). Given the shared environment and experience provided by Metaverse's platforms (e.g., Roblox, Decentraland, Zepeto, Fortnite), co-creation can be elevated to new levels, as active engagement in online communities generates higher value (Kozinets *et al.*, 2010). Furthermore, considering the growing significance of value co-creation between brands and users, especially considering the increasing demand for personalized experiences (Chapman and Dilmperi, 2022), recent research emphasizes that luxury brands must harness co-creation strategies. This approach becomes instrumental in elevating crucial values such as hedonism and self-expression, thereby exerting a positive influence on consumer equity (Choi *et al.*, 2016). In line with this context, through gamification, the Metaverse enables a more direct influence on product offerings and the overall design of virtual stores (Hofacker *et al.*, 2016). As stated by Informant C *"Surviving in the metaverse is inextricably related to the notion of community; without a community, thriving becomes an impossible goal"*. Informant B reinforced the concept stating that *"…Metaverse might have a full impact for brands who can count on a proper community in the Metaverse platforms who can spontaneously generate engagement with the brand … The absence of such community makes it harder to have impact on Metaverse platforms"*. For instance, the consistent engagement by brands through co-created games and dialogues facilitates users in attaining a significant level of co-presence within the luxury virtual stores (Colicev, 2023). As Informant F explains "*The essential mechanics of these Metaverse's platforms is the gamification that tempts players to return to that platform and dialogue with the brand"*. Importantly, such connection is expected to happen across a range of different technologies, as Informant B highlights *"Technology functions as a medium for creating an affective bond between the consumer and the brand"*.

4. How Metaverse Shapes Traditional and New Luxury Attributes

Metaverse unique characteristics have the potential to impact the luxury industry, by regenerating and reinforcing specific attributes, and ensuring access to and engagement with high-end brands. Luxury brands distinguish themselves for a set of traditional attributes that have allowed luxury managers to build a strong heritage and brand equity overtime (Dion and Borraz, 2017). They are premium-priced and regarded as rare (Moreau *et al.*, 2020; Wang, 2022) and unique (Kapferer and Valette-Florence, 2019). Moreover, the perceptions of authenticity (Morhart *et al.*, 2015), hedonism, and aesthetics generate a profound resonance with consumers (Venkatesh *et al.*, 2010). Specifically, brand heritage plays a pivotal role in shaping the essence of luxury. It encompasses various integral concepts such as craftsmanship, history, artistry, and uncompromising quality, all of which contribute to the distinctiveness of a luxury brand (Dion and Borraz, 2017). Indeed, without a rich heritage, a brand might offer expensive and authentic products, yet it falls short of earning the prestigious label of luxury. Heritage also serves as the cornerstone that amalgamates all facets of brand identity and image. It enables customers to forge a connection with the brand's historical journey, fostering a sense of identification with its corporate values (Cooper *et al.*, 2015).

4.1 Traditional Luxury Attributes

4.1.1 Brand heritage

Today, the emergence of the technologies connected to the Metaverse has empowered luxury brands to *reinforce* and *re-generate* value for existing consumers by leveraging their traditional luxury and novel attributes, enabling *access* and favor *engagement* to new customer groups, and *accelerating* the sedimentation of heritage and other luxury attributes for new high-end brands aiming

to position themselves in the luxury market. For instance, the use and adaptation of identity elements into gaming platforms (e.g., Roblox, Zepeto, Sandbox), through their intensive use by individuals, might provide the setting for a continued interaction frequency and engagement that could accelerate the creation of *brand heritage* to new potential consumers. As supported by Informant B *"we must craft experiences that resonate with heritage, as heritage comprises distinctive elements that require accurate translation into the Metaverse context […] This ensures an authentic brand narrative"*, or Informant C *"When it comes to brand heritage and identity elements, transposition is necessary to ensure effective communication across different platforms and languages"*. Also, *"since heritage is reinforced by experiences with unique products that cannot be replicated and are often unavailable to customers, through the Metaverse, we can create a collection of distinctive products […] In this space, we have the opportunity to construct retrospectives that narrate our unique story"* (Informant B).

4.1.2 Brand authenticity and craftsmanship

In line with this context, the development of *brand authenticity* in the Metaverse requires the translation of core identity elements into the digital space, such that they are resonant with both established and emerging user bases. According to Koles *et al.* (2024), the Metaverse presents an opportunity to expand and enrich the brand narrative by offering highly immersive and interactive experiences through gamification activities. This can include the recreation of iconic brand moments, showcasing craftsmanship and providing virtual tours of physical historical spaces linked to the brand, and alignment with the brand's values and heritage. It might also help satisfying different needs in terms of prominence and social status in luxury consumption (Pino *et al.*, 2019). In this way, consumers who may have never properly and actively interacted with the brand or lacked financial access to luxury products, can still feel a sense of belonging to the experience and establish an emotional connection with it. *"Understanding the logic of the Metaverse is essential, as it involves taking the elements of brand identity and seamlessly extending them into this virtual realm. […] This process requires the creation of authentic and easily recognizable experiences, coupled with the original brand storytelling"* (Informant I).

4.1.3 Premium price

When it comes to *premium price* in the Metaverse, each world possesses its unique language and logic. Consequently, the transaction price of a luxury brand in the Metaverse might be notably lower than that in the real world in absolute terms, but still maintain its core characteristic of being premium (Moreau *et al.*, 2020). However, within the Metaverse community, this pricing is perceived as luxury because it significantly deviates from the standard pricing in that virtual world. *"The costs are negligible. When we started, there was always the comparison with real-world prices. […] A Informant F shoe in Zepeto was priced at $5, and the Jackie bag at $90. When considering the platform's target community and exchange rate of 7 Zem to $0.49, the Informant F bag isn't just expensive; it's exceptionally costly"* (Informant F); or *"Individuals invested in character customization to distinguish themselves within the game environment. They opted for branded accessories like necklaces and bottles, even at an average price of thousands of Euros, to avoid appearing commonplace within the virtual world*" (Informant F). Through this approach, the brand effectively introduces a premium price and luxury status to a world where the target audience might differ significantly from the established user base, establishing premium as a distinctive feature compared to the basic offerings.

4.1.4 Hedonic value

Moreover, the Metaverse has the potential to impact the *hedonic* aspects of luxury brands,

enriching customer engagement, entertainment, and fun, and fostering closer connections with specific target audiences. The setup of a realistic vs. fantasy avatar itself might be considered an act of hedonism, where the desired attributes are self-projected into a new "virtual-me" or "virtual-not-me". Embracing avatars, virtual entities or characters influenced by human behavior, in fact has been proven to fulfill various interpersonal and personal purposes, such as fostering social connections, expressing oneself, and exploring identity, with different psychological factors influencing choices in creating avatars associated with the extent of perceived differences between their actual self, desired self, and perceived societal expectations. *"An avatar serves as your digital identity, representing you within a given ecosystem. Currently, these ecosystems are fragmented and diverse. Platform avatars vary significantly. For instance, Zepeto adopts a human-based approach, featuring high-quality 3D collections for sale and virtual stores with meticulous details"* (Informant F).

4.1.5 Aesthetics and quality

Moreover, through gamification and extended reality (XR) activities, the Metaverse can offer consumers an enjoyable experience, also facilitating the creation of 3D virtual models that authentically represent the *aesthetics* of luxury products and influencing customer perceptions on products' *superior quality* (Hagtvedt, 2022).*"The general public might think that the creation of a NFT drop would be much quicker, but it is not necessarily so […] we need expert craftmanship, of a different typology, a digital one, to ensure a perfect and superior recognizable digital quality"* (Informant C); *"We chose to partner with Epic Games' Unreal Engine 5, a technology that enables us to enhance the realism of the Metaverse experience. This decision was driven by the platform's capabilities in terms of color treatment, light refractions on products, and cinematic elements, aligning with the aesthetic standards of our luxury brand"* (Informant B).

Accordingly, brands can showcase their luxury products in diverse virtual worlds, through the creation of "microverses", in-game virtual tours or NFTs collections, also establishing connections with the real world. This approach enables new consumers to *access* the brand's community and *engage* in its initiatives; *"[…] through the purchase of NFTs, individuals can secure a two-year membership, unlocking a spectrum of physical, experiential, and digital benefits"* (Informant C). However, "*style is a must and a main principle for the development of wear-on products; […] in order to succeed, wearable MV technologies should be socially acceptable, and cannot present major disruptions vs. the desired style of what customers wear; […] wearable immersive experiences that are neither streestyle nor luxury will not succeed in terms of large adoption; […] thus the current challenge is to add technology without compromising vs the desired style"* (Informant L).

4.2 New Luxury Attributes

4.2.1 Sustainability

However, also new emerging luxury attributes such as *sustainability* and *sustainable consumption* (Kapferer and Valette-Florence, 2019), or *experientiality* and *hyper-personalization* granted by co-creation and advances in technology, are favoring the access to new market segments and contributing to shape the consumption patterns of luxury brands (Han *et al.*, 2017). In line with this context, *sustainability* entails a commitment by luxury brands to adopt eco-friendly practices, reduce environmental impact, and engage in socially responsible initiatives, with new luxury brands acting to be both "gold and green". A recent stream of research (Ruusunen *et al.*, 2022) argued that the use of the Metaverse can also facilitate consumers to process and internalize green information. For instance, as stated by Papahristou and Bilalis (2017), the detailed and vivid information conveyed through 3D Virtual Prototyping and AR tool improve consumers' awareness of green consumption, fostering *sustainable* beliefs. Moreover, the *extended lifespan* of products in the metaverse, facilitated by the availability of a ready-to-play product stock for repeated use in various contexts, not only

contributes to a reduction in waste production but also delivers tangible advantages to both consumers and companies (Sun *et al.*, 2021).

4.2.2 Experientiality

Experientiality (Gupta *et al.*, 2023; Rahman *et al.*, 2023) has heightened consumers' desire for more immersive and diverse experiences. This highlights the crucial role of luxury brands in providing pleasure and interactivity through emotional and sensory journeys (Han *et al.*, 2017). In line with this context, the Metaverse holds a huge potential for companies to develop their value propositions and build *ideal customer experiences* by combining virtual and physical touchpoints. As a result, customers could interact and engage with brands within the Metaverse, enjoying emotional and symbolic values and assuming a more dynamic and autonomous role in their experiences, leading to a journey of value co-creation (Makkar and Yap, 2018). *"We developed an interactive touch monitor housed in a display case, narrating the story of our Serpenti product from the 1940s to the present. This immersive experience was set in a Metaverse world, portraying a futuristic Rome where the strategic use of lighting on the clocks and jewelry created a visually stunning effect"* (Informant B); *"We are currently engaged in research and development involving sensors capable of detecting your physiognomy and size, generating a digital replica of you. This enables the virtual try-on of 3D garments, eliminating the need to physically try on multiple items. […] This immersive experience may even involve scenarios, like walking in a specific location during sunset, aiming to stimulate your imagination about the usability and aesthetic appeal of the showcased garments within the Metaverse"* (Informant H).

4.2.3 Hyper-personalization

Technology enables luxury to move beyond the traditional older high-net-worth individuals' segment. Metaverse can provide "*access"* and "*engagement"* to new targets. The younger generation can be approached through proper communication across interactive channels. Given that "*luxury brands have always had a very top-down approach to consumers"* (Informant A), the Metaverse can be viewed as a mechanism for fostering "*co-learning relationships between brands and users. [...] on the one hand, brands communicate the heritage and craftmanship perception of their product, and on the other hand, digital native users drive brands to create tools to keep up with society and technology"* (Informant C), and "*…a gateway of meaningful access to newer younger targets to enter in contact with high-end Brands…*" (Informant D). As generations such as Millennials and Gen Z are reshaping the conventional offerings of luxury brands, particularly with a focus on seeking *personalized* experiences, Metaverse offers unique opportunities for consumers that are allowed to shop through a *hyper-personalized* experience in the comfort of their personal space. Indeed, the integration of AR/VR into the existing shopping experiences includes the creation of personalized virtual closets across luxury retailers as well as virtual try-on products across the gaming landscape (Jain *et al.*, 2023*). "We introduced a sensory encounter to convey the "essence" of a Informant B fragrance. Guests wore a small sensor, resembling a tiara, capturing their brain waves as they strolled through the experience. They could listen to a melody associated with the perfume, observe the perfume bottle, and feel the sensation of it filling up through an automated bottle with motors. Upon completing the journey, an AI software analyzed the collected brain waves, creating an emotional map and generating a personalized artwork, potentially available for download to their phones"* (Informant B); *"The possibilities for creativity within these virtual worlds are boundless, as is the potential for customization. In the Metaverse, we designed logo-branded items like necklaces, bottles, and even the trail left by the avatar, available for users to purchase for personalization. Additionally, for those who owned the NFT Brand Grail and the Brand Vault Material (a digital fabric), we informed them to visit the site on a specified day for the chance to create their own customized bag"* (Informant F).

5. Which Metaverse Technologies Are More (Less) Effective in Elevating Traditonal and New Luxury Attributes

Given the multi-layer nature of the Metaverse, this section aims to elucidate the correlation between traditional and novel luxury attributes within the framework of key metaverse-enabling technologies (Figure 2). For instance, under a technological aspect, seven pillars have been identified to facilitate user access to the Metaverse. These include i) Augmented Reality (AR) (Yoo *et al.*, 2023), designed to organize and display digital overlays atop the physical surroundings, ii) Virtual Reality (VR) (Lee *et al.*, 2021), offering a three-dimensional perspective of the digital world iii) Mixed Reality (MR), positioned between AR and VR, enabling user interaction with virtual entities in physical environments (Dwivedi *et al.*, 2023), iv) Artificial Intelligence (AI), steering automatic digital twins, avatar autonomy, and computer agents (Barrera & Shah, 2023), v) Computer Vision, encompassing body tracking, scene understanding, and image processing (Yoo *et al.*, 2023), vi) User Interactivity, aiming to enhance the performance of delay-sensitive applications (Kim *et al.*, 2021), vii) Blockchain, facilitating the exchange of NFTs and cryptocurrencies and connecting multiple Metaverse's platforms (Sung *et al.*, 2023).

5.1 Augmented Reality

In particular, Augmented Reality (AR), with its capacity to enhance the real-world environment through computer-generated elements, profoundly influences the traditional attributes associated with luxury brands (Javornik *et al.*, 2021). As supported by Informant H *"As of now, we are enthusiastic users of augmented reality and all associated aspects involving the utilization of 3D elements. We recognize significant and intriguing potential in this regard"*. Within the realm of *heritage*, AR brings historical narratives to life, offering interactive experiences that showcase craftsmanship, granting an immersive storytelling in conjunction with tactile expeiences, a more traditional ways of experiencing product authenticity. *"We have consistently focused on storytelling, particularly in the reception context. One crucial aspect, within the framework of our stores, is to consistently establish an environment where individuals can immerse themselves in emotional experiences while respecting the inherent value proposition and authenticity of the products. It's essential to continually elevate people's adrenaline levels, ensuring that the value proposition always offers something more exhilarating"* (Informant B). The *hedonistic* aspect is enriched as AR introduces layers of enjoyment and engagement, providing users with a sensory-rich encounter (Lee *et al.*, 2021). Furthermore, The simulations superimposed on physical surroundings can visually accentuate the exquisite materials, *quality*, craftmanship and *aesthetics* of luxury products. *"The utilization of this technology ensures the appropriate aesthetics and brand storytelling, allowing for the creation of a novel in-store experience"* (Informant B). In the context of novel attributes, AR significantly contributes to enhancing the luxury-brand *experience* by bringing brand elements in close proximity, visually centering the consumer on the brand, and eliciting affective, cognitive, and sensory responses. Additionally, by stimulating multi-sensory cues, AR facilitates heightened product and avatar *personalization*. *"Augmented reality is facilitated through sensory objects of varying effectiveness, ranging from current monitors to more symbiotic personal systems, including tactile sensors, visual sensors, auditory sensors, and others. [...] We reiterate our keen interest in AR technology because it enables hyper-realistic 3D experiences. In this regard, the metaverse is particularly intriguing as it serves as a platform that encourages the extensive utilization of AR and 3D visualization"* (Informant H).

5.2 Virtual Reality

Virtual Reality (VR), crafting fully immersive digital environments, enables the creation of visually stunning virtual worlds that align with the brand's distinctive style and values. As for AR, VR contributes to the perception of *quality* by allowing users to explore luxury items in intricate

detail, fostering an appreciation for craftsmanship, *aethetics* and excellence (Yoo *et al.*, 2023). To fully engage with the Metaverse, consumers frequently utilize VR headsets like Oculus or haptic devices, allowing them to move and interact within 3D environments much like they would in a physical setting, thus enhancing the user *experience* and the connection with the brand. *"We are exploring technologies that enable the creation of significant sensory experiences. Currently, we have undertaken small initiatives using Oculus and virtual headsets, as well as smart mirrors. On the digital front, virtual try-ons and tailored technologies allow individuals residing on the other side of the world to experience services comparable to those offered in a physical store"* (Informant C); *"The integration of 3D elements into these immersive worlds has seamlessly become a component of our digital value chain. Between 2022 and 2023, we have developed over 300 Brand Heritage Game Ready products. These have been meticulously crafted with Unreal and Epic Games, forming a repository of 3D products that are deployed as needed. […] In this way, we can prolong the lifespan of these products"* (Informant B). In line with this context, the metaverse facilitates the dematerialization of inherently durable – by definition - yet intangible products, allowing luxury brands to take an additional stride toward sustainability (Sun *et al.*, 2021).

5.3 Mixed Reality

Mixed Reality (MR), seamlessly blending elements of both AR and VR, plays a pivotal role in preserving and celebrating the heritage of luxury brands. By integrating historical elements into the real world, MR enhances the brand's connection with its past (Yoo *et al.*, 2023). The *authenticity* of luxury products is underscored as MR bridges the gap between the digital and physical realms, offering consumers a cohesive and *personalized experience* (Hoyer *et al.*, 2020). Indeed, MR is often considered a more robust iteration of AR, establishing more interconnected and collaborative relationships among physical space, user interaction, and virtual entities, thus generating a more enjoyable digital journey and eliciting *hedonic values* (Lee *et al.*, 2021).

5.4 Artificial Intelligence

Artificial Intelligence (AI), driving automatic digital twins, avatar autonomy, and computer agents, transforms luxury attributes through tailored *experiences*. The *exclusivity* of luxury is enhanced as AI enables *personalized* interactions, catering to individual customer preferences. Moreover, AI contributes to the maintenance of product *quality* through smart manufacturing processes, reinforcing the brand's commitment to excellence. *"This technology enables the creation of an avatar, serving as your digital duplicate, which can be adorned with 3D garments"* (Informant H); *"Platform avatars are inherently diverse, reflecting the distinctive aesthetic and language of each platform"* (Informant F).

5.5 Computer Vision

Computer Vision, encompassing body tracking, scene understanding, and image processing, enhances the *aesthetic appeal* of luxury brands in virtual environments. By optimizing the visual elements of virtual worlds, computer vision contributes to the overall aesthetics of the brand, aligning with its unique identity. Moreover, this technology ensures a seamless, enjoyable, and authentic consumer experience, striving to minimize disruptions associated with delays in avatar movements or the processing of backgrounds in the diverse worlds of the Metaverse (Hoyer *et al.*, 2020). *"The emphasis on quality is a fundamental aspect of a luxury brand. The personalized experiences, along with the high level of 3D and photorealism, contribute to a spectacular presentation. For instance, in Brand's virtual world, you can find Brera, a famous Milan's neiborhood, where meticulous details like the sanpietrini on the floor and carefully crafted lighting are incorporated. Here, quality transcends mere functionality and transforms into beauty, creating a delightful and aesthetically*

pleasing experience" (Informant F).

5.6 User Interactivity

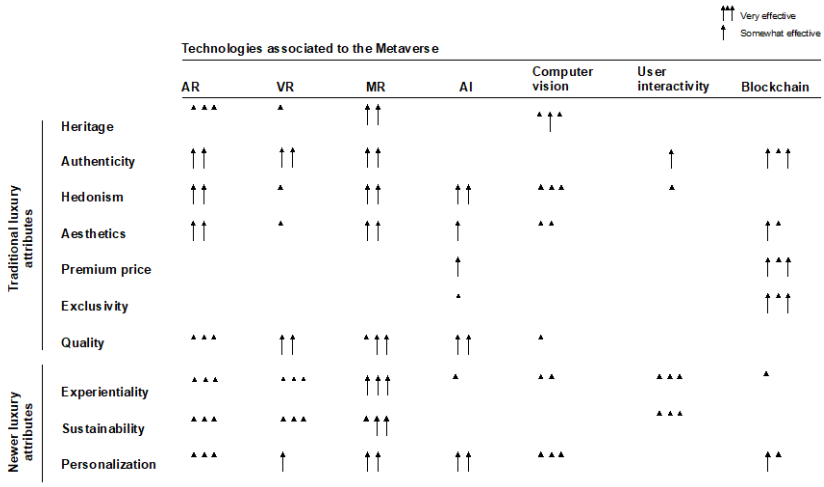
User interactivity, facilitated by mobile headsets, haptic devices, and platforms like Oculus, amplifies the hedonistic aspects associated with luxury brands. Engaging and interactive features elevate the pleasure and enjoyment of virtual experiences, creating a sense of experience's authenticity and hedonism. Moreover, it plays a pivotal role in shaping the perception of digital products by enhancing the vividness of images, backgrounds, and luxury items, thereby guiding the user toward a more intense and clear understanding of authentic materials, artistry, and craftsmanship. However, many luxury companies have shown resistance to the use of Oculus and VR headset devices as a means of accessing the Metaverse, citing concerns about their outdated technology, high cost, potential for causing motion sickness, and a sense of isolation from reality. *"Oculus might create a significant friction [...] as it imparts a dystopian effect. It diminishes the sense of elegance and elevation within the luxury store. The major pain point is that the sales advisor cannot discern what the customer is viewing at that moment, leading to a loss of eye contact between the salesperson and the customer. [...] When entering a luxury store, customers seek to feel pampered and receive a particular type of guidance; discomfort is not what they desire"* (Informant B).

5.7 Blockchain

Finally, blockchain, a decentralized and secure ledger technology, safeguards the *exclusivity* of luxury products in the digital realm. Its role in combatting counterfeiting enhances the perception of *authenticity*, a cornerstone of luxury brands. Moreover, its nature as a digital database, i.e., a secure peer-to-peer network ensuring transaction security (Sung *et al.*, 2023), enables the exchange and purchase of NFTs. NFTs are digital records associated with digital (intangible) or physical (tangible) assets, and their ownership is recorded on the blockchain. "NFTs serve as a communication channel between the brand and users. *"In one of our NFT launches, a purchase granted a two-year membership entailing various physical, experiential, and digital benefits. Remarkably, we successfully sold 5,000 memberships within a mere 22 hours"* (Informant C); *"Brand's inaugural NFT took the form of a digital artwork auctioned by Christie's, with the proceeds of the $25,000 sale donated to a specific charity. Our approach has consistently been artistic, emphasizing authenticity to steer clear of the speculative aspects that NFTs can sometimes generate"* (Informant F).

Furthermore, we present a table summarizing the findings derived from prior literature and recurring themes from interviews, offering insights into the effectiveness of each technology. The effectiveness is categorized on a scale from three to one arrow, denoting "Very effective," "Effective," and "Somewhat effective," respectively (refer to Figure 1).

Fig. 1: Technologies associated to Metaverse and their impact on traditional and novel luxury attributes.



6. How Metaverse Creates Value to the Different Stakeholders

This section aims to highlight the implications and connections between the Metaverse and the luxury audience, delineating a transformative landscape across various stakeholders, ranging from existing and new customers, to employees, investors and suppliers (Figure 2).

6.1 Customers

Traditionally, luxury items were exclusive to the wealthiest social classes and high net worth individuals, serving as conspicuous symbols of their affluence and social standing (Seo and Buchanan-Oliver, 2015). This demographic, characterized by substantial purchasing power, gravitated towards products and experiences that emphasize elegance, craftmanship, quality, and sophistication (Rosendo-Rios and Shukla, 2023). Their preferences typically aligned with well-established heritage brands renowned for consistently delivering exceptional products and services and delightful in-store experience. *"Stepping into a luxury store signifies a multifaceted experience. It involves the indulgence of attentive service from the staff and the sensation of entering a space where all five senses are enveloped in the essence of the brand. The encounter extends beyond the physical realm, offering a psychological experience that goes hand in hand with the tangible surroundings"* (Informant D). However, other segments indulge in occasional forays into luxury, such as a belt, a cap or a bag, often reflecting their financial capacity. This group, while lacking substantial savings, exhibits an increasing interest, attention and dedication to the brand (Seo and Buchanan-Oliver, 2015). Consequently, these individuals form a noteworthy customer base for luxury brands, yet their cultural knowledge of the essence of luxury, behaviors and lifestyles markedly differ. Some studies suggest that while the wealthiest consumers view luxury as a means to express their prestige and social status, the middle classes perceive luxury items more as a form of self-reward or personal prize (Silverstein and Fiske, 2003).

6.1.1 Current customers

When it comes to the Metaverse, luxury brands started to "test and learn" novel startegies to *re-generate and reinforce* connections with their current consumer base. For instance, through immersive experiences, personalized interactions, and exclusive offerings, brands could foster additional engagement and strengthen the loyalty of their existing clientele, fostering a more profound relationship. *"The implementation of the Metaverse empowers us to transcend geographical constraints and address the heritage challenge faced by luxury brands. A consumer situated in New York, Indonesia, or any other location, who cannot physically be in Italy, can still partake in the immersive experience and access digital products offered by our brand. This approach not only ensures effective brand storytelling but also enables us to strengthen relationships and foster rapport with existing consumers, even when they are geographically distant"* (Informant B). Moreover, the Metaverse holds the potential to facilitate luxury brands in establishing connections with diverse target audiences, including those who may not have the means to acquire luxury items in traditional settings. As supported by Informant D *"The Metaverse serves as a novel communication channel, providing a unique avenue to engage with diverse communities and customers. It offers the opportunity to deliver distinct and immersive experiences, fostering a new dimension of interaction"*.

6.1.2 New customers

In line with these insights, a shift in the concept of luxury has surfaced over the recent years, driven by a younger tech-savvy target of consumer (Hadi *et al.*, 2023), known for their digital affinity, and less accustomed to engaging with luxury brands in their typical daily journeys (de Kerviler & Rodriguez, 2019). Nevertheless, mirroring their quest for varied, personalized and engaging

experiences, luxury brands have begun leveraging the Metaverse as a portal to *access* and *engage* with these segments, creating an appropriate Brandtelling (Giorgino and Mazzù, 2018), establishing connections, granting co-creation experiences, serving as an experiential gateway into the realm of luxury. For instance, according to industry experts, the resulting offering present in the Metaverse would then not be only an entry point to attract future customers with limited "disposable income", but also relevant younger customers who now are less likely to spend their "disposable time" engaging with luxury brands. *"At the strategic level, our primary objective was to expand our reach to new audiences through a dual approach involving gaming and Web 3.0 activities, encompassing blockchain and NFTs. By establishing a constant and authentic dialogue we can generate much more lasting emotion than anything else. […] Through fostering a consistent and authentic dialogue, we can cultivate enduring emotional connections that surpass the impact of other interactions"* (Informant F); *"In the Metaverse, especially within gaming platforms, older generations may feel excluded due to the perceived technological complexity, as the environment predominantly caters to a younger demographic. Brands face a significant challenge in finding effective ways to directly communicate with these newer generations in this digital interactive space"* (Informant I). Still to be explored behaviors of the new Generation Alpha, that, *"being digitally native, is on the one side expecting a superior seamless and perfect experience when interacting in the digital world, on the other side is rediscovering the pleasantness of interaction with physical environment at retail stores"* (Informant E), *"where the traditional digital experience is becoming a sort of commodity, and newer experiences might generate new type of engagement"* (Informant E).

6.2 Employees

Expanding the range of potential stakeholders, the integration of the Metaverse within an organization can also influence employees' work efficiency and enjoyment (Hwang, Shim & Lee, 2022). Therefore, companies started to *"implement mandatory training sessions for all employees, providing comprehensive knowledge about the fundamentals of the Web 3.0 world, NFTs, and related concepts. […] Instances have occurred where buyers of our NFTs visited our physical stores, asserting their association with specific projects, only to encounter sales associates who were unfamiliar with the subject matter"* (Informant C). Ensuring that all staff members are well-versed in these emerging technologies is crucial for maintaining consistency and understanding across customer interactions and *"the successful execution of a project within the Metaverse necessitates the wholehearted collaboration and alignment of all departments involved. Each department must be on board, working cohesively, and providing unwavering support to ensure the project's seamless integration"* (Informant I). Accordingly, as reported by (Koohang *et al.*, 2023) the Metaverse extends beyond consumer engagement; it provides a unique space and *belongs* for employees to connect, collaborate, and contribute to the brand narrative. By fostering a sense of belonging within the virtual realm, luxury brands can enhance internal collaboration, creativity, and overall employee satisfaction, translating into a more cohesive and motivated workforce (Buhalis *et al.*, 2023).

6.3 Investors

In addition, the Metaverse introduces novel avenues for luxury brands to *outperform* in the eyes of investors. Successful integration and innovation within this digital space can be perceived as a strategic move, signaling adaptability and foresight (Duhaylongsod and De Giovanni, 2019). Brands that effectively leverage the Metaverse to enhance customer experiences, drive sales, and strengthen brand equity may attract heightened investor interest and support as *"the ultimate layer will in any case be the financial impact, generated by additional direct, or indirect, sales"* (Informant E).

6.4 Suppliers

Finally, collaborating and *loyalize* with leading technology suppliers is integral to a luxury brand's

success in the Metaverse. Furthermore, engaging in direct communication and forming partnerships with various technology partners, including suppliers and resellers, offers the chance to access and experiment with technological advancements, including VR hardware and AR visualization tools (Zabel *et al.*, 2023). As supported by Informant C *"The strategy we adopt involves extensive outsourcing as we recognize the complexity of the field and refrain from assuming expertise in-house. Our approach is to seek inspiration and influence from external experts, allowing us to be enriched by their knowledge. By collaborating with those who specialize in the field, we aim to bring our unique perspective and distinctive qualities to the table, fostering a collaborative environment that encourages innovation and creativity"*.

The Metaverse offers a dynamic arena for luxury brands to reinforce existing relationships, engage new demographics, foster internal cohesion, attract investor confidence, and fortify partnerships with technology suppliers. Navigating this digital frontier strategically can unlock unprecedented opportunities and elevate the brand's standing across various stakeholders.

7. Metaverse as a Tool to Build Competitive Advantage and Achieve Strategic Objectives

The potential of the Metaverse to *reinforce, re-generate, access, and engage*, affects the essential attributes of luxury, impacting the different stakeholders of luxury brands (Figure 2). The presence of a well-executed Metaverse strategy might then deeply affect the brand value creation chain "customer mindset - market performance - shareholder value" (Keller and Lehman, 2003), and the related primary strategic objectives of luxury, encompassing brand equity, customer equity, as well as financial and market performance. In this respect, executives underline diverse area of the Metaverse's impact on luxury strategic objectives. While some *emphasize "transposing heritage, brand identity, and image elements in a recognizable way in the Metaverse"* (Informant I) to stimulate brand equity, others view the Metaverse *"not only as a channel for building equity but mostly as a means to increase turnover"* (Informant D), and to "*introduce new revenue streams for luxury brands*" (Informant F). Through the sale of virtual goods, Non-Fungible Tokens (NFTs), and exclusive digital experiences, brands can, in fact, tap into a lucrative market (Belk, Humayun & Brouard, 2022). Additionally, the Metaverse offers a platform for innovative collaborations and partnerships, expanding revenue potential beyond traditional channels. "*With the first NFT drop, we generated revenues of 8 million. Of course, economic revenue is a very important aspect to consider in the Metaverse"* (Informant C).

Within the Metaverse, luxury brands can forge strong associations and establish a memorable presence, thereby fortifying their uniqueness and fostering positive perceptions among consumers (Hadi *et al.*, 2023), thus fulfilling objectives of brand equity building, in terms of creating brand assets that contribute positively to the overall value delivered by a product (Aaker, 1996), while generating a differential superior impact on the brand (Keller, 1993). As stated by Informant A *"if you aim to establish a brand presence in the metaverse, it is essential to adopt a long-term perspective on its activation and to cultivate users' trust over an extended period. Building a sustained presence allows for the gradual development of visibility and awareness within the metaverse community. This strategic approach ensures that the brand becomes a trusted entity, contributing to its lasting impact and resonance in the Metaverse space"*. Notably, the application of reality enhancement technologies like VR, AR, and MR in the luxury sector affects the customer journey and contributes to strengthening brand equity (Javornik *et al.*, 2021; Buhalis *et al.*, 2022). These technologies, by enabling virtual personalization and simulating the experience of donning luxury products through avatars, impact the perception of luxury attributes. This, in turn, fortifies the association with the brand's name and symbol, ultimately bolstering brand equity (Kim *et al.*, 2023). Additionally, engaging in *gamified* activities within the Metaverse has been shown to facilitate deeper emotional connections and awareness with the brand, fostering greater intimacy and commitment among consumers (Barrera and Shah, 2023). "*Gamification is the fundamental mechanism for creating*

constant interaction, contact, and dialogue with the customer. [...] We always strive to translate the quality of our products into beauty, and beauty, in turn, translates into a pleasant experience. By delivering this kind of experience, we can bring customers closer to our brand and increase consumer equity" (Informant F).

Finally, as confirmed by executives, luxury brands can elevate market performance by paving the way to "*a more positive perception of the brand by investors in the luxury sector*", through better growth expectations derived from the "*access to new potential segments and engagement of underserved ones*", and the "*capability of ensuring innovation within the boundaries of luxury authenticity and heritage*". Virtual environments provide a global stage for brands *"to connect with audiences worldwide, breaking geographical constraints"* (Informant C). Moreover, staying active in the Metaverse allows brands to stay attuned to emerging trends, ensuring they remain relevant and adaptable in a rapidly evolving luxury market.

8. Relevance of Key Enablers to Ensure Metaverse's Impact

The interconnection of the Metaverse's attributes and core elements with luxury brands, along with its impact on strategic objectives, initiates a reinforcing loop that continuously evolves and elevates the future luxury attributes. As emphasized by industry experts, a prerequisite for the Metaverse to have a truly positive and sustainable impact on such industry involves the implementation and effective execution such as organization, IT systems, and performance metrics (Figure 2).

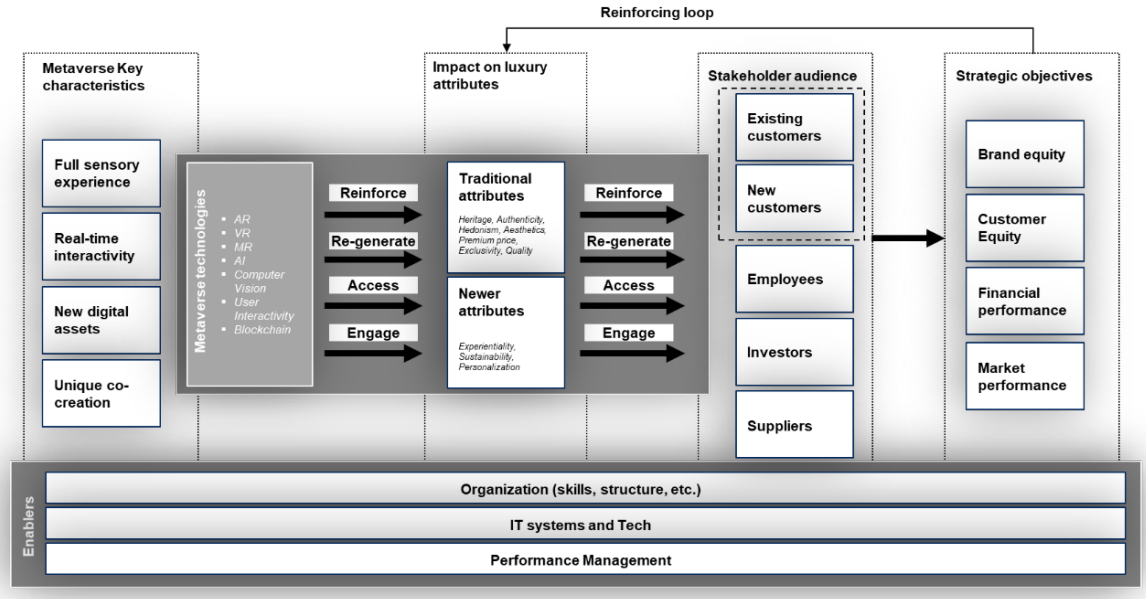
First, luxury brands that want to establish their presence in the Metaverse need to develop the necessary skills and expertise, as well as a proper organizational structure, that can help navigating and capitalizing on the opportunities presented by this new means of communication (Hwang *et al*., 2022). For instance, it is crucial that *"all the departments are aligned, updated and supportive between each other"* (Informant I). This involves *"training and upskilling employees to understand the dynamics of virtual environments, digital technologies, and emerging trends"* (Informant C). Additionally, the organizational structure should be flexible and adaptive to integrate new roles and responsibilities related to Metaverse strategies.

Second, the backbone of successful Metaverse integration lies in the agile integration of advanced technologies that support seamless connectivity, data analytics, virtual experiences, while guaranteeing protection and security. The IT infrastructure should be capable of handling the complexities of Metaverse interactions, ensuring a smooth user experience (Lee *et al.*, 2021), and a dedicated function should be ready to "*keep exploring and testing alternatives for the benefit of the business*" (Informant B) and "*advancing the use of available technologies for guaranteeing market impact of the Metaverse*" (Informant F). Moreover, since vast amounts of data will be generated exploiting the Metaverse, luxury brands might apply the blockchain technology to the data storage system to guarantee the de-centralisation and security of information shared in the Metaverse.

Finally, implementing appropriate performance metrics systems enable luxury brands to track and measure the impact of each Metaverse's initiative and project. To date, there still a lack in terms of desired availability of performance indicators to monitor activities in the Metaverse as *"most of the KPIs are proprietary to the varies platforms, so there's not an independent verification"* (Informant A). According to Informant H, *"the measurements should be essentially similar to those in a physical store because, ultimately, the experience involves an avatar entering a virtual store. There may be additional considerations related to the location, specifically its physical position within this virtual world; however, measuring such aspects has become more intricate"*. Therefore, brands should deploy analytics tools and KPIs such as *"monitoring user engagement, repeated visits, time spent when building a microverse"* (Informant A), or *"assessing the effectiveness of virtual experiences, and gathering insights into consumer behavior within the Metaverse"* (Informant F) are fundamental, as the "*Metaverse should evolve and integrate the performances of the current online and physical retail, sales and communication channels*" (Informant E). Moreover, "*it is extremely relevant to*

understand the pace at which wearbale technologies are adopted, if they are adopted by the expetected consumers' target, and how they use them […] which music they hear and why, which content they look at, in which occasion devices are activated" (Informant L). All these metrics will be essential for making informed decisions, optimizing strategies, and demonstrating the return on investment in the virtual space.

Fig. 2: Integrated model of the impact of Metaverse on the luxury industry



9. Conclusions

The Metaverse provides a unique opportunity for luxury brands to reinforce their brand and customer equity, while improving their financial and market performance. Starting from the understanding of the current mix of attitudes toward this set of technologies, ranging from skepticism to enthusiasm by top luxury executives, this article aims to establish a theoretical framework, and the related logical building blocks, that can assist luxury managers in making informed decisions about implementing impactful digital strategies within the Metaverse.

By relying on a set of structured in-depth interviews, our research shows that luxury brands can leverage the Metaverse to reinforce, re-generate, access, and engage relevant stakeholders, by positively affecting a relevant set of luxury attributes. This enables brands not only to strengthen relationships with existing customers but also to embrace new communities and target audiences. Once luxury attributes are aligned with the Metaverse, brands may experience a positive impact on their strategic objectives, provided that specific enablers are in place. Therefore, once the above is set, a significant effect might be expected in strengthening brand and customer equity, improving company performance, and creating the basis for a reinforcing loop.

Additionally, this paper argued that through careful consideration and the adoption of the right strategies, luxury managers can unlock the potential of the Metaverse, leverage its unique features to their advantage and create new opportunities for differentiation and growth. The Metaverse can then serve as a powerful tool for luxury managers to achieve their business objectives and stay ahead of the curve in an ever-evolving market.

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1

Appendix 1. Disguised list of interviews

Future strategic interest in the Meaverse	Informant	Sector of the company	Range of turnover (2022)	Informant Role	Years of experience
Yes	Informant A	Luxury jewellery	<0,1 bn Euro	Global broadcast Director	10-20
Yes	Informant B	Luxury jewellery and watches	> 1 bn Euro	Innovation&Transformation Director	>20
Yes	Informant C	Global luxury fashion	> 1 bn Euro	Haed of New Media	10-20
Yes	Informant D	Global luxury automotive	> 1 bn Euro	Global Marketing Director	>20
Yes	Informant E	Global luxury automotive	0,1-1 bn Euro	Chief Marketing Officer	>20
Yes	Informant F	Global luxury fashion	> 1 bn Euro	VP Metaverse Ventures	10-20
Yes	Informant H	Global luxury fashion	0,1-1 bn Euro	Chief Information Officer	>20
Yes	Informant I	Global luxury fashion	0,1-1 bn Euro	Ecommerce Manager	10-20
Yes	Informant L	Global luxury eyewear	> 1 bn Euro	Global Head Brand eyewear	10-20
No	Informant M	Luxury jewellery and watches	> 1 bn Euro	Chief Client Officer	>20
No	Informant N	Global luxury fashion	> 1 bn Euro	CEO	>20
No	Informant O	Global luxury fashion	> 1 bn Euro	Chief People Officer	>20
No	Informant P	Global luxury fashion	> 1 bn Euro	Global HR Director	>20
No	Informant Q	Global luxury fashion	> 1 bn Euro	CEO	>20

Impact of inclusive marketing and adaptive fashion on Gen Z's customer journey: an explorative study in the digital realm of the luxury industry

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Abstract

Frame of the research. *This research centers on exploring the influence, effectiveness, and impact of Inclusive Marketing on Generation Z's (Gen Z) customer journey, situated within the context of Marketing 5.0's Next Tech advancements and digital-savvy Gen Z.*

Purpose of the paper: *The primary objective is to investigate and demonstrate the role of Inclusive Marketing and Adaptive Fashion in shaping Gen Z's customer journey. Additionally, the study seeks to understand the implications of Marketing 5.0, particularly in the luxury sector, and to determine whether inclusivity can redefine exclusivity within this industry.*

Methodology: *Employing a combination of secondary and primary research methods, including quantitative data analysis, this article critically assesses the relevance and application of Inclusive Marketing, focusing on its implications for the luxury sector. The research also scrutinizes the concept of Adaptive Fashion and its potential role in Marketing 5.0's Next Tech landscape.*

Results: *The findings affirm the efficacy and impact of Inclusive Marketing and Adaptive Fashion in the digital sector of Gen Z's customer journey. Furthermore, the positive reception of Marketing 5.0's Next Tech applications by Gen Z suggests enhanced marketing accessibility, ultimately fostering greater diversity and inclusivity within the fashion industry.*

Research Limitations: *Despite the valuable insights gained, it is essential to acknowledge the limitations of this research, including potential biases in data collection and generalizability of findings.*

Managerial Implications: *The study provides insights for marketing managers and industry professionals, highlighting the potential benefits of adopting Inclusive Marketing and leveraging Adaptive Fashion to cater to Gen Z's preferences in the Marketing 5.0 era.*

Originality of the paper: *This research contributes to the existing body of knowledge by offering a comprehensive exploration of Inclusive Marketing, Adaptive Fashion, and their impact on Gen Z's customer journey within the evolving landscape of Marketing 5.0. The investigation also poses critical questions regarding the redefinition of exclusivity in the luxury sector through inclusivity.*

Key words: *inclusivity; marketing; ethics; fashion; luxury*

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1. Introduction

In the dynamic era of mass communications, emerging technologies, and diverse consumer markets, businesses face the challenge of establishing successful long-term relationships with their target customers. An essential aspect of achieving this goal lies in creating a well-balanced mix of marketing communications (Kitchen & Burgmann, 2015). Additionally, the concept of sustainability has gained significant prominence, extending beyond environmental concerns to encompass social practices (Caratù *et al.*, 2023b). Notably, as the global consumer population becomes increasingly diverse in terms of race, ethnicity, sexual orientation, and abilities, brands must genuinely reflect a range of backgrounds and experiences to forge effective connections with future customers (Gilbert, Stead & Ivancevich, 1999; Pless & Maak, 2004).

Moreover, the unprecedented impact of the Covid-19 pandemic has accelerated the digitalization of businesses, necessitating adaptations to new digital realities. This has given rise to the notion of Marketing 5.0, wherein technology intertwines with humanity to foster a sustainable society, facilitated by smart technologies, or the Next Tech (Kotler, Kartajaya & Setiawan, 2017). Simultaneously, the evolving consumer market has made it increasingly challenging to establish authentic feelings of inclusivity, and traditional generalized marketing may fail to cater to the unique needs of distinct consumer segments. Consequently, the marketing landscape is shifting towards inclusive communication strategies to ensure that products and services address the diverse needs of all consumers (Dimitrieska, Stamevka & Stankovska, 2019).

This study aims to address these contemporary challenges by investigating the impact of Inclusive Marketing and Adaptive Fashion on Gen Z's customer journey in the digital sector. Generation Z, comprising the majority of the workforce by 2025, represents a crucial demographic with distinct preferences and expectations. Thus, understanding and meeting their needs become paramount for businesses seeking sustainable growth.

The primary objectives of this research (research questions – RQ) are as follows:

Objective 1 (RQ1): To assess the extent of influence that Inclusive Marketing in the digital sector has on Gen Z's customer journey, both within the luxury and non-luxury sectors. Additionally, the study aims to evaluate the effectiveness of Inclusive Marketing for Gen Z within the context of Marketing 5.0, permeated by Next Tech, with a specific focus on enhancing marketing accessibility.

Objective 2 (RQ1): To examine whether Adaptive Fashion can be considered the evolutionary step towards inclusivity within the fashion industry, particularly in catering to the needs of the selected target audience (Gen Z). Moreover, the study aims to explore the impact of Adaptive Fashion on Gen Z's perception of brand image and its potential to foster diversity and inclusion in the fashion sector (Bernstein *et al.*, 2020).

To achieve these objectives, the research has employed a combination of secondary and primary data, using a quantitative approach to analyze the responses of the selected target audience. By investigating the correlation between inclusive marketing strategies, customer perceptions, and brand image, this study seeks to contribute valuable insights to the promotion of diversity, inclusion, and ethical practices in both the business and fashion domains.

2. Research Context

2.1 From Marketing 1.0 to Marketing 5.0 with the Next Tech and the Gen Z

Covid-19 pandemic has accelerated the digitalization of businesses, as well as cause-related marketing initiatives on the web (Castellano *et al.*, 2023) so people are inclined to think that this is the right time for Marketing 5.0, where technology meets humanity by creating a sustainable society supported by smart technologies, the Next Tech (Kotler, Kartajaya & Setiawan, 2017). In particular, Marketing 5.0 is "the application of human-mimicking technologies in order to create, communicate, deliver and increase value across the customer journey" (Kotler, Kartajaya & Setiawan, 2021); while,

the Next Tech is a group of technologies that aims to emulate the capabilities of human marketers, like: artificial intelligence (AI), natural language processing (NLP), sensors, robotics, augmented reality (AR), virtual reality (VR), internet of things (IoT) and blockchain. It is important to highlight that a combination of these technologies is the enabler of Marketing 5.0 and exploiting them in the most appropriate way can revolutionize how marketers play their trade in the digital world; it could also be an effective way to get closer to inclusivity in the digital and social media marketing and make marketing accessible to everyone (Kotler, Kartajaya & Setiawan, 2021).

In addition, Marketing 5.0 addresses challenges in a digital world, including the generational gap. In fact, in order to succeed, companies must adapt their strategies to cater to diverse attitudes and preferences and marketers are now turning their attention to Generation Z (1997-2012): the very first digital natives who has outnumbered Generation Y as the largest generation globally; in fact, by 2025, they will make up most of the workforce and thus, become the most significant market for products and services (Kotler, Kartajaya & Setiawan, 2021). Moreover, they are, as Millennials (Generation Y), also very focused on sustainable products, including fashion (Ryding *et al.*, 2016, 2022; Caratù *et al.*, 2023c).

2.2 Needs and wants of the selected target

The hi-tech marketing touchpoints can revolutionize how marketers play their trade in today's competitive digital scenario. Moreover, in this digitization process the means of communication were the main area where the waves of change hit for the better (Fanta & Ayman, 2021). In fact, companies are now more inclined to focus their marketing strategy on social networks rather than on traditional media (Tulen, Solomon, 2018). In particular, social media has transformed the way people interact, fostering inclusivity by breaking down geographic and demographic barriers (Kotler, Kartajaya & Setiawan, 2017). To keep up with the evolving social climate, brands must take responsibility, encourage social change and create campaigns that celebrate diversity and representation (Pérez, 2022). In particular, Gen Z prefers to portray authentic version of themselves and wants to see this kind of approach put into practice in the marketing as well, but not just as a mere marketing stunt and thus support brands that align with their values and address social and environmental issues. For these reasons, personalized, highly targeted online ads and campaigns are essential for marketing success, since authentic and inclusive advertising fosters trust, loyalty and purchase intent among Gen (Microsoft, 2021; Dicey, 2021). This was confirmed by a 2021 study from Quantilope, which found out that 53% of Gen Z said they would like to see brands include more diverse casting and imagery in their advertising and branding.

Hypothesis 1: Gen Z wants to see diversity and inclusion in marketing campaigns.

Finally, Gen is longing for the perfect application of the Next Tech that allows everyone to have marketing accessibility even in their customer journey (Kotler *et al.*, 2017) and is very willing to spend their money where their values are represented.

Hypothesis 2: Gen Z is longing for the perfect application of the next tech of Marketing 5.0 that allows to have a better marketing accessibility in their customer journey online.

2.3 Towards more sustainable types of marketing: Inclusive Marketing and D&I

In today's marketplace being transformed by digitalization, social change and a global pandemic, leading retailers and brands know that they must keep meeting evolving consumer preferences to stay relevant (Brown *et al.*,2022). In this context, terms such as "diversity" and "inclusivity" are gaining more and more relevance, since Gen Z lives in a world that is more aware, connected and attentive to the rights of all social categories. In fact, the importance of these issues has consequently also pushed brands to embrace a new way of communicating: Inclusive Marketing (Creation Dose, 2021). In particular, being the future of Marketing 5.0, it is defined as a communicative approach of creating content that truly reflects the diverse communities that companies serve. It means that people are

elevating diverse voices and role models, decreasing cultural bias and leading positive social change through thoughtful and respectful content (Pérez, 2022). Moreover, Inclusive Marketing is about building genuine long-lasting relationships and connection between brands and people (Microsoft, 2021) by considering all aspects of a person's identity like: skin color, gender identity, age, sexual orientation, body type, ethnicity, culture, language, religion, socio-economic status and much more (Chiorboli, 2021). In this way, inclusive marketing ensures that a brand reaches the broadest intended customers: accessibility on digital platforms through the next tech and in-person experiences (Saini, 2022). Not to mention, diversity and inclusion are not synonymous: diversity is the 'what' (Gynn, 2020) and is about individual differences and characteristics (Dimitrieska, Stamevka & Stankovska, 2019); while inclusion is the 'how" (Gynn, 2020) and is a measure of culture that enables diversity to thrive (Dimitrieska, Stamevka & Stankovska, 2019). In addition, among the numerous benefits of adopting Inclusive Marketing are that, by reaching a wider audience, by gaining brand respect, trust and recognition and by understanding and getting closer to customer, brands can boost their bottom line (Nosto, 2020). Finally, it is possible to assess the effectiveness and the influence of Inclusive Marketing in the customer journey of the target by simply looking at the following data: a survey conducted by Google and The Female Quotient showed that "64% of the respondents acted after seeing an ad considered as diverse or inclusive; 69% of black customers were more likely to purchase from a brand whose ad positively represents their ethnicity (Zalis, 2019); 90% of them say authenticity is important when deciding which brand they like and support and which products buy (Nosto, 2020). So, on the whole, there was an increase in purchase intent after being exposed to an ad deemed inclusive, that drives trust and builds loyalty for Gen Z. In fact, another study conducted by Microsoft showed that an inclusive ad drove a 23pt lift in the global purchase intent (Microsoft, 2021).

Hypothesis 3: There is a direct correlation (positive) between inclusive marketing campaigns/strategies and Gen Z's willingness to pay, since they have high impact on their customer journey.

Hypothesis 3 bis: There is a direct correlation (positive) between inclusive marketing campaigns/strategies and Gen Z' s brand image perception.

Finally, many recognizable brands have successfully implemented diversity and inclusivity in their marketing strategies, resonating with varied audiences and challenging traditional beauty standards (Germano, 2020; Thompson, 2021). Brands like Fenty Beauty, Dove, Adidas and Calvin Klein have showcased diverse representations in their campaigns to connect with a broader consumer base (Sernagiotto, 2021).

2.4 Customer journey in the luxury industry

In the luxury industry, today there is no more the "Internet dilemma" (Bastien & Kapferer, 2009), since digitalization is more fundamental than ever: e-commerce and social media marketing and platforms have extended the reach of luxury brands worldwide. The opening up its boundaries to the globalisation thanks to the Internet has impacted also the way luxury brands approach diversity and inclusion issues (Capobianco, 2020). In fact, in recent years, luxury industry began to give D&I issues a central role in internal governance and communication strategies and the number of luxury brands which have launched and shared a message of inclusion and diversity has grown exponentially (Khalifa, Shukla, 2021).

Finally, the market has made a lot of progress in a short time by creating diversity councils, appointing chief diversity officers and developing special programs for underrepresented groups (Creary, 2021). Thus, luxury is becoming more inclusive in terms of design, stores, by speaking to the emotional side of consumers, through storytelling, in order to be present in their lives not only with products, but also with content and values. (Cabigiosu, 2020).

In fact, in the economic era people live nowadays, experience plays a leading role (Van Hagen, Bron, 2013) and people are inclined to think holistically about customer experience (CX), as a journey that consists of customers' cognitive, emotional, sensory and spiritual responses to all individual

touchpoints. Therefore, the decision-making process of a product is not related to a logical process, but, on the contrary, every choice is influenced by emotions and impulses, the so-called "emotional journey" (Varnali, 2018). Marketers are inclined to divide this journey into five main micro stages: attention, attraction, interest, analysis and action (Kotler, Keller, 2012). Nowadays people can easily observe that there was a paradigm shift from what was previously called the "customer decision-making process" to what is actually known as "customer decision journey" or "mass marketing customer journey", centered on the concepts of consumer-centricity, data overload and hyper-targeting. In particular, at a broader level, customer journey can be explained as a process that transforms a person into a customer and describes the path and behaviour that customers take when deciding to make a purchase (Fanta, Ayman, 2021). From the digitalization era, the conventional consumer purchase journey has changed radically, since now customers want to share their past-purchase experience online (Gupta, 2020). Therefore, it encompasses three main macro stages of the purchase: pre-purchase, purchase and post-purchase (Fanta, Ayman, 2021). In particular, it is now widely argued that the consumer also passes through five different stages in its purchase journey: need or problem recognition, information search, evaluation of alternatives and post-purchase behavior (Kotler, Keller, 2012).

2.6 Inclusive marketing in luxury brands

The luxury world has increasingly evolved and changed connotations over time (Mimosa Ravasio, 2020) and luxury brands are trying to incorporate inclusive marketing in their strategies, thus trying to carry on and increase the paradox of making inclusivity the new exclusivity without suffering from unconscious bias (Team Vue.ai, 2019). However, despite efforts, a Salesforce study shows that 62% of Gen Z does not feel that luxury brands communicate and include them (Dumargne, 2021) and the physical store remains a symbol of the unique luxury experience for them (Capobianco, 2020).

Hypothesis 4: There is an inverse correlation (negative) between inclusive marketing strategies and Gen Z's luxury industry perception.

Inclusivity in the luxury sector can range from the representation of bodies, the issue of gender, the representation of cultures to the social inclusion. In fact, brands like Kenzo, Dolce & Gabbana, Gucci, Chanel and others are challenging traditional beauty standards and promoting diverse representation (Dumargne, 2021) in order not to be misunderstood and to avoid cultural appropriation. In addition, while inclusive marketing can drive economic growth and revenues, luxury brands aim to balance inclusivity with exclusivity in order to maintain their luxury status (Creary, 2021). Thus, brands must uphold high-quality products and core values while leveraging next-gen tech like virtual try-ons and AI for personalization (Bargeron, 2021) (Klajda, 2019). So, inclusivity can be the new exclusivity if there is a balance between all those strategies, even better if luxury brands use the next tech of Marketing 5.0 to let inclusive marketing be accessible to all customers and to improve the phygital manifestation, which is fundamental in the light of Covid-19 Pandemic and the digital savvy Gen Z mindsets (Gottl, 2020). In fact, entering the Metaverse, virtual try-ons, AI and AR are also gaining widespread interest (Bargeron, 2021).

Hypothesis 5: In a phygital perspective, the luxury shopping online with the next tech of Marketing 5.0 (for ex. in social media marketplaces) improves the Gen Z's customer experience.

2.7 The evolution of fashion towards inclusivity: Inclusive Marketing meets Adaptive Fashion

Inclusive marketing can be also used as a tool to provide better accessibility and experience for disabled people, since they are often underrepresented in marketing in general (Shalvi, 2022) and they constitute around 16% of the global population (WHO, 2022). In particular, although it can be challenging and difficult for inclusive Marketing to include and represent all forms of disability, there are tools of the next tech of Marketing 5.0 and practices that can provide a more inclusive experience and accessibility in marketing, like: the alternate text, subtitles and audio description; the time-

sensitive and color content; AI, AR, screen readers and magnifiers (Shalvi, 2022), but also apps that tie the shoes of disabled people, as the one created by Nike and so on (Gambi, 2021).

Hypothesis 6: The next tech of Marketing 5.0 (for ex. Alt-text, subtitles, AI, AR, etc.) can make the fashion industry more diverse and inclusive and move it towards adaptive fashion, which improves the brand image.

Furthermore, since in 2022 there were still inclusivity barriers for disabled people within the fashion industry too (Alexiou, 2022), even the fashion sector is trying to offer some ways to include and provide more accessibility and a better experience for them and the best one is Adaptive fashion, which can be considered as the evolution of fashion towards inclusivity and diversity (Alvarez, 2021). More specifically, Adaptive Fashion is a branch of ethic and sustainable fashion that mixes together fashion and disability (Alvarez, 2021), with apparel created for disabled people and for their needs, to ensure ease of dressing and style representation by providing some clothing modifications (Gambi, 2021). Adaptive fashion offers psychological and emotional benefits by reflecting personal needs and style, promoting self-confidence and not to make any individual feel excluded (Alexiou, 2022). In addition, the global adaptive clothing market is expected to reach nearly $400 billion by 2026 (Gambi, 2021) and it is developing very fast and becoming widely popular in the United States and Great Britain (Olivieri, 2018). Brands like Alexander McQueen and Tommy Hilfiger have led the way in inclusive fashion, hiring disabled models and creating adaptive clothing lines (Alvarez, 2021). The representation of disabled models in the fashion industry fosters body acceptance and challenges conventional beauty standards (iMobility, 2020).

2.8 Cultural appropriation in the fashion industry

An inappropriate and bad management of inclusive marketing strategies can lead to cultural mistakes and blunders or, in the worst case, to the cultural appropriation phenomenon (Young, Brunk, 2012). In the 21st century, cultural appropriation can be found also within the luxury and fashion industries, especially in relation to the themes of diversity and inclusivity, which can generate a lot of indignation among people, especially Gen Z and designers (Blazio-Licorish, Anyanwu, 2020). Luxury brands such as Gucci, Prada, Louis Vuitton, Isabel Marant, Chanel, Burberry, Givenchy and Loewe have been accused and condemned of cultural appropriation for borrowing ideas, symbols, and styles from BIPOC cultures without proper credit, leading to negative impacts on their brand image (Assomull, 2021) (Blazio-Licorish, Anyanwu, 2020). Examples include: Gucci's controversial kaftan resembling a kurta and the balaclava-style sweater resembling blackface (Assomull, 2021) (Bobb, 2019); Prada faced backlash for its "Otto-Toto" keychain resembling blackface (Silbert, 2018).

In fact, this lack of a multicultural approach may also lead to a brand reputation and brand image harms, even if they claim to have inclusive marketing strategies (Pozzo, 2020).

For these reasons, Gen Z actively educates and criticizes cultural appropriation on social media platforms and believes brands should properly credit and apologize to the affected communities to address criticism for cultural appropriation, like happened for other fashion brands in the past (Borgerson *et al.*, 2009).

Hypothesis 7: When inclusive marketing strategies fall into practices of cultural appropriation, they negatively impact the Gen Z's brand image.

3. Research Methodology

The data of the quantitative research has been collected through a structured Internet-Mediated or Web-based questionnaire, which has been submitted to 145 persons belonging to the Gen Z's target (15-25 years old), which were both Italian and foreigners. The questionnaire was divided into seven main sections: demographics, inclusive marketing, next tech of marketing 5.0, inclusive marketing in the luxury industry, adaptive fashion, cultural appropriation and customer journey in the digital

sector; it comprises 30 entirely closed-end questions with available answers of five scales of significance; it also includes dichotomous choices (Yes/No) and non-comparative scaling techniques (Likert scales and Rating scales).

Finally, the time period over which this survey extends is cross-sectional (Sreejesh, Mohapatra & Anusree, 2014).

4. Data Analysis and Findings

In this section, data gathered from the internet-mediated questionnaire have been analyzed by using both the frequency distribution statistical techniques and the correlations. In this way, the insights gained from the data analysis will lead to informed judgments and conclusions (Sreejesh, Mohapatra & Anusree, 2014). In particular, from the analysis of the frequency distribution, in relation to the demographics section of the survey (Q.1-Q.5), it emerged that the whole sample of the 145 respondents belonging to the Gen Z is constituted as follows in Table 1:

Tab. 1: Sample's characteristics related to Gender, Age, Country of residence, Educational qualification and Occupation

Gender	Absolute frequency	Percentage
Male	52	35.9
Female	93	64.1
Total	145	100.0
Age		
15-18	2	1.4
18-21	27	18.6
21-25	116	80
Total	145	100.0
Country of residence		
Italy	137	94.7
Spain	5	3.4
Russia	2	1.4
Total	144*	99.5*
Educational qualification		
Primary School	1	0.7
Secondary School	42	29
University	83	57.2
Graduate	17	11.7
None	2	1.4
Total	145	100.0
Occupation		
Student	60	41.4
Unemployed	10	6.8
Employed	52	35.9
Employed-student	23	15.9
Total	145	100.0

Source: Own Production from Primary Research.

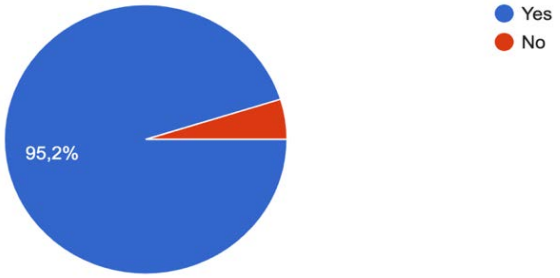
So, we could notice from Table 1 that the majority of them were females (64.1%) in the age between 21-25 (80%), from Italy (94.7%), which are mainly students (41.4%) with University educational qualification (57.2%).

Now, in order to achieve what it has been discussed so far, the study has analyzed several factors, but in this section, they have not been reported tout–court, still the most significant ones have been taken into account, attaining thus the following main outcomes, like:

- The "*Gen Z's willingness to buy products from brands that embrace Inclusive Marketing by including and representing underrepresented people in marketing campaigns/strategies"* (Q.6)

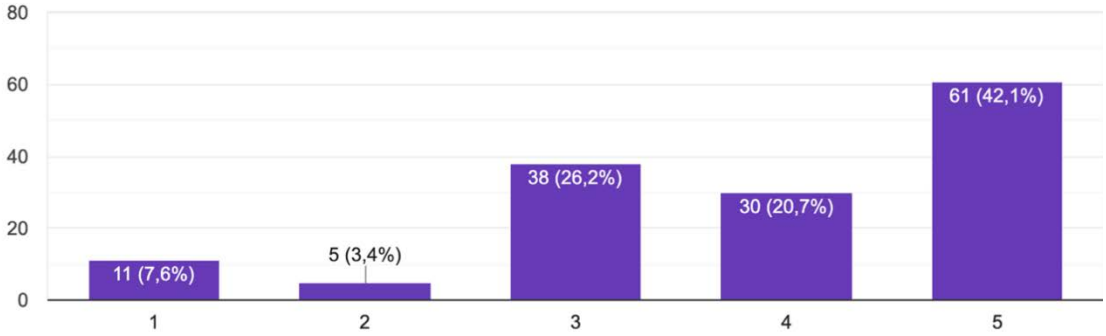
and as you can see from the graphs below (Figure 1) , almost the whole sample (95.2%), whose absolute frequency is 138, would buy them; as well as, as you can see from the rating scale from 1 to 5, (where: 1= not important…5= very important) (figure 4.2), the majority of them (4.1%), whose absolute frequency is 61 (Figure 2), consider very important *"to see underrepresented people in marketing campaigns/ads"* by selecting the numerical score (Q.8)

Fig. 1: Gen Z's willingness to buy products from brands that embrace inclusive marketing in their campaigns/strategies. Source: Own Production from Primary Research.



Source: Own Production from Primary Research.

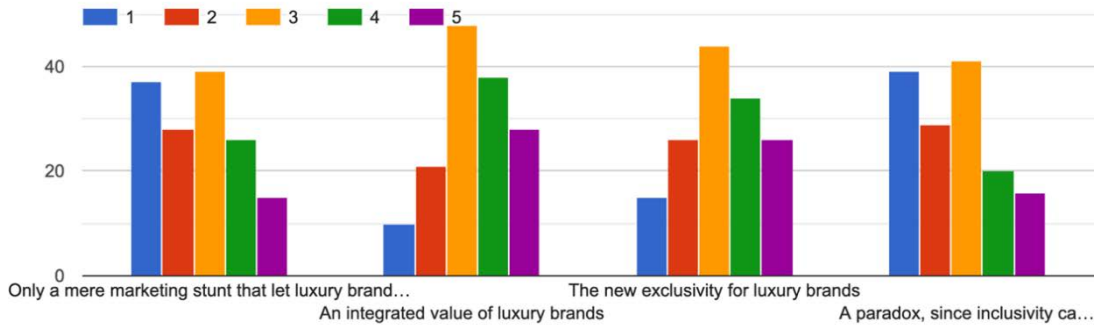
Fig. 2: The importance to see underrepresented people in marketing campaigns/ads for Gen Z. Source: Own Production from Primary Research.



Source: Own Production from Primary Research.

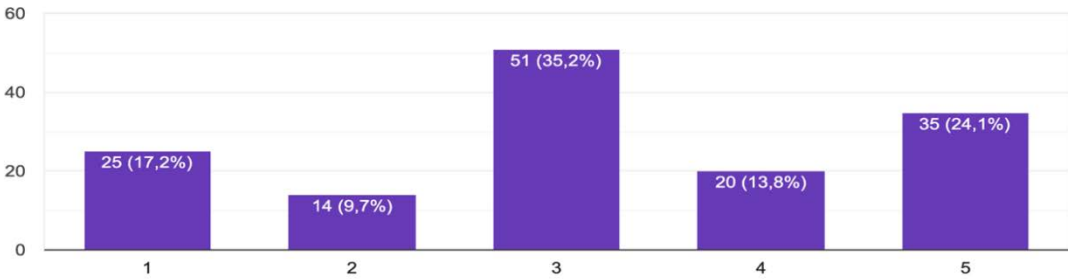
- The *"Gen Z's opinions towards Inclusive Marketing in the luxury sector"*(Q.16), and as you can see from the Likert scale below from 1 to 5 (where 1= totally disagree…5= totally agree) (figure 3), although they are in the middle, since they quite agree with the four statements, all the second most select scores are positive; in fact, *"their perception of the luxury industry's inclusivity"* (Q.17) in general, as you can see from Figure 4, from 1 to 5 (where: 1= not at all…5= very much) is overall positive, since although the majority of them (35.2%) thinks that it is quite inclusive, the second most selected score (24.1%) is 5, so really inclusive. To conclude, from Figure 5 emerged that almost the whole sample (88.3%), so 128 respondents *"would like to see more luxury brands that include and represent underrepresented people in their campaigns/ads"* (Q.19).

Fig. 3: Inclusive marketing in the luxury sector for Gen Z. Source: Own Production from Primary Research.



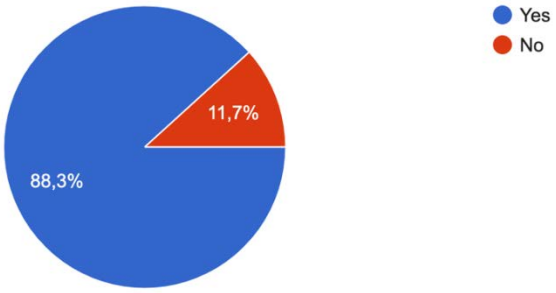
Source: Own Production from Primary Research.

Fig. 4 Gen Z's perception of the luxury industry's inclusivity. Source: Own Production from Primary Research.



Source: Own Production from Primary Research.

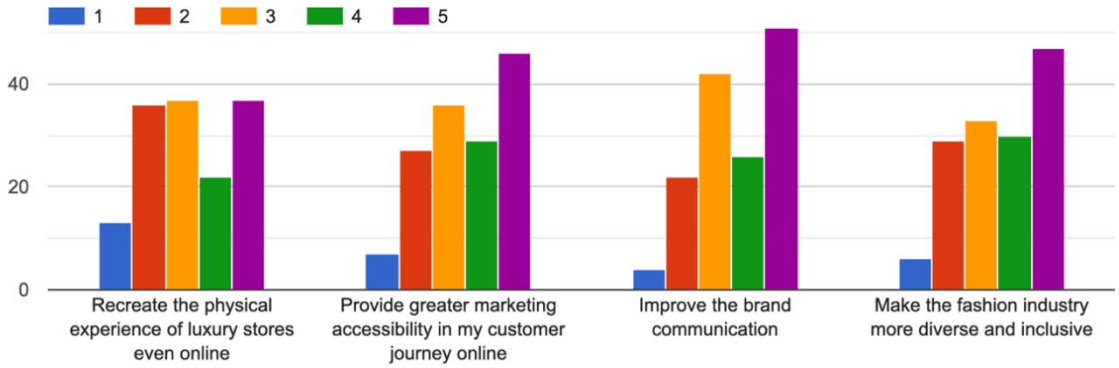
Fig. 5: Gen Z's willingness to see more luxury brands that include and represent underrepresented people in their campaigns/ads. Source: Own Production from Primary Research.



Source: Own Production from Primary Research.

- The *"Gen Z's opinions towards the implementation of Marketing 5.0's Next Tech in brands' marketing strategies"* (Q.12), and as you can see from the Figure 6, they are very positive, since the majority of the sample totally agree that thanks to the next tech of Marketing 5.0 implemented in brands' marketing strategies it is possible to provide greater marketing accessibility in their customer journey online, as well as that they can make the fashion industry more diverse and inclusive.

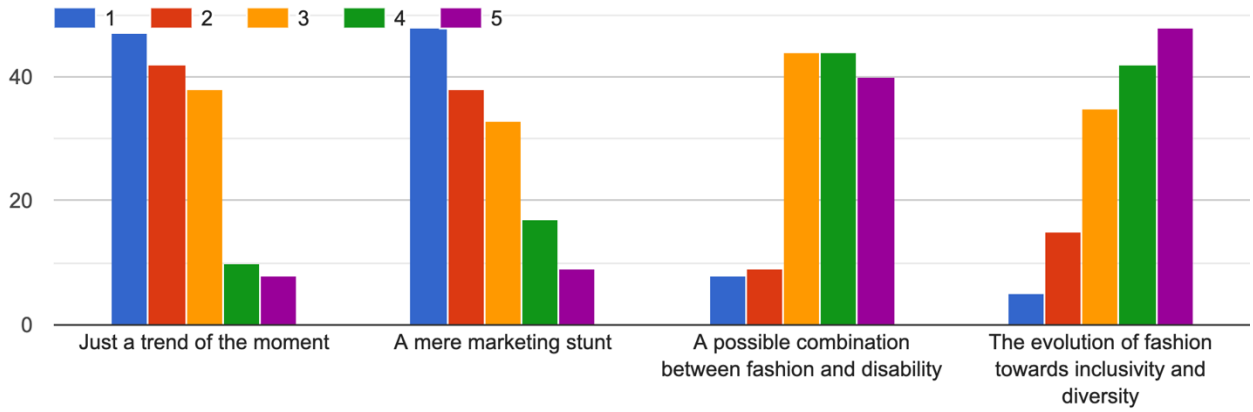
Fig. 6: The Next technologies' aims of Marketing 5.0 according to the sample.



Source: Own Production from Primary data.

- The *"Gen Z's perception of Adaptive Fashion"*(Q.21), and as you can see from Likert scale below (Figure 7) from 1 to 5 (where 1= totally disagree…5= totally agree) they have positive opinions, since the majority of them (33.1%) totally agree that it is the evolution of fashion towards inclusivity and diversity.

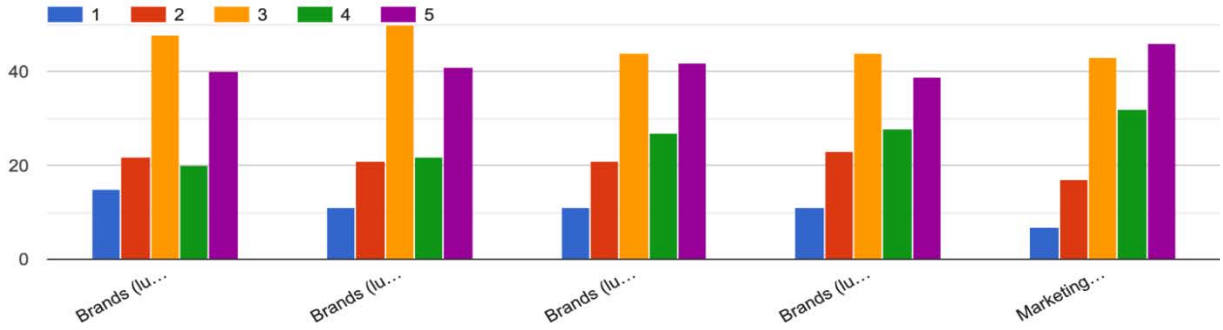
Fig. 7: Gen Z's perception towards Adaptive Fashion. Source: Own Production from Primary Research.



Source: Own Production from Primary data.

- The "*extent through which the following factors influence your customer journey*" (Q.28), and for the majority of them, as you can see from the Rating scale below (Figure 8) from 1 to 5 (where 1= irrelevant…5= very relevant), the 5 factors (brands that implement inclusive marketing campaigns/ad, brands that embrace D&I practices in their philosophies, brands that include adaptive fashion in their collections, brands that implement adaptive fashion campaigns/ads, marketing accessibility during the customer journey) have influence in their customer journey, since, although the most selected numerical score in all of them is 3, the second most selected ones are 5.

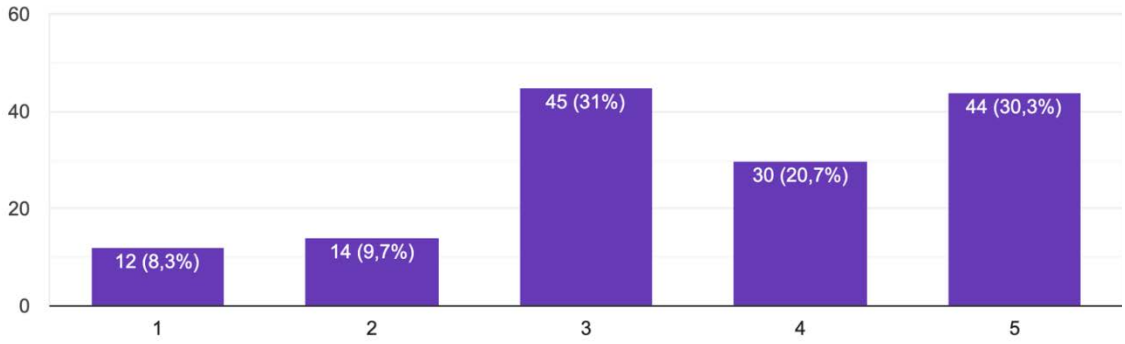
Fig. 8: Factors that influence Gen Z's customer journey. Source: Own Production from Primary Research.



Source: Own Production from Primary data.

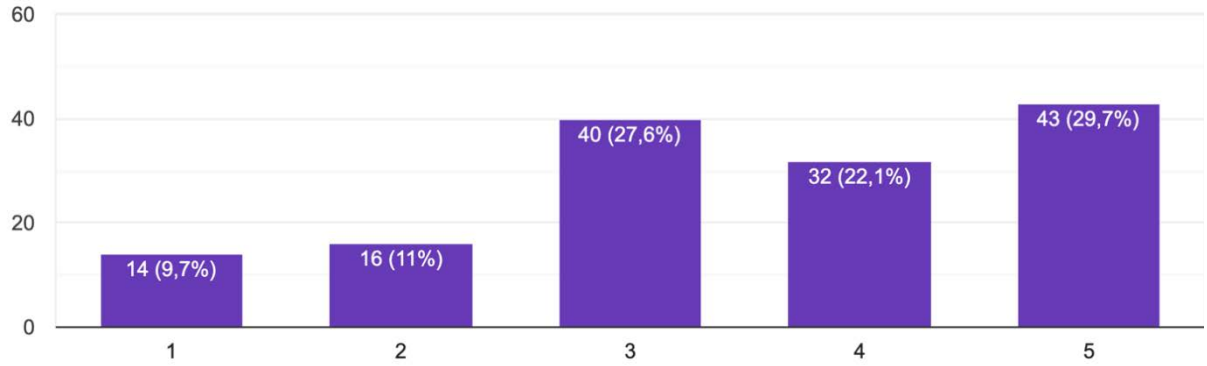
- Finally, "*the influence of both Inclusive Marketing* (Q.29) *and Adaptive Fashion* (Q.30) *in the digital sector on the Gen Z's customer journey*", and as you can see from the rating scales below (Figures 9 and 10) from 1 to 5 (where: 1= not at all…5= very much), is high.

Fig. 9: The influence of Inclusive Marketing in the digital sector in the Gen Z's customer journey. Source: Own Production from Primary Research.



Source: Own Production from Primary data.

Fig. 10: The influence of Adaptive Fashion in the digital sector in the Gen Z's customer journey. Source: Own Production from Primary Research.



Source: Own Production from Primary Research.

4.1.1 Hypothesis Testing

The data analysis in this section is aimed to test the consistency of the seven hypotheses (see Table 2). In particular, the Paired Two Sample T-tests for Means with Excel have been used in this stage to verify the statistical significance of the means. In addition, the level of statistical significance (p-value) used in this case is 5%, so, 0.05, which means that a p-value less than 0.05 ($\leq$ 0.05) is statistically significant.

Tab. 2: Hypothesis Development.

Hypothesis 1 (√)	Gen Z wants to see diversity and inclusion in marketing campaigns.
Hypothesis 2 (√)	Gen Z is longing for the perfect application of the next tech of Marketing 5.0 that allows to have a better marketing accessibility in their customer journey online.
Hypothesis 3 (√)	There is a direct correlation (positive) between inclusive marketing campaigns/strategies and Gen Z's willingness to pay, since they have high impact on their customer journey.
Hypothesis 3 bis (√)	There is a direct correlation (positive) between inclusive marketing campaigns/strategies and Gen Z' s brand image perception.
Hypothesis 4 (X)	There is an inverse correlation (negative) between inclusive marketing and Gen Z's luxury industry perception.
Hypothesis 5 (√)	In a phygital perspective, the luxury shopping online with the next tech of Marketing 5.0 (for ex. in social media marketplaces) improves the Gen Z's customer experience.
Hypothesis 6 (√)	The next tech of Marketing 5.0 (for ex. Alt-text, subtitles, AI, AR, etc.) can make the fashion industry more diverse and inclusive and move it towards adaptive fashion, which improves the brand image.
Hypothesis 7 (√)	When inclusive marketing strategies fall into practices of cultural appropriation, they negatively impact the Gen Z's brand image.

Source: Own production.

H1 Test: this hypothesis is confirmed by the responses to Q.8, Q.18, Q.19 and in part by the ones to Q.28: the majority of the sample (42.2%) considered very important *"to see underrepresented people in marketing campaigns"* (Q.8); the majority of Gen Z (34.5%) totally agrees they *"like to see underrepresented people in brand's campaigns, especially of famous ones"* (Q.18); almost the whole sample (88.3%) said that they *"would like to see more luxury brands that include and represent underrepresented people in their campaigns/ads"*; 40 respondents consider *"brands that implement inclusive marketing campaigns"* a very relevant factors in their customer journey (Q.28). This is also confirmed by the fact that there is a perfect positive correlation (=0.55) between Q.8 and Q.18.Moreover, the results are supported by the evidence from the Paired Two Sample T-test for Means between the responses to Q.8 and Q.18, which, by showing a p-value <0.05 means statistically significant (Table 3)

Tab. 3: T-Test: Paired Two Sample for Means

	5	*5*
Mean	3,85416667	3,645833333
Variance	1,49606643	1,57298951
Observations	144	144
Pearson's correlation	0,55414731	
Hypothesized Mean Difference	0	
df	143	
t Stat	2,13676687	
P (T<=t) one-tail	0,01715938	
t Critical one-tail	1,65557914	
P (T<=t) two-tail	0,03431875	
t Critical two-tail	1,9766922	

Source: Own production.

H2 Test: this hypothesis is confirmed by the responses to Q.12 and part of Q.28: the majority of Gen Z (31.7%) they totally agreed that *"thanks to the next tech of Marketing 5.0 implemented in brands' marketing strategies, it is possible to provide greater marketing accessibility in their customer journey online"* (Q.12); the majority of them (31.7%) considers very relevant *"the extent marketing accessibility influences Gen Z's customer journey"*.

H3 Test: this hypothesis is supported by the responses to Q.6, Q.9, Q.28 and Q.29: almost the whole sample (95.2%) "*would buy products from a brand that embraces inclusive marketing by including and representing underrepresented people in marketing campaigns/strategies*" (Q.6); the majority of Gen Z (28.3%) is quite willing to pay more for those kinds of brands and also the second highest percentage (22.8%) showed that they are very willing (Q.9). H3 is also confirmed by the fact that there is a perfect positive correlation (=1) between their willingness to buy (Q.6) and their willingness to pay more (Q.9) for those products and brands that sell them; and also a perfect positive correlation (=0.74) between Q.28 and Q.29. Moreover, the results are supported by the evidences from the Paired Two Sample T-test for Means between the responses to Q.28 and Q.29 which, by showing a p-value <0.05 means statistically significant (Table 4):

Tab. 4: T-Test: Paired Two Sample for Means

	2	*3*
Mean	3,5625	3,33333333
Variance	1,54851399	1,72027972
Observations	144	144
Pearson's correlation	0,74122996	
Hypothesized Mean Difference	0	
df	143	
t Stat	2,98417511	
P(T<=t) one-tail	0,00167252	
t Critical one-tail	1,65557914	
P(T<=t) two-tail	0,00334504	
t Critical two-tail	1,9766922	

Source: Own production.

H3 bis Test: this hypothesis is valid since both literature reviewed and the responses to Q.10 confirmed it: almost the whole sample (84.1%) thinks that *"inclusive marketing campaigns/strategies improve the brand image's perception they have of those brands that implemented them"*.

H4 Test: in this case, the data gathered from the responses to Q.16 and Q.17 seem to demonstrate the contrary of what the literature analyzed outlined. In fact, the responses to Q.16 can reject this hypothesis by the fact that Gen Z's opinions related to what they think inclusive marketing is in the luxury sector are in the middle of the scale. The same can be said for Q.17: the majority of the sample (35.2%) has "a *perception of the luxury industry's inclusivity"* that is in the middle of the scale,

however, the second most selected score by 24.1% of them is 5, so really inclusive. Moreover, this hypothesis rejection is also confirmed by the fact that there is a perfect positive correlation (=0.49) between the responses to Q.16 and the ones to Q.17, thus not a negative one. So, the hypothesis is not confirmed. Moreover, the results are supported by the evidences from the Paired Two Sample T-test for Means between the responses to Q.16 and Q.17 which, by showing a p-value >0.05 means not statistically significant (Table 5):

Tab. 5. T-Test: Paired Two Sample for Means

	3	*5*
Mean	3,20833333	3,16666667
Variance	1,52272727	1,86013986
Observations	144	144
Pearson's correlation	0,49445533	
Hypothesized Mean Difference	0	
df	143	
t Stat	0,38140928	
P(T<=t) one-tail	0,35173284	
t Critical one-tail	1,65557914	
P(T<=t) two-tail	0,70346568	
t Critical two-tail	1,9766922	

Source: Own production.

H5 Test: this hypothesis is confirmed by the responses to Q.14, since the majority of Gen Z (31.7%) thinks that *"in a phygital perspective, the luxury shopping online with the next tech of Marketing 5.0 improves customer experience very much"*.

H6 Test: this hypothesis is confirmed by the responses to Q.12 and Q.24 and in part by Q.22: the majority of the sample (32.4%) totally agrees that the next tech of Marketing 5.0 implemented in brands' marketing strategies makes the fashion industry more diverse and inclusive (Q.12); almost the whole sample (82.8%) *"thinks that the next tech of Marketing 5.0 (for ex. Alt-text, AI, AR, etc.) can move the fashion industry towards adaptive fashion"* (Q.24); almost the whole sample (85.5%) thinks that *"brands like Tommy Hilfiger that have adaptive fashion collections, improve the perception they have of those brands' brand image"* (Q.22).

H7 Test: this hypothesis is confirmed by the responses to Q.25, Q.26 and Q.27: the majority of the sample (36.6%) thinks that when inclusive marketing strategies fall into practices of cultural appropriation, they quite negatively impact the brand image (Q.25), but, since the second most selected score by 27.6% of them is really negative, the hypothesis is confirmed; the majority of the respondents have overall negative opinions about the items showed in the photo that generated scandal and so that negatively impact the brand image (Q.26); for the majority of Gen Z (51.7%) some items released by Gucci that were considered as examples of cultural appropriation negatively impact the brand image (Q.27). Moreover, there is a perfect positive correlation (=0.57) between Q.25 and Q.26. Finally, the results are supported by the evidences from the Paired Two Sample T-test for Means between the responses to Q.25 and Q.26 which, by showing a p-value <0.05 means statistically significant (Table 6):

Tab. 6: T-Test: Paired Two Sample for Means

	5	*4*
Mean	3,39583333	3,02777778
Variance	1,65340909	1,91530692
Observations	144	144
Pearson's correlation	0,57536724	
Hypothesized Mean Difference	0	
df	143	
t Stat	3,58129375	
P(T<=t) one-tail	0,00023386	
t Critical one-tail	1,65557914	
P(T<=t) two-tail	0,00046772	
t Critico two-tail	1,9766922	

Source: Own production.

So, 6 out of 7 hypotheses were confirmed: only H4 was not supported by data, therefore rejected. This means that not only, both Inclusive Marketing and Adaptive Fashion work in terms of impact, influence and effectiveness in the digital sector on the Gen Z's customer journey, but also that, basing on the rejection of H4, there is a positive correlation between Inclusive Marketing and Gen Z's luxury industry perception, even though the literature analyzed outlined almost the contrary.

5. Conclusions and Managerial implications

So far, this empirical study has outlined that both Inclusive Marketing and Adaptive Fashion in digital sector influence the Gen Z's customer journey. Therefore, brands, especially luxury and fashion ones, should increase the representation of underrepresented people in their marketing strategies/campaigns online. In addition, all brands should improve their technologies by using the next tech both in their websites and in social media marketplaces (Caratù *et al.* 2023a), in order to let the target enhances its customer experience, as well as its marketing accessibility. In this way, for instance in relation to the luxury sector, not only luxury brands can recreate the physical experience of the luxury stores even online, but also there will be even more Gen Z's customers that will buy luxury products online. Moreover, although Inclusive Marketing in digital sector influences and impacts the Gen Z's customer journey very much, when it falls into practices of cultural appropriation, the target is more inclined to develop negative perceptions and attitudes that, therefore, negatively impact the brand image they have (YPulse, 2022). For these reasons, in order to improve this situation, brands should, first of all, inform themselves about other cultures and about the D&I themes, for instance by implementing Diversity and Inclusion Councils; secondly, they should not go overboard in trying so hard to communicate and represent diversity, that can offend the segment of their audience (Gynn, 2020). However, in all cases, they have to immediately apologize both to the people offended and to the entire society, as well as they have to remove from the market the items considered as examples of cultural appropriation. Then, for what concerns Adaptive Fashion's findings, this implies that more fashion brands should implement and introduce adaptive collections in their lines, in order to better spread this new inclusive fashion in nowadays society. Finally, since the digitally-savvy target is highly exposed to digital and social influence, brands should promote more online their efforts, messages and initiatives related to their implementation of adaptive fashion collections.

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Branding “Mountain Products” to develop equity and consumer willingness to pay

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Abstract

Frame of the research. *Eu quality labels protect consumers, support agri-food producers and enhance food products value. In this vein, in 2012 the EU introduced the* **“***Mountain Product” (MP) denomination and in 2017 the Italian Ministry of Agriculture, Food and Forestry regulated its use as optional label. But to boost its adoption between producers it is essential to demonstrate its role as equity and value developer for final consumers.*

Purpose of the paper. *The paper explores the role of the “Mountain Product” label in generating consumer-based brand equity (CBBE) and consumer willingness to pay (WTP). To this aim, a model is proposed where the traditional CBBE determinants are postulated as generating equity and - by this way - value in terms of consumer WTP.*

Methodology. *A survey was performed administering a structured questionnaire F2F to a convenient sample of consumers (N=201). Data were then processed applying structural equation modeling (Lisrel 8.0).*

Results. *The research verified that CBBE for food MPs is developed by brand awareness, perceived quality and brand loyalty but not by brand associations. The paper evidences the mediating nature of CBBE in developing consumer willingness to pay for food products branded with the “Mountain Product” label. Control variables related to socio-demographic data do not exert any effect.*

Research limitations. *This work presents some preliminary results in relation to a wider research project on the MP denomination. To note that a convenient sample of consumers was interviewed and this can diminish the generalizability of our results. Moreover, the survey took place in relation to a specific food context (Parmigiano Reggiano cheese) and a given cultural context (Italy): future surveys should replicate the model considering different MP categories and different national areas. Other variables can also intervene as moderators and/or outcomes (i.e.: Intention to purchase.)*

Managerial implications. *This work verifies the relevance of using the optional label “Mountain Product” in order to enhance the perceived value of mountain foods for consumers, rending them more prone to pay higher prices. These findings are essential to food producers based in the mountain area in order to develop and exploit value from their activity, generally costlier and less productive than that of similar farmers but based in plain. They are also useful for food producers’ consortiums and public policy authorities interested in supporting disadvantaged areas as the mountains zones are.*

Originality of the paper. *In extant literature, the role of CBBE in developing consumer WTP requires further support and empirical evidence. The paper applies the CBBE model to a new food label evidencing the goodness of fit of the model even for niche products; it also considers an independent variable rarely verified in relation to CBBE.*

Key words: *consumer based-brand equity; willingness to pay; mountain product label; food products; SEM*

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1. Introduction

Research on brand equity gives particular relevance to the matter of how customers perceive brands and what leads them to pay a premium price. Extant research has duly studied the topic in relation to corporate brands, but less attention has been given to brand equity and its relationship with willingness to pay a premium price (WTP) when collective brands are considered. Specifically, relevant collective brands for food products are Eu quality labels, conceived to safeguard and promote the origins, traditions and unique characteristics of a number of selected food products originated in the EU countries.

Next to the most famous geographical indications of origins (PDO, PGI, GI, TSG), and quite more recently, other EU quality schemes were launched to highlight the traditional production process or products made in problematic natural areas such as mountains or islands. Within the latter, in 2012 the EU introduced the "Mountain Product" (MP) denomination (Regulation No 1151/2012) with the aim to protect and support products whose raw materials and animal feed comes from mountain areas (600 m. altitude and higher). This is recognized also for processed products. The Italian Ministry of Agriculture, Food and Forestry regulated its use as optional label more recently, in 2017. So, it is a quality scheme still young and whose use and awareness requires patronage.

The final goal of this quality scheme is to support the mountain agri-food and tourism sector, promoting sustainable models of development in areas that tend to become depopulated due to the scarcity of profitable business activities, the lack of efficient logistic infrastructures and services, higher farming costs and lower yields. Indeed, agri-food producers are likely to benefit from taking advantage of the positive image of mountain areas and increase the perceived value-added of their products. As a matter of fact, extant literature highlighted the market potential of this denomination: Martins and Ferreira (2017), Bonadonna (2016), Finco et al. (2017) found that the use of an optional quality term referring to "mountain" for foods could improve the level of consumer awareness of mountain products, while Mazzocchi and Sali (2021) found that the MP label might increase consumers' willingness to pay. However, our understanding of consumer behavior when MPs are involved is still low (Bassi et al., 2021), especially when it comes to understand the brand equity value generated by this label. As a matter of fact, extant literature on the topic is mainly based at exploring attitudes and behaviours rather than surveying the topic in terms of perceived value of the brand. Within this context, this study aims at exploring the role of the "Mountain Product" label in generating consumer-based brand equity (CBBE) and consumer willingness to pay (WTP). To this aim, a model is proposed where the traditional CBBE determinants - namely: brand awareness, perceived brand quality, brand loyalty and brand associations - are postulated as generating equity and - by this way - value in terms of consumer WTP for MPs. This is performed conducting a survey based on the administration of a structured questionnaire to a sample of consumers, and applying structural equation modeling.

In extant literature, the role of CBBE in developing consumer WTP requires further support and empirical evidence. In fact, the work contributes to the literature on consumer behaviour and branding by applying the CBBE model to a new food label evidencing the goodness of fit of the model even for niche products; it also considers an independent variable rarely verified in relation to CBBE, such as WTP, so relevant for the business success of branding strategies.

This study can generate true interest also for its managerial and public policies implications. Proving the value generation developed by the use of this optional quality scheme, producers and retailers can find assurance on its business potential and be encouraged to add this voluntary denomination to their food offer. At the same time, policy makers at the EU and national level can use these results to further support the use of the MP label among mountain products producers.

The paper is structured as follows. After having presented the theoretical framework and the hypotheses underpinning the proposed model, the work depicts the methodology used in terms of research design, sample features, measurements employed and their validity. Then, the study findings are described and discussed, evidencing the managerial and policy making implications deriving from

the study. Some brief final conclusions evidence the limitations of the paper and future research avenues.

2. Research Model and Hypotheses

Traditionally, brand equity has been defined as "*[…] a set of assets and liabilities linked to a brand's name and symbol that adds to (or subtracts from) the value provided by a product or service to a firm and/or to a firm's customers*" (Aaker, 1991, p. 15). When applied to consumers, CCBE is considered as the perceived value of a brand to the consumer, referring to consumer perceptions - rather than objective indicators - and able to develop a global impression of the value associated with a brand, which originates from the brand name, and not only physical attributes (Lassar et al., 1995). Several conceptualizations of CBBE exist, and these conceptualizations have offered valuable insight into the processes that consumers evaluate and choose brands within a given product category.

In the context of this work, the brand equity paradigm represents a key point for analysing the intrinsic market value of the MP label. EU quality schemes reporting to a definite origin help in establishing a sustainable competitive advantage and enhance perceived value.

Aaker (1991) considers brand equity as developing from a number of antecedents, among which brand awareness, perceived quality, brand loyalty and brand associations.

Brand awareness consists in the consumer's ability to identify the brand under different circumstances (Keller, 1993) and is considered to be of particular importance in low involvement product categories (Keller, 1993; Ritson, 2003). The general level of awareness of the EU quality labels seems to be low, suggesting that in most cases consumers will not even perceive the presence of the label when shopping (Grunert and Aachmann, 2016).

Perceived quality in relation to a brand can be conceived as "*the customer's judgment of the overall excellence, esteem, or superiority of a brand (with respect to its intended purposes) relative to alternative brand(s)*" (Netemeyer et al., 2004, p. 210).

Brand associations are conceived as the information in the consumer's mind linked to the brand (Aaker, 1991; Keller, 1993).

Brand loyalty is a central and evergreen topic in brand literature. However, we have to acknowledge that two different conceptualisations of the nature of brand loyalty in relation to CBBE exist: 1) Aaker (1991, p. 39) considers it as a determinant of brand equity, defining it as "*the attachment that a customer has to a brand*". On the contrary, Keller (1993) considers loyalty as an outcome brand equity. In this work we adopt the Aaker (1991) view.

As MP have been only recently launched on the market and are collective brands, we would like to explore the verification of a traditional CBBE model in this context. To this aim, we postulate the following hypotheses:

H1: MP brand awareness positively influences MP brand equity;
H2: MP perceived quality positively influences MP brand equity;
H3: MP brand loyalty positively influences MP brand equity;
H4: MP brand associations positively influences MP brand equity.

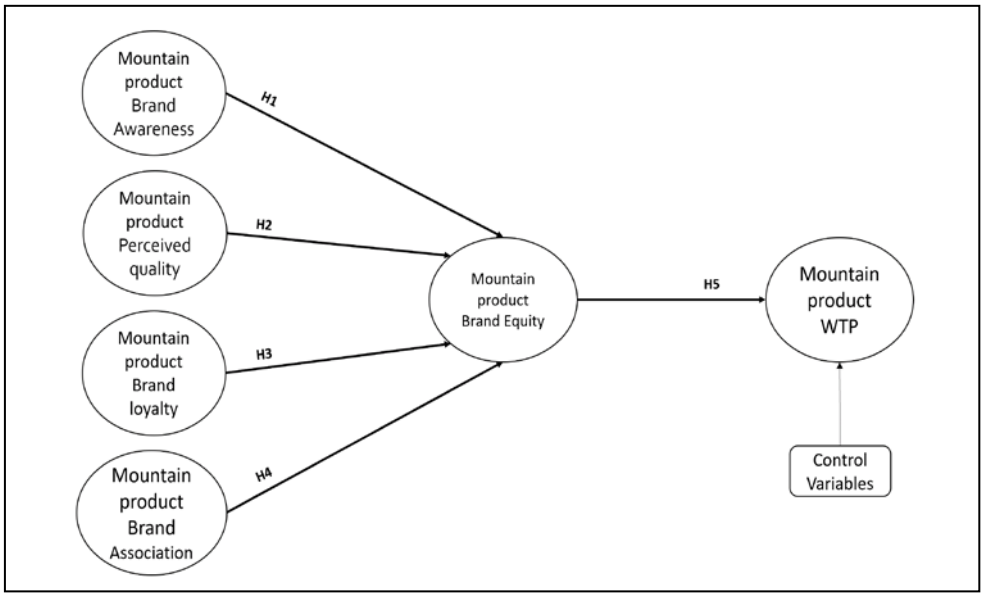
The willingness to pay a price premium is defined as the amount of money a customer is willing to pay for his/her preferred brand over comparable/lesser brands of the same package size/quantity. The more a customer values a brand, the more he or she will be willing to accept a price increase (Aaker, 1991). Thus, willingness to pay a premium price (WTP) signals the power of a brand and it is sometimes considered as a superior indicator of brand success, rather than actual purchase behavior. CCBE can reinforce price elasticity (Kay, 2006), i.e. the extent to which consumers become more or less demanding when the price goes up or down. Previous research has also suggested that CBBE has a direct effect on a firm's ability to charge higher prices (e.g., Yoganathan et al., 2015; Maity and Gupta, 2016). This relationship has been verified in the context of the banking industry (Augusto and

Torres, 2016) and of grocery products (Anselmsson et al., 2007). Consequently, we postulate that CBBE impacts WTP for the MP label, acting as a mediator.

H4: MP brand equity positively influences consumer WTP for the MP label

The overall theoretical model has been extended with several demographics as control variables. Fig. 1 presents the overall theoretical model proposed.

Fig. 1: Theoretical model



Source: our elaboration, 2024

3. Methodology

4.1 Study design and data collection

During the "Night of the Research" in 2023, a group of researchers and students surveyed consumers. Respondents completed a structural questionnaire aimed at exploring the role that the recent European quality label "the Mountain Product brand" plays in enhancing mountain food products. The Italian context was chosen for the development of this study as Italian consumers are among the most acknowledged concerning EU quality labels (De Canio and Martinelli, 2021). Based on the Euromontana report (2020), in Italy, nearly half of the land is covered by mountains, accounting for 47.5% of the country's territory. Italy is the largest producer of EU mountain products; Italian mountain products account for 17.4% of the country's overall farming activity. Furthermore, Italy, along with France, is the only country with current legislation on the certification of mountain products, contributing to 30.8% of the EU's mountain food production, which is worth around €7,195 million.

A total of 201 questionnaires were collected during the Research Night event and in the very subsequent days in September 2023.

4.2 Sample characteristics

The overall dataset is composed of 201 questionnaires almost equally filled by women (~55% of the sample) and men (~45% of the sample). The age distribution also appears to be heterogeneous among the different identified clusters, with respondents falling within the range of 19 - 84 years of age (mean = 39.1; S.D. = 11.8).

The composition of the family household of the sample used for the empirical analyses sees a

greater representation of larger families. Clusters of families composed of 4 members (~44% of the sample) and three members (~39% of the sample) are prevalent. In line with this information, the monthly family net income also tends to be higher than 2,600 euros with approximately 29% of the sample declaring they have a monthly family net income higher than 5,000 euros.

Tab. 1: Demographic characteristics of the sample

Measure	***Items***	***N (201)***
Gender	Male	91 (45.3%)
	Female	110 (54.7%)
Age	18-25 years old	20 (10.0%)
	26-35 years old	67 (33.3%)
	36-45 years old	54 (26.9%)
	46-55 years old	38 (18.9%)
	Over 55 years	22 (10.9%)
Family members	1 member	6 (3.0%)
	2 members	14 (7.0%)
	3 members	79 (39.3%)
	4 members	88 (43.8%)
	5 or more members	14 (7.0%)
Monthly net income (household)	0-600€	0 (0%)
	601-1,300 €	4 (2.0%)
	1,301-2,600 €	14 (7.0%)
	2,601-3,600 €	45 (22.4%)
	3,601-5,000 €	80 (39.8%)
	>5,000€	58 (28.9%)

Source: our elaboration

4.3 Measures

The survey measures are derived from the extant marketing literature on brand equity and the EU quality labels. Questions are adapted to the context of our study. Items, reported in Table 2, were translated into the Italian language to simplify the response of the survey's participants. However, to reduce translation biases, a double translation method (English-Italian and Italian-English) was used. Respondents to the survey evaluated construct measures on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree).

Tab. 2: Constructs, items, and original scales

Constructs	*Code*	*Item*	*Original Scale*
Mountain Product Willingness to Pay (MPWTP)	MPWTP1	I am willing to pay more to buy Mountain Products	Adapted by Voon et al. (2011)
	MPWTP2	I think it's right to pay a higher price to buy Mountain Products	
Mountain Product Brand Equity (MPBEQ)	MPBEQ1	The Mountain Product is a well-known brand	Adapted by Yoo et al. (2000)
	MPBEQ2	The Mountain Product is a strong brand	
	MPBEQ3	The Mountain Product is a unique brand	
	MPBEQ4	The Mountain Product is a recognised brand	
Mountain Product Brand Awareness (MPBAW)	MPBAW1	I can quickly recall the symbol or logo of the Mountain Product label	Adapted by Yoo et al. (2000)
	MPBAW2	I can distinguish the Mountain Product brand from other brands	
	MPBAW3	I easily recognise the Mountain Product logo among other logos	
Mountain Product Perceived Quality (MPQUAL)	MPQUAL1	I consider the Mountain Product brand to be high-quality	Adapted by Vera (2015)
	MPQUAL2	I consider the Mountain Product brand excellent	
	MPQUAL3	I consider the Mountain Product brand to be superior	
Mountain Product Brand Loyalty (MPBLOY)	MPBLOY1	I trust the Mountain Product brand	Adapted by Van Ittersum et al. (1999)
	MPBLOY2	I believe that the Mountain Product brand delivers what it promises	
	MPBLOY3	The Mountain Product brand is reliable	
Mountain Product Brand Association (MPBAS)		I believe the "Mountain Product" brand is:	Adapted by Yoo et al. (2000)
	MPBAS1	Negative- Positive	
	MPBAS2	Very bad - Excellent	
	MPBAS3	Unfavourable - Favourable	

Source: our elaboration

4.4 Measurement model validity

To analyse the data, we followed the two-step approach recommended by Anderson and Gerbing (1988). First, we estimated the measurement model to establish the relationship between the dependent latent variables and their indicators (items). Then, we estimated the structural model to measure the paths between the constructs (latent variables). We used the software SPSS Statistics v.29.0 and the software Lisrel 8.80 to develop our empirical analyses (Jöreskog and Sörbom, 2006).

The validity of the constructs used in the study was evaluated and found to be reliable. All factors considered have a loading widely higher than the 0.7 cut-off and are significant (Hu and Bentler, 1999). The items used in the study also show a high item-total correlation, indicating their effectiveness in measuring the construct being investigated. Cronbach's alphas are greater than 0.70, confirming the reliability of the measures. Additionally, the Average Variance Extracted (AVE) and Composite Reliability (CR) values are assessed to check the convergent validity of the constructs. Both indicators exceed the thresholds cited in the literature for all constructs, with AVE > 0.5 and CR>0.7. Table 3 summarises the relevant data.

Tab. 3: Statistic Descriptive for Items and Measures' Discriminant validity

Constructs	*Code*	*Factor Loadings*	*T-statistics*	*Cronbach's α*	*AVE*	*CR*
Mountain Product Willingness to Pay (MPWTP)	MPWTP1	0.851	n.a.	***0.850***	***0.740***	***0.850***
	MPWTP2	0.869	7.631			
Mountain Product Brand Equity (MPBEQ)	MPBEQ1	0.924	n.a.	***0.954***	***0.797***	***0.954***
	MPBEQ2	0.947	23.476			
	MPBEQ3	0.891	17.655			
	MPBEQ4	0.897	18.108			
Mountain Product Brand Awareness (MPBAW)	MPBAW1	0.879	n.a.	***0.954***	***0.838***	***0.959***
	MPBAW2	0.992	21.806			
	MPBAW3	0.952	26.763			
Mountain Product Perceived Quality (MPQUAL)	MPQUAL1	0.910	n.a.	***0.957***	***0.883***	***0.958***
	MPQUAL2	0.961	23.769			
	MPQUAL3	0.947	23.948			
Mountain Product Brand Loyalty (MPBLOY)	MPBLOY1	0.952	n.a.	***0.975***	***0.930***	***0.976***
	MPBLOY2	0.974	40.190			
	MPBLOY3	0.967	35.588			
Mountain Product Brand Association (MPBAS)	MPBAS1	0.961	n.a.	***0.983***	***0.952***	***0.983***
	MPBAS2	0.979	42.901			
	MPBAS3	0.987	39.782			

Source: our elaboration

By utilizing the Fornell and Larcker criterion (1981) we evaluated the discriminant validity of the measurement model. The average variance's square root is higher than the correlation between the construct and the others (Fornell and Larcker, 1981) (refer to Table 4).

Tab. 4: Fornell-Larcker Criterion and Correlation Matrix

	MPWTP	***MPBEQ***	***MPBAW***	***MPQUAL***	***MPBLOY***	***MPBAS***	***SEX***	***AGE***	***FAM***
MP willingness to pay	**0.860**								
MP brand equity	0.556	**0.893**							
MP brand awareness	0.427	0.767	**0.916**						
MP perceived quality	0.462	0.833	0.701	**0.940**					
MP brand loyalty	0.465	0.842	0.696	0.871	**0.965**				
MP brand association	0.315	0.564	0.563	0.619	0.687	**0.976**			
Gender	-0.009	0.011	0.094	-0.071	0.013	0.030	**1.000**		
Age	0.042	0.109	0.084	0.084	0.188	0.247	-0.153	**1.000**	
Household number	0.047	-0.059	-0.001	-0.105	-0.058	0.029	0.212	-0.060	**1.000**

Note: Diagonal elements in bold are the square root of Average Variance Extracted (AVE).
Source: our elaboration

The analysis of the model fit indexes indicates that the theoretical and structural models have a good fit. The robust Satorra and Bentler chi-square $\chi^2_{(SB)(163)}$= 263.061 ($p < 0.000$) and its chi-square

ratio $\chi^2_{(SB)}$/df (1.613) show that the model fit is acceptable. This is confirmed by the not-significant Close-Fit RMSEA (RMSEA=0.0554, p-value= 0.229). It confirms that the model reflects the pattern of covariance in the raw data. Furthermore, the Normed Fit Index (NFI = 0.980) and the Comparative Fit Index (CFI=0.992) show that the model fit is good, which is higher than the 0.90 cut-off value suggested by Byrne (2013). The Goodness of Fit Index (GFI= 0.844) is also quite acceptable. Additionally, the standardised root mean square residual (SRMR= 0.065) is closer to its 0.05 cut-off, indicating a low value for the root mean square discrepancy between the observed correlations and the model-implied correlations (Byrne, 2013).

4. Findings

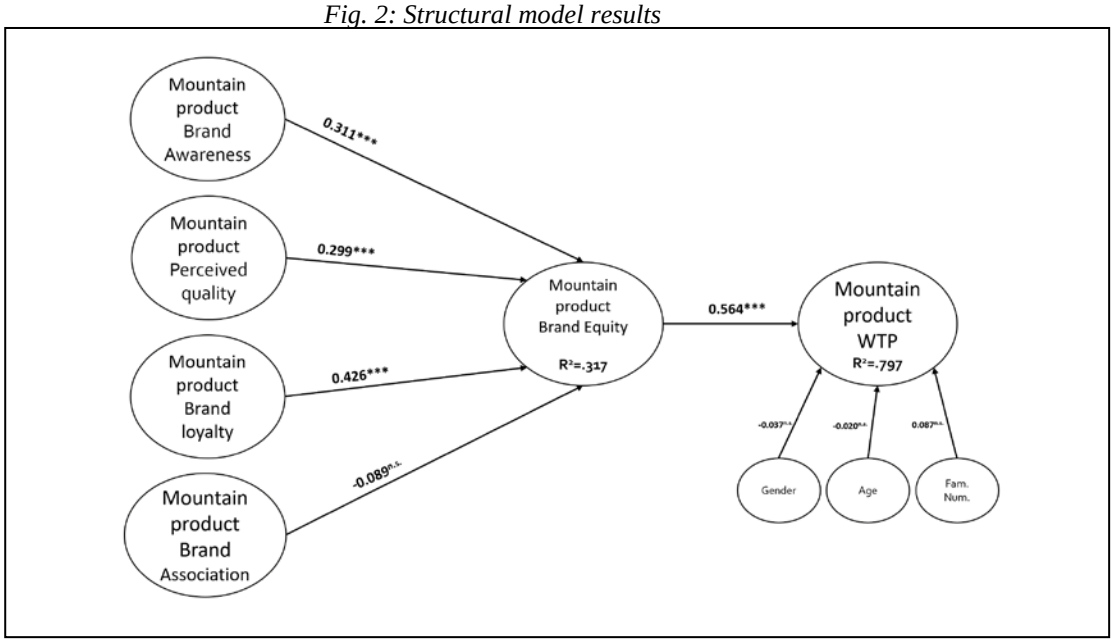
Figure 2 illustrates the main direct paths in the structural model. First, the empirical model demonstrates a strong ability to explain a good predictive ability and a strong explanatory power in defining the mountain product brand equity (R^2=31.7%), and the willingness to pay a premium price for mountain products (R^2=79.7%).

Second, considering the direct paths among latent constructs, we can confirm all the postulated theoretical hypotheses, except for the relationship between the mountain product brand association and its brand equity. Thus, the mountain product brand awareness, perceived value, and loyalty are relevant cues in determining the mountain product brand equity and accordingly the consumers' willingness to pay more for a product produced in mountain areas. Thus, we confirm H1, H2, H3 and H5.

The mediation analysis confirms a partial mediation of the relationship between mountain product brand awareness, perceived value, loyalty and the WTP for mountain products. Strong and highly significant indirect effects are identified as follows: MPBAW → MPBEQ → MPWTP β: 0.186, T-value: 3.220; MPQUAL → MPBEQ → MPWTP β: 0.178, T-value: 3.118; MPLOY → MPBEQ → MPWTP β: 0.221, T-value: 3.289. Not significant is the indirect impact of MPBAS and the WTP for mountain products. Overall, these results lead to the conclusion that the Mountain Product brand cues and its equity are valuable drivers leading consumers to pay a premium price for food mountain products.

Finally, there was no significant impact of the control variables on the dependent variable.

Fig. 2: Structural model results



Note: ***p<0.01, **p<0.05, n.s. not significant path.
Source: our elaboration, 2024

5. Discussion

This work has verified the relevance of using the optional label "Mountain Product" in order to enhance the perceived value of mountain foods for consumers, rending them more prone to pay higher prices. In this way, the study contributes to the consumer behaviour literature on EU quality labels and to the branding literature verifying the role played by CBBE in relation to the MP label. This is able to generate a positive predisposition in consumers in paying a premium price in order to buy products branded with the MP label.

Results confirm that MP brand awareness, MP perceived brand quality and MP brand loyalty are all positive and significant drivers of MP brand equity, with MP brand loyalty resulting as the main variable supporting the creation of a positive brand equity in consumer perceptions. On the contrary, brand associations stimulated by the MP label do not show any significant effect.

These findings are essential to food producers based in the mountain area in order to develop and exploit value from their activity, generally costlier and less productive than that of similar farmers but based in plain. Our results are also useful for food producers' consortiums and public policy authorities interested in supporting disadvantaged areas as the mountains zones are. In fact, to boost the MP label adoption among producers it is essential to ascertain its role as equity and value builder for final consumers.

The use of the MP label provides mountain farmers with a competitive advantage in increasing the value of their products and addressing their offer. EU and national policymakers should implement communication strategies aimed at increasing consumers' awareness of MPs stressing in particular the good image of a qualitative product and the feeling of assurance and belonging to a specific origin so that to capture the brand loyalty value.

From a marketing perspective, mountain farmers and policy makers should try to leverage brand awareness between citizens on the MP label through communication campaigns centred on the MP logo and the attachment to the mountain area. EU investments in supporting the MP denomination diffusion and awareness among EU citizens are key in order to reach this policy's goals.

6. Conclusions

The study shows that the use of the Mountain Product denomination enhances foods value generating brand equity and this in turn brings to a higher WTP by consumers.

Despite its contribution, this research is explorative and evidence some limitations that require further attention in future studies.

First, other dependent variables can be interested to be explored, such as purchase intentions, while moderators can intervene in the structural model.

Second, the analysis focused on Italian consumers, who are keener to food product quality and EU labels compared to other national contexts (De Canio and Martinelli, 2021). Future studies should be replicated in other countries less sensitive to these topics, considering that mountain areas are important in countries like German countries, Balkans and Spain, among others.

In addition, as consumer behaviour is product category dependent, and as the survey took place in relation to a specific food context - the Parmigiano Reggiano cheese - future surveys should replicate the model considering different MP categories.

To note that a convenient sample of consumers was interviewed and this can diminish the generalizability of our results.

Additionally, the research focuses only on the MP label, while agri-food product can hold other brands, like the farmer's one; future studies should better understand the interaction between the use of multiple labels so that to get a better understanding of CBBE's formation.

Last but not least, this work presents some preliminary results in relation to a wider research project on the MP denomination which is still ongoing. Further developments can bring to advancements and refinements of the proposed model.

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Track 7
Purpose-driven Businesses

Tracing the evolution of corporate purpose: an exploratory wine industry case study

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Abstract

Frame of the research. *Contemporary business leaders are increasingly interested in adopting a 'purpose-led business' approach, but there is a lack of clear conceptualization of corporate purpose and its dynamics.*

Purpose of the paper. *As an organization's reason for being is dynamic and evolves over time, this paper aims to explore how corporate purpose can be analyzed from an evolutionary perspective. Based on Esposito De Falco's (2012) conceptual model, the proposed theoretical framework uses the '3S' dimensions - structural, systemic and strategic - to describe the evolutionary path of purpose, starting from its emergence.*

Methodology. *A qualitative research approach with an exploratory case study method is used to analyse the evolutionary path of corporate purpose in the wine industry, which represents a fine and healthy sector in Italy. The selected case, one of the twelve legendary Italian wines of the 20th century, serves as a well-documented example of a transformation towards purpose.*

Results. *The proposed theoretical framework is supported by the empirical research, which confirms the interconnectedness of the organization's intrinsic identity (structural), its engagement within the ecosystem (systemic), and the alignment of purpose with actionable strategies (strategic). As the transformational journey of the case study is still in its infancy, the company is proving to be purpose-driven, but not yet a fully purpose-led business.*

Research limitations. *The main research limitation is the inability to generalize the findings, mainly due to the nature of a single case study. Multiple case studies and longitudinal case studies are interesting avenues for future research.*

Managerial implications. *A full and deep transition to purpose depends on whether the organization's reason for being is perceived as credible by the organizations' internal and external stakeholders. Practitioners should therefore focus their efforts on the relational dimension of the evolutionary journey.*

Originality of the paper. *The paper extends the application of the evolutionary lens to the context of corporate purpose by introducing a new theoretical framework that is also validated through an empirical investigation. This study contributes to the advancement of knowledge in the field of corporate purpose by asserting that the evolutionary path of an organization's reason for being is not inherently linear, but rather circular in nature.*

Key words: *corporate purpose; evolutionary perspective; genotype; relational dimension; phenotype; exploratory case study*

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1. Introduction

The concept of corporate purpose has long been central to the ideas of classical and contemporary management thinkers and business scholars (Ellsworth, 2002; Hong *et al.*, 2021; Morrison & Mota, 2023; Jasinenko & Steuber, 2023). Corporate purpose has emerged as a crucial concept that promises to channel organizational energy for the benefit of stakeholders and positive economic growth (Björck *et al.*, 2023). The literature (Gartenberg & Serafeim, 2023) acknowledges that establishing purpose can improve the quality of governance (Fisch and Davidoff Solomon, 2020), drive innovation (Henderson, 2021), improve financial performance (Gartenberg *et al.*, 2019) and enhance social performance (Porter *et al.*, 2019). It also has a positive impact on employee wellbeing and job satisfaction (Ellsworth, 2002; Hollensbe *et al.*, 2014). Nevertheless, the pursuit of purpose can pose challenges for organizations (Vilá & Bharawaj, 2017). One such challenge is navigating potentially conflicting stakeholder demands (von Ahsen & Gauch, 2022). If the purpose is continually adjusted to accommodate these developments, there is a risk that the concept may lose its integrity and be perceived as "purpose washing".

Scholars therefore call for future research to explore these facets of 'purpose dynamics' and suggest strategies for firms to effectively address this challenge (von Ahsen & Gauch, 2022). Indeed, there remains a notable gap in understanding the determinants of inter-firm variability and the reasons for the superior ability of some firms to establish a compelling sense of purpose relative to others (Edmans, 2020; Qin *et al.*, 2022). The field of corporate purpose is still in its infancy due to a lack of clear conceptualization and consensus on a common definition (Brosch, 2023; Zenger, 2023). This complexity extends to the multifaceted nature of research on corporate purpose, encompassing various theories such as economic theory, shareholder theory, institutional theories, stakeholder theories, theories of ethics, values and morality, resource-based view and stewardship (Morrison & Mota, 2023).

To address these challenges, this paper aims to adopt an evolutionary perspective, as corporate purpose is dynamic and evolves over time (Ocasio *et al.*, 2023). We believe that the co-evolutionary approach is appropriate for studying corporate purpose in a rapidly changing business environment. Therefore, the research question guiding this investigation is: How can corporate purpose be analysed from an evolutionary perspective?

Based on Esposito De Falco's (2012) conceptual model, the proposed theoretical framework uses the '3S' dimensions - structural, systemic and strategic - to delineate the evolutionary path of purpose, starting from its genesis.

This framework is validated through a qualitative research approach with an exploratory case study method to analyse the purpose of Italian wineries. The Italian wine industry is an interesting field of research due to its national and international relevance (Mediobanca, 2023). In particular, our research focuses on the case of an Italian wine company, pseudonymed Alpha, which serves as a well-documented example of purpose transformation involving individual actors (i.e. entrepreneur, owner, etc.), stakeholders and the company as a whole.

The study makes a theoretical contribution to the developing literature on corporate purpose, extending and developing existing frameworks (Henderson, 2021; George *et al.*, 2023). The adoption of an evolutionary perspective, previously unexplored in the field, proves insightful in explaining the emergence and translation of purpose into action. In addition, the co-evolutionary lens differs from dominant theoretical approaches and provides a nuanced understanding of changes in the role of firms over time.

By proposing a clear theoretical framework, the paper contributes to shifting the construct of corporate purpose from ambiguity to construct clarity, thereby promoting ontological understanding. This approach is in line with the evolution of management thinking and promotes a critical perspective in understanding the complexity of contemporary social and environmental challenges (Wood, Souza, & Caldas, 2022).

The Alpha case study demonstrates the suitability of the multi-dimensional co-evolutionary framework to effectively analyse the components of corporate purpose. However, unlike a linear

progression where each stage logically follows the previous one upon completion, the evolution of purpose is characterised by circularity. This means that different stages can occur simultaneously, representing a dynamic and interconnected process rather than a strictly sequential one. In Alpha, several stages are indeed activated simultaneously by the CEO's strong commitment. However, this activation is not fully mature, which is why Alpha is configured as a shallow purpose company rather than a deep purpose company.

The article is structured as follows. Section 2 provides a literature review on corporate purpose and describes the interpretive framework proposed to re-read the phenomenon. Section 3 describes the research methodology. Section 4 presents the research findings. Finally, section 5 discusses the findings and proposes the main implications of the study.

2. Theoretical background

2.1 Corporate purpose

The concept of corporate purpose has evolved over time, as highlighted in a recent literature review that identified three sets of definitions (Brosch, 2023). The first set focuses on the reason for the organisation's existence, viewing purpose as an ultimate goal that guides actions but often lacks specificity (Pache & Santos, 2013; Freeman, Phillips & Sisodia, 2020). The second group emphasises a defined corporate purpose beyond profit maximisation, challenging the legitimacy of a purpose based solely on shareholder primacy (Henderson & van den Steen, 2015; Hsieh *et al.*, 2018). Scholars argue for the interdependence of profit and purpose (Hollensbe *et al.*, 2014; George *et al.*, 2023). The third group presents contemporary definitions that see business purpose as going beyond profit, with a prosocial orientation that contributes positively to society and the planet (Rey, Velasco, & Almandoz, 2019b; Mayer, 2021).

Corporate purpose is closely related to well-established concepts such as mission, vision, corporate social responsibility (CSR) and corporate sustainability. While purpose and mission both guide organisations at the highest management level, they are very different. Mission is customer-centric and focused on day-to-day activities, whereas corporate purpose specifies societal and planetary value, emphasising 'why an organisation exists' in a higher social context (Brosch, 2023). Similarly, purpose and vision share the ability to inspire employees, but differ in their focus and direction (Barby *et al.*, 2021). When examining corporate purpose and CSR/corporate sustainability, both aim to improve societal well-being. However, corporate purpose is positioned at the core of an organisation and addresses all activities, whereas CSR remains peripheral and consists of isolated programmes (Aguinis and Glavas, 2013; Qin *et al.*, 2022).

George *et al.* (2023) distinguish two perspectives in the literature on corporate purpose: goal-based purpose specific to an organisation, expressed through mission statements, vision and strategic intent; and duty-based purpose linked to societal values, expressed through a company's values and environmental stewardship, where profit is seen as a means to a deeper positive impact (Hollensbe *et al.*, 2014; Rey *et al.*, 2019b).

In addition, Gulati (2022) identifies the deep purpose companies as companies that embrace purpose more fully than their peers because they understand better how to embed and activate it. A qualitatively different way of understanding and approaching purpose, rather than executional tactics or even broader strategies, distinguishes these companies. In sum, deep purpose existentially aligns organisations around the 'North Star' of purpose and articulates a conscious intention to do business in a more elevated way.

Two competing theories, shareholder and stakeholder, offer perspectives on the purpose of modern business. Shareholder theory, rooted in Smith's concepts, sees the purpose of the organisation as the provision of shareholder returns, but since the 1990s there has been a shift towards an intrinsically ethical view, influenced by Kantian ethics (Bartlett and Ghoshal, 1994; Pfarrer, 2013). Stakeholder

theory emphasises ethical responsibilities to multiple stakeholders, consistent with the basis of being a purpose-driven organisation (Freeman, Wicks & Parmar, 2004; Morrison & Mota, 2023). Stakeholder capitalism, as another theoretical approach, sees organisations as economic, moral and human institutions, combining business and ethics. In this view, Schwab (2021) introduces the 'universal purpose of the firm in the fourth industrial revolution', where firms engage all stakeholders for shared and sustainable value creation, addressing environmental, social and governance objectives (Sachs *et al.*, 2015; Freeman, Martin & Parmar, 2007).

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2.2 The analysis model

2.2.1 Roots of the analysis model

Advocates of 'generalised Darwinism' have adopted three key evolutionary processes, such as variation, replication and selection, to determine the drivers of the evolutionary process of firms (Hodgson, 2013). Although the Lamarck-Darwin dichotomy is an important reference point for evolutionists (Grandinetti, 2018), many argue that Darwinian mechanisms can elucidate evolution not only in biology but also in areas such as culture and management (Abatecola *et al.*, 2020; Grandinetti 2021).

In the field of management and organisation studies, a consensus is emerging that "circular, dialectical and multi-level perspectives can better support social organisations in their continuous adaptation to the global scenario" (Abatecola *et al.*, 2020). As a result, the construct of coevolution has gained prominence, with frameworks based on open systems theory, evolutionary organisation theories, and complexity theory (Golinelli 2000; Sydow *et al.*, 2009; Cafferata, 2016; Smith & Lewis, 2011). Coevolution posits that entities evolve in relation to their environment and vice versa (Porter, 2006), which is the first assumption of the co-evolution approach (Weick, 1979). The second and third assumptions involve interdependence and mutual feedback between entities, as well as a multi-level logic (Abatecola *et al.*, 2016). Abatecola (2014) suggests that the co-evolutionary lens views the relationship between the firm and its environment as dialectical rather than deterministic, leading to different but interconnected pathways of organisational evolution.

Building on these principles and recognising the dialogue between the firm and its environment, this paper adopts a logic closer to Jones' (2016) autecological approach. The autecological concept, which has not previously been applied to the study of the firm, proves fascinating for the deconstruction of the firm's purpose. Jones (2016) highlights two key concerns: an ecological account of how firms adapt to change, and an understanding of their contribution to environmental change. According to Jones, the firm is an 'open system that survives by importing and exporting energy and information to and from its operating environment'. Firms operate in an environment specific to their existence, distinguishing between external, ecological and selective levels. These levels, inseparable from the firm, constitute its operating environment. The interaction between the firm and its environment implies a constant process of interpenetration, a common feature of autecology and neo-institutionalism (Powell & Di Maggio, 2012). Researchers should explore how firms can change their operational environments, including those of other firms.

To explore this, the paper adopts Esposito De Falco's (2012) framework, which consists of three dimensions. The structural dimension corresponds to the genotype of the organisation, which represents the identity of the company. It includes the entrepreneurial factor, which influences the chromosomal make-up of the firm, and the territorial factor, which encapsulates the resources offered by the territory. The genetic dimension, inspired by Lamarck, emphasises evolution through the firm's ability to establish an evolutionary dialogue with the environment (Kotler & Sarkar, 2017). This dynamic dimension requires consideration of the genetic make-up of the firm.

The structural dimension gives way to the relational dimension, initiating the shift from the genetic to the implementation of the firm's decision-making processes (phenotypic dimension). The relational dimension, rooted in a systemic perspective, involves a continuous exchange between the company and its territory. This leads to the development of the territory by the company

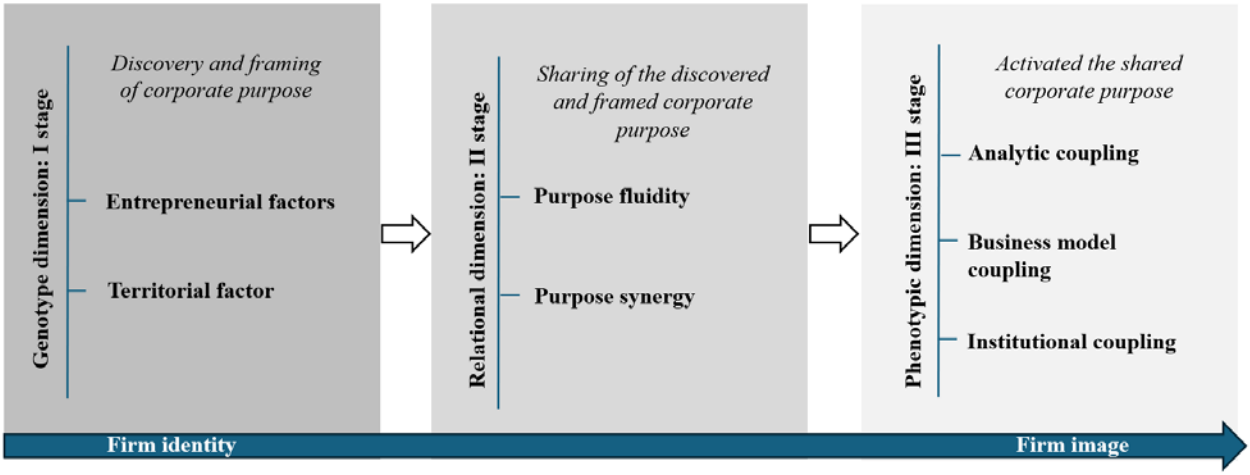
(institutionalisation process) and the growth of the company facilitated by the territory (contextualisation process). This reciprocal relationship, which highlights the strategic variable between the territory and the company, is in line with the co-evolutionary approach.

The final dimension, the phenotypic dimension, sees the company expressing its phenotype through specific survival strategies and sustainable actions. Sustainable growth requires coherence between the genotypic identity and the phenotypic image. In essence, sustainable growth is possible when there is alignment between the company's genetic make-up and its expressed image.

2.2.2. The multi-dimensional co-evolutionary framework for corporate purpose

The evolution of corporate purpose unfolds through distinct stages shown in Figure 1.

Fig. 1: The corporate purpose's evolution across three stages



Source: Adapted from Esposito De Falco (2012)

The genotype or structural dimension represents the first stage in the evolution of the firm's purpose, consisting of the discovery and framing of the organisation's reason for being (Brosch, 2023). This genetic dimension, similar to the company's genotype, encapsulates its identity, values, structural endowment and embedded organisational routines that have evolved over time (Ocasio *et al.*, 2023). Understanding a company's purpose requires delving into the elements intertwined with its identity, acknowledging its unique history, the individuals it represents, and its adaptability to the environment (Brosch, 2023). The historical context, dating back to the founding of the organisation, plays a crucial role, as the beliefs of the founders imprint lasting goals on the company (Ocasio *et al.*, 2023). Entrepreneurial factors also contribute significantly to the discovery and framing of the firm's purpose, with owner commitment and motivation being key influencers (Gartenberg and Serafeim, 2023). Strong owner commitment is consistent with a robust corporate purpose, with committed owners exhibiting behaviours consistent with the purpose, particularly when considering the long term. Motivations for commitment to purpose can be competitive, legitimacy-driven or ethical, each of which shapes the long-term goals of the organisation (Hollensbe *et al.*, 2014). Considered as part of the highest level of management, corporate purpose serves as a guiding reference for subsequent strategic and operational levels of management (Collins & Porras, 1991; Wolf & Mair, 2019).

Furthermore, the territorial factor, within the genetic aspect of corporate purpose, highlights the continuous interplay between the firm and its territory. The characteristics of a firm are intertwined with those of its territory of origin, influencing identities, behaviours, resource use and responses to territorial changes (Dicken & Malmberg, 2001). Finally, the structural aspect of purpose evolves dynamically, much as biological organisms adapt to survive. The genotypic dimension at the time of purpose discovery differs from that at a later time, taking into account changes due to generational ownership transitions and environmental changes (Brosch, 2023).

The evolutionary trajectory of corporate purpose moves to the second stage, the relational or systemic dimension, which involves the shared discovery and framing of the organisation's reason for being (Brosch, 2023). Firms exist in complex networks of relationships with diverse stakeholders, resulting in different forms of relational embeddedness based on the quality of ties, the exchange of strategic resources, and firm characteristics (Eng, Liu & Sekhon, 2012; Albis, Álvarez, & García, 2021; Dahlquist, 2021). This sharing of firm purpose is bidirectional, involving both internal and external stakeholders (Freeman, 1984). Internally, purpose is shared with participants in the value chain and influences corporate strategies, particularly with employees, who derive intrinsic and transcendent motivations from the organisation's reason for being (Grant, 2008). Employees find fulfilment and strengthen their identification with the company when they personally experience the corporate purpose in action (Rey *et al.*, 2019b; Jasinenko & Steuber, 2023). Unifying the reason for existence promotes shared meaning throughout the organisational hierarchy (Almandoz, 2023). Externally, corporate purpose is shared with societal stakeholders and regulators who have no direct economic interest but influence public opinion (George *et al.*, 2023). Corporate purpose is consistent with a logic of 'ecological centrism', in which the natural environment is seen as fundamental to society and the economy (George *et al.*, 2023). In this context, corporate purpose aims to provide profitable solutions to societal and environmental challenges without profiting from creating problems (Schwab, 2020). The relationship between the environment and the firm involves processes of institutionalisation and contextualisation, reinterpreting concepts such as purpose fluidity and purpose synergy (Rey & Malbašić, 2019). Fluidity brings corporate and stakeholder purposes closer together, while synergy allows for the mutual absorption of purposes. Harnessing these dynamics creates a strong link between the internal and the external, strengthening the company's self-awareness and embracing its territorial system. This promotes a harmonious development in which the company absorbs wealth from the territory and generates wealth for the territory (Brosch, 2023).

Sharing the organisation's reason for being propels it into the third stage, the phenotypic or strategic dimension, which marks the activation of the transformative power of corporate purpose (Brosch, 2023). This dimension involves translating corporate purpose into tangible actions, fostering a genuine alignment between the company's identity and image, ensuring authenticity and avoiding superficial operations for transient market appeal. In this context, corporate purpose is more than a descriptive concept; it serves as a bridge between the company's identity and image. While corporate purpose is generally stable over time, it evolves as the organisation pursues new goals, requiring a constant alignment between identity and image (Hatch & Schultz, 2017; Quinn & Thakor, 2018; Rey & Bastons, 2019). The aim is to prevent changes that could undermine the sustainable vitality of the organisation. In the negative scenario, similar to Morris or Belladonna syndrome in biological systems, a significant incongruence between genetic heritage (identity) and chromosomal expression (image) can occur. This incongruence can have a detrimental effect on the vitality of the company (Brosch, 2023). In the positive scenario, there is a perfect match between identity and image. Specific actions, as outlined by Rey and Ricart (2019), include analytical coupling, where purpose is incorporated into plans and objectives; business model coupling, where purpose is integrated into the business model for simultaneous purpose and profit; and institutional coupling, where principles and values related to corporate purpose are established, maintaining balance with stakeholders and providing meaning to members of the organisation (Brosch, 2023).

3. Method

3.1 Research design

As the paper focuses on improving the understanding of the phenomenon of corporate purpose, rather than measuring it, we used a qualitative research approach with an exploratory case study method to analyse the purpose of Italian wineries. Exploratory research, as opposed to providing conclusive evidence, helps to gain a deeper understanding of the problem (Saunders *et al.*, 2015).

Case studies are relevant to management studies as they serve as an appropriate methodology to capture organisational dynamics and social processes (Gummesson, 2017). The case study is the most appropriate empirical research approach due to its ability to provide detailed insights into a phenomenon in its authentic context (Miles & Huberman, 1994). According to Yin (2018), case study research is a specific strategy to elucidate a contemporary phenomenon in its real context, providing an in-depth description that proves valuable.

Following Siggelkow's (2007) approach, we select a powerful example that provides unique descriptive and conceptual insights, involving multiple levels of analysis (individual, group, organisation) as suggested by Yin (2003). Our research focuses on the case of an Italian wine company, pseudonymed Alpha, which serves as a well-documented example of purpose transformation involving individual actors (i.e. entrepreneur, owner, etc.), stakeholders and the firm as a whole. The decision to focus on a single case is in line with Eisenhardt and Graebner's (2007) assertion that single case studies can facilitate the development of more complex theories than multiple cases, allowing researchers to tailor their theories to the nuances of a particular case. In addition, the chosen case, one of the twelve legendary Italian wines of the 20th century, offers a wealth of reliable and diverse secondary and primary data, contributing to the empirical richness emphasised by Weick (2007) through a detailed narrative.

Moreover, the Italian wine industry is an interesting field of research because Italy is the second largest market in the EU and the third at world level (International Organisation of Vine and Wine, 2022) and represents a fine and healthy sector whose companies have a total turnover of 10.7 billion euros, representing 89.3% of the national sector total (Mediobanca, 2023).

3.2 Data collection

Alpha was contacted personally by email from mid-2023. To analyse the single case study in depth, we collected primary data through a semi-structured online interview, telephone discussions and email exchanges.

A two-hour semi-structured interview was conducted with the Chief Executive Officer (CEO) selected as the informant. The CEO was emailed a copy of the questionnaire and a cover letter describing the general purpose of the study and how the data would be used. Confidentiality and anonymity were confirmed.

An interview protocol provided the framework for the interview (Walliman, 2015). The interview consisted of a combination of open, semi-open and closed questions, the topics of which were communicated to the respondent in advance. The interview protocol was divided into four sections. Section I was designed to determine whether the company is guided by a clear and stated corporate purpose, while section II aimed to understand if and how the corporate purpose has evolved over time. In section III we asked the respondent about the genotypic dimension of the purpose, and in section IV we discussed its relational dimension. Section V identified the phenotypic dimension of an organisation's purpose, while section VI involved collecting data on the interviewee and the winery, such as expertise in the corporate role and the company's affiliation to a holding, among other aspects. The interviews were recorded and then transcribed.

Secondary data was also collected to complement the primary data. The use of multiple sources of data, known as data triangulation, is recommended to increase the internal validity of a study (Stake, 1995). The secondary data included internal company documents, including sustainability reports, annual reports and investor presentations. In addition to these materials, data was extracted from the company's official website.

3.3 Data analysis

Within a qualitative data analysis, we have adopted a 'pattern-matching' approach (Yin, 2018), which consists of linking concepts from the theoretical world to data from the empirical world through

a translation process. Consequently, our analytical process was mainly deductive, as we used the multidimensional co-evolutionary framework of corporate purpose, based on co-evolutionary theory, as a conceptual model.

We manually analysed the transcript line by line, carefully reading through the transcript, making notes and highlighting important statements. The data was broken down into manageable segments and given names or other labels (Schwandt, 2007) derived from the concepts underlying the suggested framework of corporate purpose. This process was repeated as many times as necessary to get an accurate sense of our database in its entirety. Gaps in information were filled by telephone conversations and email exchanges.

We then produced a case study description and shared it with the interviewee for additional comments. Finally, a case study profile was created, as suggested by Yin (2018).

4. Findings

Alpha is a medium-sized family business based in Umbria (central Italy). It has been producing and bottling wine under its own label for fifty-three years and is a leader in the production of Sagrantino di Montefalco red wine, both on the national and international markets. The characteristics of the company are described below according to the dimensions of the co-evolutionary framework for corporate purpose.

Genotype dimension

Alpha is undertaking a complex journey of discovery and articulation of the organisation's reason for being. This involves a refinement of the company's vision and mission, born out of an awareness of the need to address current global challenges. As the CEO stated: "Alpha is at a turning point: we are working to expand the role of business by helping to solve serious global problems such as climate change and reducing inequality". In this way, Alpha is driven to engage in purpose-driven activities primarily for ethical reasons, based on moral values such as improving society and the environment by changing the way we make a profit. This goes hand in hand with the commitment that the owners have made in recent years to place sustainability at the heart of the company's philosophy. However, why the company exists and how it contributes to the common good is not yet formalised, while the vision and mission are well defined, as the CEO confirms: *"Our vision is to be the pioneers of a new wine-making culture, based on a constant and meticulous search for quality, on research and experimentation into new agronomic and oenological techniques, and on the dissemination of the culture and traditions of the territory"*.

In the process of discovering and defining Alpha's purpose, the company's history has been influenced by the will to "*fulfil an ambition, not only a personal ambition, but an ambition to improve the territory of origin*", according to the CEO. Alpha was founded in 1971 by a successful entrepreneur in the textile industry. He bought a few hectares of land in the municipality of Montefalco in order to differentiate his investments. Alpha's rapid growth is closely linked to the founder's son, who took over responsibility for managing the farmland in 1987. As the CEO explains: "At that time, wine production in the area was very heterogeneous. The few companies that existed worked on an empirical basis, without clear scientific guidelines, and were not regulated by wine legislation that established basic production criteria. The quality of the product was therefore uneven and sporadic, despite the great potential of Sagrantino. Producers were better described as peasants, given the marginal nature of entrepreneurship in wine production. The wines were mainly intended for domestic consumption and sold within the regional borders". The entrepreneurial intuition was to recover one of the oldest Italian grape varieties, unknown to the general public and in danger of disappearing, despite its great market potential. This was achieved by combining tradition and innovation, by counting the surviving plants and classifying them according to their physical and organoleptic characteristics, in order to construct a new Sagrantino that would enhance the identified differences. The key values were tradition and innovation. As the CEO pointed out: *"If you want to*

produce quality wine in Italy, you have to be at peace with the past, firmly anchored in the present and open to the future".

Moreover, the territory played a crucial role in the creation of the corporate identity. Alpha offers a place-based product, influenced by material specificities, pedoclimatic conditions, higher-order skills such as craftsmanship, myths and rituals that qualify the territory of origin and represent sources of uniqueness in the competitive scenario. In this respect, the CEO underlined: "*Alpha is the heir and interpreter of the culture and tradition of the territory. A vine that has grown in Montefalco for more than 400 years has become the company's strength"*. The "terroir" - the combination of territory, vineyard and producer - is the element on which we have focused from the outset. The link between the company and the terroir is also reflected in the company's brand, which includes the name of the founder and the old tower from which the terroir takes its name. The strong identification of the company with the territory helps to define a corporate purpose centred on profitable solutions to the problems of people and the planet.

Relational dimension

Although the discovery of the reason for the organisation's existence is ongoing, those aspects of the corporate purpose that have already been framed are shared within and beyond the organisation's boundaries. In this regard, the CEO clarified that: *"We believe that Alpha's growth is based on the trust and respect of our stakeholders. These are public and private bodies, the media, industry associations, suppliers, partners, customers, employees and the community, with whom we have built relationships based on loyalty and transparency, and with whom we have discussed and continue to discuss our present and future prospects"*.

In particular, in order to bring the company's purpose and stakeholders' purpose closer together and more closely linked (fluidity), a culture of listening and continuous dialogue between employees is a constant in Alpha's working environment. As the CEO stated: *"Each of us, regardless of our job, contributes with our own knowledge, culture and experience to maintaining a safe, serene and stimulating working environment"*. One driver of fluidity is a shared ethical code that guides internal relationships with employees. Contextually, the mutual absorption of purpose between Alpha and its stakeholders (synergy) is evident in the relationships, even personal ones, with mass retailers. As the CEO explains: *"This proved crucial during the coronavirus pandemic, where we did not experience any significant downturn in HoReCa, which suffered months of closures"*. Sinergy is also expressed in the cooperation with many regional wineries to create a regional identity as a result of the mixed and closely related identities of the companies operating in the place.

This favours a harmonious development in which Alpha absorbs wealth from the territory (contextualisation) and generates wealth for the territory (institutionalisation). Specifically, the company has achieved its entrepreneurial project by firmly anchoring itself in the resources and expertise of the area dedicated to the production of Sagrantino wine. However, as the CEO points out: *"The entrepreneur absorbs from the territory ideas that others may not be able to capitalise on, and on these he builds opportunities. In other words, the entrepreneur takes and gives"*. The institutionalisation factor therefore involves the growth and development of human resources through targeted integration, first within a production cycle and then across all business cycles. In addition, Alpha has played a key role in unveiling the riches of an entire region that was previously associated only with religious interests, transforming it into a sought-after tourist destination. As the CEO points out: *"We attract visitors from all over the world to Montefalco, captivated by the authenticity of our wines and seduced by the region's distinctive culinary, oenological and cultural offerings"*. With this in mind, Alpha supports the culture of the area and contributes to the recovery and restoration of some works that testify to the cultural vitality of the area.

Phenotypic dimension

Although the reason for the company's existence and how it contributes to the common good are not yet formalised, the company's purpose inspires specific actions that are consistent with the

genotypic identity that has been framed so far in the evolutionary path taken by Alpha. These actions are identified in the area of analytical coupling, which involves incorporating the purpose into plans and objectives, such as initiating strategic endeavours with purpose. In particular, the purpose is acted out through sustainability, which is expressed in the strategic choice to adopt responsible agriculture, which is crucial at a time when viticulture is facing the consequences of extreme meteorological events all over the world. Responsible agriculture protects the environment, protects itself and brings ethical values as an added value to production. It is able to constantly innovate in order to offer the best possible products, and it promotes the cultural values of the territory by keeping alive the tradition of wine-growing. As the CEO explains: *"We have a modern agriculture that produces with the help of technology and research, while remaining firmly rooted in its origins. In this way, contemporary agriculture puts the individual, safety, the quality of the product and the context in which it is produced at the centre"*.

On this basis, sustainable agriculture requires the use of precision farming systems, tools and new cultivation and winemaking techniques that make innovation a building block of sustainability. As the CEO clarified: *"We see innovation as a necessary path to the sustainability of our business. This is why we are constantly at the forefront of researching and testing new technologies and tools for Agriculture 4.0"*. The creation of a research and development laboratory inside the winery has marked Alpha's way of doing business with purpose, encouraging a continuous exchange between scientists, thanks in particular to the collaboration with the Faculty of Agriculture of the University of Milan, and young professionals. The number and technical validity of the projects tested in the R&D laboratory have led to the birth of an innovative start-up in the agricultural sector, with the aim of sharing the wealth of knowledge, relationships and production philosophy with Italian and foreign wine companies.

The purpose of the company, which is based on sustainability, is also reflected in its social behaviour, which makes Alpha a vineyard of integration within a project that aims to integrate migrants in an effective way, making them protagonists of the redemption of the territory and the community in which they live and work. As the CEO stated: "*We welcome asylum seekers not with works of charity, but with the offer of work and professionalism"*.

5. Discussion and conclusion

Our empirical study demonstrates that the evolutionary perspective is appropriate to effectively analyse the components of corporate purpose through the multi-dimensional co-evolutionary framework proposed here.

The three dimensions of the framework find support in the empirical research, which confirms the interconnectedness of the organisation's intrinsic identity (genotype), its engagement within the ecosystem (relational), and the alignment of purpose with actionable strategies (phenotypic). This multi-dimensional approach reveals how corporate purpose guides companies through a transformative journey from their inception to their interactions with stakeholders and broader market dynamics.

In line with Ocasio *et al.* (2023), we acknowledge the dynamic nature of Alpha's purpose as it evolves over time. However, Alpha's transformative journey towards a deeper purpose is still in its early stages, as the end goal remains distant. This perspective aligns with Gulati's (2022) assertion that companies imbued with a deep sense of purpose infuse their operations with passion, meaning, identity and community, thereby animating their activities with a heightened sense of social responsibility that enhances both social and financial value.

In practice, Alpha's purpose manifests itself in tangible behaviours that seek to align the company's identity with its external image, ensuring genuine transparency between its essence and its appearance. As highlighted by Qin *et al.* (2022), when purpose permeates every facet of an organisation, it has the potential to unite internal and external stakeholders, thereby reducing uncertainty in times of change, resolving conflicts between stakeholders, and galvanising collective

action towards shared social goals beyond profit. This conceptualisation of corporate purpose as a unifying force for ethical behaviour, rooted in genuine concern for stakeholder welfare and an ethic of care (Freeman *et al.*, 2020; Bhattacharya *et al.*, 2023), is broadly consistent with Alpha's operational framework.

However, while these aspects are generally observable within Alpha, they currently exist at a superficial level. Our analysis suggests that the presence of a relatively underdeveloped relational dimension may hinder the full integration of the company's purpose, resulting in ambiguous feedback from the evolving context.

However, it is notable that the alignment between Alpha's purpose genotype and phenotype is particularly strong, largely due to the CEO's consistent commitment to adopting behaviours consistent with the company's purpose identity through sustainable and innovative strategies. This commitment has the potential to facilitate the development of a deeper purpose, positioning Alpha as a promising purpose-led company. At present, however, Alpha is more appropriately categorised as a shallow purpose company than a deep purpose company (Gulati, 2022).

Based on the findings, we contribute to the advancement of knowledge in the field by asserting that the evolutionary path of corporate purpose is not inherently linear, but rather circular in nature. The Alpha case study illustrates that, unlike a linear progression where each step logically follows the previous one upon completion, the evolution of purpose is characterised by circularity. This means that different steps may occur simultaneously, representing a dynamic and interconnected process rather than a strictly sequential one. For example, Alpha is navigating the complex journey of uncovering and articulating purpose, but it already demonstrates the presence of both relational and phenotypic components.

The feature of non-linearity underlines the complex process of defining and refining an organisation's purpose, which involves continuous self-discovery, adaptation and re-evaluation. This implies an ongoing adjustment of both the relational and phenotypic dimensions as the genotypic dimension of purpose becomes more clearly defined. Organisations may therefore encounter unexpected challenges, shifting priorities and evolving perspectives along their purpose-driven journey. This non-linear path allows for flexibility and responsiveness to changing circumstances, fostering a more resilient and adaptive sense of purpose. In this logic, corporate purpose is not a fixed destination, but an ongoing exploration that requires constant reassessment.

By embracing the non-linearity of purpose from a leadership perspective, organisations can better manage uncertainty, learn from experience and refine their purpose over time. This recognition encourages a more holistic and open-minded approach to purpose, emphasising the importance of accepting change, learning from setbacks and continually evolving to align with personal or organisational values and aspirations. In essence, an understanding of the circular trajectory in the evolution of corporate purpose helps leaders overcome 'myopia' during times of crisis and uncertainty. This awareness enables them to uncover new insights, view issues holistically and maintain focus and direction. The link between corporate purpose and organisational resilience in a complex and rapidly changing environment is supported in the literature (Collins and Saliba, 2020; Liu *et al.*, 2020; Florez-Jimenez *et al.*, 2023). Another managerial implication relates to the critical role of relationships as an enabler of the transition to a deep corporate purpose. A successful transition depends on whether corporate purpose is perceived as a credible approach by the company's internal and external stakeholders (von Ahsen, Gauch, 2022). The credibility of the corporate purpose inevitably increases when the company builds relationships based on trust and sharing, both externally and internally. According to this logic, it is advisable to avoid purpose orientation being seen as a mere marketing measure (purpose washing) (Westphal, 2023; Kaplan, 2023). For this reason, purpose should originate from top management and/or corporate strategy rather than being anchored in the communications department. Furthermore, a shared and aligned purpose should never be perceived as 'akin to soldiers standing in an artificially rigid order' (Kramer 2017, p. 7). Therefore, it seems essential to engage in a thorough and ongoing dialogue with internal and external stakeholders to assess their evolving needs and formulate communication strategies accordingly.

However, it is important to emphasise that interaction and communication approaches with diverse stakeholders should not be one-size-fits-all and that a certain level of differentiation is essential (Annweiler, 2018).

This study is not without its limitations. The main limitation is the inability to generalise our findings, mainly due to the nature of a single case study. Although it provides rich insights, qualitative research of this type has some limitations, such as a lack of representativeness and the subjectivity of its findings (Hamel *et al.*, 1993). To overcome this weakness, a multiple case study is proposed for future research developments. However, this exploratory research is intended to provide a basis and stimulus for further research in this area. An interesting avenue for future research could be to explore how the evolutionary trajectory of Alpha's purpose unfolds over time through a longitudinal case study. This would allow us to understand which specific elements have a greater influence on the evolution of purpose over time, ranging from the ownership structure (whether concentrated in the hands of the family or not) to the legal context (i.e. the norms and a system of constraints and rules governing social, legal and economic activities within a territory), which not only influences a firm's ability to co-evolve, but also influences the sensitivity of organisations and public opinion to purpose, potentially creating conditions for the alignment of the genotypic and phenotypic dimensions of purpose. The study also identifies further research avenues: extending the application of the multidimensional co-evolutionary framework for corporate purpose to other countries, as the wine industry is one of the most representative economic activities in most countries (Galati *et al.*, 2019; Karagiannis & Metaxas, 2020). Furthermore, corporate purpose has different meanings in different societies and the starting point of the emanation of corporate purpose varies from country to country (Aguilera, 2023).

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Track 8
Retailing & Service Management

Building customer experience strategy in phygital retail: an analysis within the fashion industry.

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Abstract

Frame of the research. *Given the rising importance of customer experience and accelerating digitization, brands must meet customers wherever they prefer, urging brands to build a symbiotic ecosystem of digital and physical retail touchpoints through phygital strategies.*

Purpose of the paper. *The paper analyzes the role of customer experience in phygital retail strategies. Using the fashion industry as an empirical setting, it adopts qualitative research to investigate how customer experience can be successfully delivered in phygital retail.*

Methodology. *By analyzing existing literature on customer experience and retail, we extract five key elements to deliver relevant customer experience within phygital retail which are then validated through qualitative research combining a press and media case analysis and semi-structured interviews. Managerial implications are stressed.*

Results. *The research identifies five key elements as those successfully creating a relevant customer experience in phygital retail: shared purpose, experience personalization, core digital platform, relevant positioning, and ecosystem of partnerships. If effectively integrated, they can guide organizational decision-making and strategy.*

Research limitations. *Main limitations relate to the impossibility to visit stores and the running of interviews online with partial control on contextual variables. Multiple sources were combined to make findings reliable, and a sample of questions was given before interviews to reduce uncontrollability. Sample size could also be further enlarged.*

Managerial implications. *Due to escalating digitization, brands become increasingly omnipresent in consumers' daily life. As this asks them to develop phygital retail strategies, this research supports managers on how they can develop a coherent customer experience throughout phygital retail touchpoints integrating the proposed five elements.*

Originality of the paper. *Despite growing literature on phygital customer experience and retail, it provides limited guidance for managers on how to build an effective customer experience strategy, especially in phygital retail. This paper makes a theoretical and practical contribution, showing the relevance of five elements.*

Key words: *customer experience; phygital retail; omnichannel strategy; platform; purpose; fashion*

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1. Introduction

The rise of contemporary omni-customers claiming an active role in the process of brand content creation and wanting to frictionlessly choose how, when, and where to engage with the brand itself has made the customer experience critical to establish unique customer engagement (Bellio *et al.*, 2021; Pangarkar *et al.* 2022; Timoumi *et al.*, 2022) and enhance loyalty (Zou *et al.*, 2022: Tuguinay *et al.*, 2022) and retention (Cambra-Fierro *et al.*, 2021). Hence, the "experience room" (Edvardsson *et al.*, 2005), the "space" where customers encounter the brand, whether physical or digital, becomes a key managerial tool whose features can be controlled to assemble a specific customer experience. If this turns retail into a strategic factor in delivering a unique customer experience (Brakus *et al.*, 2009), delivering a holistic, unique, consistent, and relevant customer experience throughout a symbiotic ecosystem of digital and physical retail touchpoints also becomes essential in combination with rapport building and social engagement (Pangarkar *et al.*, 2022). Phygital retail identifies a novel form of retail strategy connecting "physical and digital worlds and helps customers live in-store and online at the same time in the same place" (Banik, 2024), delivering a "new customer experience" (Batat, 2019; Batat, 2022). Thus, phygital retail strategies may enhance distinctiveness and differentiation of the customer experience through hyper-customized offerings (Pangarkar *et al.*, 2022) and the perfect integration of digital and physical touchpoints into a unified customer experience for "onlife" customers (Kotler *et al.* 2021).

Given the rising importance of phygital retail in customer experience strategy, it is crucial to understand (1) which elements managers should focus on to design a relevant customer experience in phygital retail and (2) how they can successfully integrate them. Thus, this paper wants to answer the following two research questions:

RQ1: Which elements are needed by managers to deliver a relevant customer experience?

RQ2: How can the elements be integrated into a successful phygital customer experience in retail?

First, we conducted an in-depth literature review on both customer experience and recent retail trends. Despite the growing literature on both topics, there is limited research able to provide which customer experience elements should be effectively integrated in phygital retail strategies with implications for managerial practice. From this first phase, five key elements of customer experience in phygital retail are identified: shared values (purpose), hyper-customized experiences and products (personalization), the construction of relevant narratives and contexts with respect to which customers position themselves (positioning), a strong networked ecosystem of collaborating stakeholders (partnerships). To validate their relevance also in current managerial practice and outline managerial implications on how they can be successfully integrated to build effective customer experience strategy in phygital retail, we combined a case analysis on online press and media content of fashion retail brands (RQ1) and semi-structured interviews with CEOs and experts working with(in) the fashion industry (RQ2). The paper is exploratory and attempts to build rather than test theory, reflecting the developing nature of the empirical and theoretical context. Our contribution is twofold. Our study contributes to existing literature by connecting two streams of literature: the customer experience and retail literature, identifying the elements that affect the most customer experience strategy in retail. Moreover, it provides managerial implication on the drivers to be used to reach a successful customer experience strategy in retail where the different elements are properly combined to complement and reinforce each other in a phygital perspective.

The paper is organized as follows. The first section is the literature review, section two describes our research methodology, while section three presents the main results of the press and media case analysis and semi-structured interviews. Section four further discusses and integrates the main findings of both qualitative approaches. Section five concludes our paper by suggesting the managerial and theoretical implications of our study, presenting ideas for further research.

2. Literature Review.

Gentile *et al.* (2007) identify six main components of a customer experience: sensory, emotional, relational, pragmatic, cognitive, and lifestyle. Given escalating digitization, customers demand an active role in their customer experience with a brand, so customer engagement, empowerment, excitement, and experience in value creation become also critical. Grewal (2018) adds education to these 4Ps, as new channels and processes influencing customer choice and experience are continuously introduced in the digital transformation. Hence, establishing a synergy between a customer experience's controllable and uncontrollable features becomes vital (Verhoef *et al.*, 2009), with retail directly affecting customer satisfaction (Molinillo *et al.*, 2022). If customer experience is crucial in retail, Mathur (2020) explains that a retail social capital depends on different consumer-associated factors: acquiescence, recognition, and integration. Through an integrated retail brand equity model, Zhang *et al.* (2023) popose that consumer shopping experience and store performance evaluation should focus on not only visible metrics (e.g., sales) but also information about how customers feel. However, existing models fail to address the phygital era and provide relevant managerial guidance for delivering an integrated customer experience across phygital retail touchpoints. Our literature review on customer experience and (phygital) retail strategy identifies five main elements to do so, as follows.

Purpose

Purpose describes the cause a brand supports and its communication to the target audience (De Swaan Arons *et al.*, 2014). Goodyear (1996) describes it as a brand's identification with social, ethical, or political values and ideals that are also shared by its customers, since purpose nowadays also refers to social concerns through which a brand can strengthen consumer loyalty and brand image, constituting a marketing driver in branding strategies (Hamill, 2020). As it embodies the reason why a brand exists (Gad, 2016), the brand's "inspirational and motivational reason for being" (Stengel, 2011, p. 3), or the impact it seeks to have in the world (Afdhel and Jones, 2021), purpose also identifies the intersection of the brand's unique talents and the needs of the world (Reiman, 2012) and an organization's value reshaping to meet the customer's expectations of a positive contribution to society (Brophy, 2017).

Percolating into the brand's culture and values, purpose becomes part of the very essence of the organization (Barton *et al.*, 2018), driving all its stakeholders, making them feel part of something "larger" (Annweiler, 2018; O'Brien *et al.*, 2019) and establishing a sense of bonding, memorability and "virality" (Annweiler, 2018). Consumers also increasingly demand organizations to act, choosing brands reflecting their values (Mishra, 2020). Since strong emotional relationships positively affect customer loyalty, sometimes resulting in brand evangelism (Al Nawas *et al.*, 2021), purpose may allow brands to meet these expectations and enhance recall (Hayman, 2019; Anderson *et al.*, 2018). As purpose becomes a key component upon which consumers evaluate brands, it becomes a crucial factor to build authentic customer experience in phygital retail. Thus, building and delivering a strong meaning through the customer experience in retail can differentiate a brand from competitors (Artusi and Bellini, 2021).

Personalization

Personalization commonly refers to a targeted marketing strategy, through which the company provides relevance to customers by offering "the right content to the right person at the right time" (Tam and Ho, 2006, p. 867). In phygital retail, this entails providing customized content, services, and interactions based on data (Adomavicius and Tuzhilin, 2005; Ansari and Mela, 2003) and adapting offers to meet a customer's needs (Lemke *et al.*, 2011). Smart technologies can support in-store personalization with an individually targeted in-store approach (e.g., O'Shea, 2016), enhancing the integration of physical and digital dimensions in brick-and-mortar retail settings through customer-specific information and offerings that reflects combinations of historic and real-time data.

In online retail, personalization technologies can modify what to display and how to display it based on a customer's purchase behavior and history (Zhang *et al.*, 2011). By granting a good match between offerings and customer preferences through enhanced elaboration of relevant information, personalization may positively influence purchase decisions, creating delighting experiences, gratitude, or customer satisfaction (Bock *et al.*, 2016; Vesanen, 2007). Hence, personalization is positively related to customer experience.

Personalization has become incredibly critical in omnichannel strategies since integrating retail channels holds enormous potential in delivering a more personalized customer experience (Hanninen *et al.*, 2019). Ruiz-Molina *et al.* (2021) describe personalization as crucial in stores to generate excitement and enjoyment both online and offline, while strengthening customer loyalty. Bilgihan *et al.* (2016) state that recommendation systems with personalization features can engage customers in online stores. McLean *et al.* (2018) examine the relationship between customization and customer experience specifically within retail mobile applications, showing that customization directly influences customer experience. Rose *et al.* (2012) study the relationship between web store customization and the affective components of customer experience, concluding that providing personalized and relevant content can result in positive customer emotions and influence the affective customer experience component. Hence, personalization enhances the customer's feeling of control and makes him/her part of creating the experience (Chang *et al.*, 2010), affecting the customer experience as well.

Platform

Retailing is now extensively driven by innovative technologies (Grewal *et al.*, 2021) implemented in many retail-related touchpoints of a customer experience, including in-store services, back-end operations (e.g., warehouses, supply chains), communication (e.g., websites, social media platforms), promotion and display of merchandise. Despite the rising importance of omnichannel retail strategies and customer experience in retail (Frasquet-Deltoro *et al.*, 2021), little research attempts to capture an omnichannel experience. Jones and Runyan (2013) develop a scale to measure brand experience in the offline and online channels of multichannel retailers, treating online and offline retail channels separately, while Frasquet-Deltoro *et al.* (2021) define a brand experience scale for omnichannel retail focusing on single-brand retailers.

However, the coexistence of complementary online and offline brand-related touchpoints in phygital requires brands to adopt a customer-centric approach to deliver an integrated, holistic, and seamless customer experience that is consistent and customized across digital and physical retail touchpoints and moments (Valdani *et al.* 2016; Banik, 2021). Since this ecosystem of multiple stakeholders co-creating a purpose-led customer experience across digital and physical retail touchpoints requires fast information and data sharing across touchpoints, stakeholders, and dimensions, engaging, interactive, and immersive technology-powered platform can enable this synergy by conferring all stakeholders a major responsibility in the customer experience design. Core digitally powered platform that enables to leverage on network externalities and use of data (Nuccio and Guerzoni, 2019) is critical to build competitive advantage through customer experience in phygital retail.

Positioning

Positioning involves creating a clear image in consumers' minds as to what the brand stands for (He and Mukherjee, 2009). If brands allocate significant resources to the creation and establishing of a distinctive brand identity (Kumar and Polonsky, 2019) in retail, it is critical that a brand's positioning is consistent with actions, including both at the operational and in-store level (Kent and Stone, 2007). If this can be achieved through various dimensions of in-store experiences including product display, providing knowledge, product trials, store layout and store-level special activities, consumers also assess the in-store experience based on their motives to visit the store, time available to purchase, mood at the time of visit, and familiarity with the store (Backstrom and Johansson, 2006). Hence, aligning expectations and customers' in-store experience becomes essential for effective

brand positioning (He and Mukherjee, 2009; Khan and Rahman, 2015). However, the industry structure also affects positioning through continuous changes in technology and consumer behavior, forcing organizations to be continuously innovative in strategizing how to best position themselves to survive and flourish in this environment. Sit *et al.* (2021) stress how both honesty, which identifies a customer's trust in a brand, and connection through shared values directly affect customers' perceived authenticity of online retailers. As positioning becomes vital to establish strong and long-lasting relationships with active customers in phygital retail, the customer experience must deliver a lifestyle. Lifestyle branding is a strategic concept entailing a brand-oriented positioning focused more on intangibles and less on product-range or brand extensions. This includes building the brand around consumers' "life moments", making the brand relevant for a "diverse" target and creating brand content around that target's interests, affinities, tastes, and lifestyle. Hence, it grows out of a preexisting community and must not be perceived as imposed (Pérez del Castillo *et al.*, 2020).

Partnerships

Strategic partnerships can bring convenience for customers, boost sales, allow organizations to gain access to new capabilities and extend their brand reach to new customers in novel places. Moreover, they grant retailers access to new shopping occasions and new customers and may extend a retailer's brand halo to its partners (Briedis *et al.*, 2020).

Mutually beneficial partnerships can help brands deliver personalized experiences while giving vendors full transparency into how their products perform (Lindecrantz *et al.*, 2020). In studying how core customers' behaviors and spending habits were impacted by COVID-19, multiple studies establish that retail partnerships and M&A activities are set to be vital for brands to grow, by creating opportunities for financially sound players to acquire or partner with less advantaged players (Atmar *et al.*, 2020), and to meet customers' needs more effectively. Long-lasting relationships and partnerships become fundamental for continuous and relevant value co-creation (Rubio *et al.*, 2021). This implies that organizations should be discerning about which partnerships may actually add value and innovate their customer experience as they are crucial for delivering a relevant and consistent customer experience across phygital retail touchpoints.

3. Methods

Through the literature review, we have identified the above described five key elements (i.e., purpose, partnerships, platform, personalization, and positioning) as relevant in designing a customer experience strategy. Despite the growing importance of delivering a relevant customer experience through phygital retail solutions, there is a lack of literature proving the salience of these elements and showing how managers can implement and integrate such elements to reach success. Given the novelty of the analyzed phenomenon and exploratory nature of our study, we decided to rely on qualitative methodology to answer our research questions. The developing nature of this phenomenon makes a qualitative approach more appropriate as it allows researchers to understand the factors underlying the phenomenon (Carson *et al.*, 2001) from the direct experience of those living it (Gioia *et al.*, 2013) by understanding how they interpret it (Denzin & Lincoln, 2005, p. 3). Moreover, considering the novelty of the phenomenon (i.e., phygital retail), qualitative research is a traditionally used approach to develop new theories and understand organizational processes by investigating how people make sense of them (Gioia *et al.*, 2013). We combined two qualitative methodologies: a press and media case analysis and semi-structured interviews, to delineate whether the five key elements found in literature characterize a relevant customer experience in retail and how they can complement each other into successful customer experience in phygital retail strategies in the fashion industry.

3.1. Press and media case analysis

Case analysis choice is consistent with the research aim of allowing the replicability of the results and generating theories regarding the elements that emerge from the analysis of the considered phygital cases (Eisenhardt, 1989; Yin, 2013).

Cases were selected based on two phygital-related variables: (a) the simultaneous usage of multiple digital technologies (e.g., apps, web, social media, mixed reality, virtual reality, and augmented reality); (b) the existence of a link between the physical and virtual dimensions through interfaces as done by Bartoli *et al.* (2023). The method employed for the case identification is consistent with that adopted for phygital events by Piccioni *et al.* (2021). Cases were selected among those involving the usage of technologies that are deemed capable of merging the digital and the physical in accordance with Nofal *et al.* (2017), and according to the categorization developed by Batat (2019), which regards as phygital the experiences of integrating the real into the digital, such as those that have been analyzed in the present study. To select relevant brands as cases to be considered for our analysis on phygital customer experiences strategy, several articles were retrieved from official sources relevant in the fashion industry such as Vogue Business, Fashion Network, the Business of Fashion and LinkedIn from January to April 2021 and examined in addition to the platforms' analysis (Patton, 1999). The sources dealing with phygital retail formats in the fashion industry were selected through separate phases. After conducting a keyword search on these websites and social media to select a first sample of articles about phygital retail, this sample was further refined through deep reading. After five brands were selected as representative in terms of phygital strategy: Burberry, Gucci, Nike, Gentle Monster, and Portèlo. We collected further information from the brand's official online sources such as the website and all social media platforms. Once the material about each brand including (1) their overarching digital strategy and (2) a specific phygital store case was organized, we performed a comprehensive analysis on the collected and organized data according to the identified five key elements previously found in literature. Table 1 reports the main characteristics of each selected brand.

Tab. 1: Selected brands.

Company	Industry	Considered Store	Store Location
Burberry	Luxury apparel and accessories	Burberry Shenzhen Social Store	China
Gucci	Luxury apparel, leather goods, and accessories	Gucci Garden Boutique	Italy
Nike	High-end sports apparel, footwear, equipment, and accessories	Nike Rise Store in Guangzhou	China
Gentle Monster	Luxury eyewear and accessories	Gentle Moster Haus Dosan	South Korea
Portèlo	Luxury resale e-commerce	portelo.shop	Mexico

Source: our elaboration

3.2. Semi-structured interviews

If the observational study aims at showing the validity of the 5 key elements derived from the literature, we then conducted semi-structured interviews to corroborate the salience and understand their successful application to define implications and guidelines for managerial use. Semi-structured interviews provide insights on a novel phenomenon through a deep understanding of the "relationships among variables even within complex processes" (Massaro *et al.*, 2020, p. 2153). Given the flexible nature of their design, they can be tailored to the specific interviewee and context to include more relevant information. Hence, it was the most appropriate methodology due to the emergent and developing nature of our analyzed phenomenon and our focus on customer experience strategy building.

Five semi-structured interviews have been performed online on digital platforms (i.e., Zoom, Google Meet, and Skype) between April and May 2021 due to Covid-19 restrictions. Questions were related to the five key elements of customer experience strategy within retail strategies derived from the literature review and on their role and combination into phygital retail solutions. Interviewees were chosen through purposive sampling and snowballing technique to ensure that they had sufficient knowledge and expertise of the phenomenon choosing them in both fashion retail and consultancy companies. Given the limited number of interviews, this approach also ensures enough coverage of the phenomenon by tailoring the questions to the specific industry and/or job position, increasing the robustness and reliability of our results. Due to privacy issues, names of the participants cannot be disclosed so numbered aliases are used instead. Table 2 provides general information on interviewee's industry, job position, and geographic location. Participants were first contacted and given an abstract and general outline of the research by email. If they accepted to participate, they were given a general brief description and/or sample of questions before the interview. Interviews were conducted in Italian or Spanish and lasted approximately 1 hour each. Interviews stopped when saturation of topics and insights was reached (Glaser and Strauss, 1967). Interviews were video-recorded and run by the same researcher to avoid biases, being manually transcribed verbatim by listening to the recording. The coding was also conducted by the same researcher, being checked by the other two researchers afterwards. Each interview was coded according to pre-existing five elements derived from the literature (see paragraph 2): purpose, positioning, personalization, platform and partnership. This coding was then discussed among the three researchers until mutual consensus was achieved for reliability.

Tab. 2: Semi-structured interviews. Summary information about the interviewees.

Interviewee	Company Industry	Short Description	Country	Job Position
1	Consulting	Innovation consultancy supporting organizations in the implementation of innovative processes, business models, and products.	Italy	Innovation Consultant
2	Luxury resale e-commerce	E-commerce for reselling second-hand luxury fashion products and accessories.	Mexico	CEO & Co-founder
3	Consulting	Management Consulting Company assisting luxury brands to develop their retail and communication strategy in APAC.	Singapore	Founder & Managing Director
4	Consulting	Retail management consulting helping luxury and beauty brands enter South Korea.	South Korea	Founder & Managing Director
5	Luxury Jewellery	Jewellery luxury brand part of a larger multi-brand group with more than boutiques and retailers worldwide.	Italy	Group Head of Controlling

Source: our elaboration

4. Findings

4.1. Press and media case analysis

The analysis of the information available on online press and media on the phygital retail strategies of the five selected brands highlights how each of the elements derived in the literature review contributes to customer experience in phygital retail for each considered brand and are summarized in Table 3.

Tab. 3: The five key elements of customer experience applied to the selected cases (phygital stores).

Store	Purpose	Personalization	Platform	Positioning	Partnership	Type
Burberry Shenzhen Social Store	Localization Environment	▪ WeChat mini program's social currency collecting game unlocking additional in-store and at-home experiences ▪ Cafeteria ▪ Personalized avatar ▪ Interactive mirrors ▪ Scannable QR codes ▪ Store Playlist Mix to be download at home	WeChat mini program	Social, seamless, interactive, customizable, and localized	Social media (Tencent)	Social Store
Gucci Garden Store	Heritage Localization	▪ Virtual replica of physical store with exclusive content online ▪ Book an appointment in store or table at osteria ▪ Navigation arrows and layouts for moving online as if in store (i.e., climbing stairs) ▪ Temporary art exhibitions ▪ On-live customer service	VR platform and brick-and-mortar store	Localized, experiential, seamless, cultural	Short-term partnerships with developers and artists for website and exhibitions	Virtual Store
Portèlo	Sustainability	▪ Possibility to be either seller or buyer or both ▪ Access through iOS and Android apps and e-commerce website ▪ Chatbot ▪ Reusable packaging ▪ Thematic lists mimicking in-store shopping consultation online ▪ Possibility to donate part of revenues to local charities through Fundación Portèlo	E-commerce platform and app	Localized, sustainable, socially committed	Fundación Portèlo (charities)	Online Circular Store
Nike Guangzhou	Sports and wellness	▪ Nike Members app unlocking additional experiences both in and outside the store ▪ AR game turning the city of Guangzhou into an open-air gym, extending the store experience to the city ▪ Sports-related events inside and outside the store ▪ Nike Fit technology for product personalization ▪ Adjustable store layouts	Brick-and-mortar store	Experiential, community-driven, localized, personalized	Local gyms and sports events	Digitally powered city-led store
Gentle Monster Haus Dosan	Boundless creativity, experimentation, uniqueness, and innovation	▪ Physical store complemented by VR version online, with the former offering additional social experiences (i.e., a bar and a cosmetics) ▪ The store three-legged moving robot, the Probe, replicated as packaging for home deliveries ▪ Store designed as sort of art installation with products displayed as pieces of art ▪ Hosting other two brands for other industries (F&B and beauty)	Brick-and-mortar store	Experience Community Uniqueness	Tamburins (beauty) and Nudake (F&B)	Multi-brand concept store

Source: our elaboration

The brand's *purpose* is proved as a vital customer experience element in phygital retail, driving retail design, logistics and storytelling to convey the brand's commitment. For instance, Nike implements special lighting to reduce energy and water consumption in store and reinforces the commitment to its purpose of wellness and an active lifestyle by providing Nike Members access to local gym sessions and sport games through collaborations with local gyms and events, adapting its

purpose to local habits. Portèlo provides customers with a convenient platform to contribute to a more sustainable fashion industry by selling second-hand clothes and to connect with other people interested in the issue, whereas Burberry commits to superior customer engagement both offline and online using local social media (i.e., WeChat). Committed to local talent development, Gucci holds store exhibitions of local artists, while Gentle Monster collaborates with local brands, such as Nudake and Tamburins, and artists to offer additional offerings in store and create unique store concepts and architecture.

Personalization ascribes the customer an active role in designing a customized customer experience and may regard only the product or the whole customer experience. Nike Rise's customers can have a customized version of their shoes through Nike Fit personalization store services, but they can personalize their customer experience through the Nike Member App by choosing whether to extend their customer experience beyond the store by joining an augmented reality (AR) game, gym sessions or sport games in the city. Customers can personalize their customer experience in Gucci Garden Virtual Store by freely moving in the virtual space through arrows as they would do in a brick-and-mortar store thanks to virtual reality (VR) technology. Portèlo's customers personalize their customer experience by choosing their degree of commitment to the sustainability cause, as they can opt for donating part of revenues to local charities in addition to selling their second-hand clothes through their personal account. Gentle Monster Haus Dosan exists as a physical store and a virtual replica, so that customers can decide whether to go to the store or stay at home to "visit" it. Moreover, they can choose whether to go to the store for shopping or to visit it to drink a coffee with friends in the indoor cafeteria, extending their customer experience beyond the shopping moment and turning the store into a meeting place. Burberry's Social Store is built upon a currency-collecting powered by WeChat allowing customers to design their own customer experience by unlocking additional services and products in store and at home (e.g., items in the cafeteria's menu) according to the amount of social currency collected by scanning QR codes in store through their mobile devices. Hence, in phygital retail, personalization implies the active involvement and contribution of the customer and other stakeholders, thanks to digital platforms allowing customers to choose which features to include in their experience and stakeholders to easily communicate across touchpoints.

P*latform* is the major contribution of digital transformation: it allows to aggregate, manage, and collect data across all touchpoints, allowing for a constant and information sharing between different stakeholders, which in turn permits growing customization of the individual customer experience in both physical and virtual retail touchpoints. Burberry Shenzhen Social Store's currency-collecting game is powered by the Chinese social media platform WeChat. Portèlo's uses the e-commerce platform as a sort of circularity hub to connect people and local charities with a shared commitment to a more socially and environmentally friendly fashion industry through discussions on social media, events, extending the customer experience beyond the shopping moment. Nike Rise exploits Nike Member's app as a core element aggregating numerous services both in and outside the store, including an AR experience across Guangzhou, exclusive access to local sports events, and Nike Fit's personalization service for encouraging people to practice sport. Gentle Monster's store itself works as a platform, hosting three distinct brands jointly building a customer experience across the floors through additional services and offering a VR replica of the store online. Similarly, Gucci's virtual store provides a seamless experience and complementary services with respect to its physical counterpart.

If the platform allows the brand to be omni-present in a customer's daily routine, extending the customer experience beyond the shopping moment into the customer's daily life, even outside the store, this also reveals how the stakeholders involved in a specific retail touchpoint influence the brand's *positioning* in a customer's mind. Thus, consistent positioning builds a relevant storytelling about the brand, being jointly determined by all stakeholders (i.e., the brand, the customers, the partners). If our analysis shows how customers actively contribute to positioning by designing their customer experience in phygital retail, it also indicates how partners enable brands to enrich the customer experience through additional services and experiences inside or outside the store. Tencent

provided the WeChat mini-program working as a foundation for Burberry's Social Store, whereas ObsessVR supplied the technology to build the virtual replica of Gucci Garden brick-and-mortar store. Gentle Monster partnered with Nudake, to offer fantasy-inspired delicatessen desserts to store visitors, and Tamburins, to sell other products (i.e., artisanal cosmetics) in store. Nike collaborated with local gyms and sport events to extend its commitment to wellness to grant Nike Members convenient access to gym sessions and games, while Portèlo collaborated with no-profit entities organizations to let customers further commit to their social sustainability purpose. Hence, *partnerships* are confirmed as crucial for luxury companies to acquire either needed technology or additional and/or localized offerings and customer service or to reinforce the purpose of the brand, strengthening the brand's positioning consequently.

4.2. Semi-structured interviews

The semi-structured interviews confirm the relevance of the five key elements identified in literature, for the implementation of a successful phygital retail strategy but also provide further insights to guide managers on how to integrate such elements into customer experiences. Table 4 summarizes some exemplifying quotes according to the five key elements found in customer experience and retail strategy literature:

Tab. 4: Semi-structured interviews. Quotations from interviews

Element	**Quotes**
Purpose	"Today, the brand remains central, but it must represent new values with respect to the past… today it must endorse values of …sustainability, positive impact on the environment and society, employees, and suppliers" (Interviewee 3) "Young people are more aware of what happens around the world, they are connected, and they read and see more… because they are really and actually interested in sustainability issues" (Interviewee 2)
Personalization	"What does today's customer desire? Hyper customization, value, responsibility, and authenticity" (Interviewee 5) "A real pain [was the] perfect closure of the information cycle about the consumer behavior inside a physical store…. How the person interacts with what s/he sees, which path s/he follows, and what experience s/he lives… to avoid completely de-personalizing the experience" (Interviewee 1)
Platform	"Today business is all about platforms that give back to consumers the power of deciding how to consume" (Interviewee 2) "The single vision of the consumer…entails the redesigning of the supply chain into a circular model… which is driven and pushed by the consumer" (Interviewee 5)
Positioning	"[The contemporary consumer gets easily] bored... so should be continuously stimulated with new propositions" (Interviewee 3) "In the long-term, brands should get ready for the experience era. And everything will be experiential in stores" (Interviewee 4)
Partnerships	"The ability of bringing together different actors and perspectives which can play the same game together… is strategic, because in a globalized world, if you do not build an ecosystem, you cannot survive" (Interviewee 5) "Many brands do not understand that they have to invest not only on the product, which is a necessary but not sufficient condition anymore, but also on their image, brand, retail distribution (both direct and indirect, both physical and online)" (Interviewee 3)

Source: our elaboration

Purpose

All interviewees unanimously agreed that customer experience has become a key strategic element in retailing as a purpose shared by both the brand and its customers, becoming a discriminating factor in consumption choices in both fashion and retailing.

"The customer, on buying … buys … shared values" (Interviewee 3)

Participant 2, 3, and 5 made examples of how nowadays the customer experience in phygital retail may deliver a brand's purpose of environmental sustainability through special customer services,

such as refilling stations that let customers re-fill their bottles of perfume in store, or thanks to artificial intelligence (AI), machine learning and advanced algorithms which may calculate the most environmentally friendly and least consuming delivery route from a brand's warehouse or store to a client's house when customers are buying online from their personal e-commerce or social media account. This becomes a source of competitive advantage because customers are increasingly conscious of the environmental impact of the fashion industry.

Participant 3 added that shared values may also guide the atmosphere of online and physical retail touchpoints, being conveyed through arts exhibitions or exclusive customers' events in store. Thus, purpose affects the building of the customer experience in phygital retail by influencing retail design and atmosphere, customer services, and the use of retail technology and social media. Participant 4 and 5 explained that purpose also constitutes an aggregating element since customers acquire an active role in contributing or talking about it throughout their customer experience. Therefore, the customer experience in phygital retail must be a cooperative process.

> "The consumer is not anymore captivated by traditional advertising, but much more by the values of a brand, how the brand communicates and resonates with you… how relevant the brand managed to be, during the year, with respect to its employees, the environment, and other causes" (Interviewee 5)

Personalization

If most respondents acknowledge that customers are increasingly conscious about their consumption choices (contributor 2, 3, 4, and 5), they also admit that emerging and future luxury customers, especially among Gen Z, are omni-customers, who merge online and offline dimensions constantly and effortlessly in their daily routine. This implies that, in addition to sharing values with a brand, they want to freely choose how and what to consume across various channels and touchpoints in terms of contents, channels, and services during their customer experience. As they expect to be highly empowered with an active role in building their own customer experience by choosing when, how, where, and what to consume, they value personalization through a hyper-customized service and customer experience at the point of sale (interviewee 4 and 5).

> "The consumer…. does not want to follow what others do, but looks for novelty, trying to personalize, detaching from standardization" (Interviewee 4)

Participant 5 explained that personalization in the customer experience in phygital retail should trigger a "wow" effect, through advanced retail technology and solutions, enabling brands to connect what a customer does in store and what s/he does online to grant a superior hyper-personalization of products and customer service to the single customer. Interviewees 2 and 5 asserted that this may entail enriching the customer experience thanks to AI, 3D printing, 3D modeling, smart mirrors, and 3D scanning tools, which allow brands to tailor a product or service to the single customer's needs. Referring to a customer who, after trying a sample of the product in store through 3D scanning may have a customized version based on personal size delivered from the nearest store automatically to the right address, interviewee 5 claimed that personalization of the customer experience in phygital retail demands a more customer-driven value chain, which also needs a more sophisticated business intelligence (BI).

Platform

The majority of interviewees said that the successful delivery of a consistent, seamless, and relevant customer experience through online and offline retail touchpoints requires exploiting interactive and immersive technology-driven platforms that may make shopping frictionless by integrating digital tools (interviewee 1, 4, 5) and additional store services (i.e., cafeterias and art exhibitions; contributor 3), turning stores into locations where customers go not necessarily to buy but to live an experience about the brand with other visitors. So, the exploitation of the potential of digital platforms also demands more customer-driven strategies in retail (interviewee 5), turning platforms into a key factor in building the customer experience in phygital retail.

"Companies…should move… under a more customer-centric approach… exploiting the potential of digital platform" (Interviewee 5)

Participant 2 explained that platforms may help businesses transition towards more circular and sustainable solutions, reinforcing the commitment of a brand and its customers towards a shared purpose and enhancing customer trust and perceived brand authenticity, boosting the customer experience. Interviewee 2 described how platforms in second-hand fashion retail may improve shipping routes and time through collected data, machine learning and algorithms, while also involving customers in the commitment towards more sustainable fashion and lifestyles in a much deeper way by giving them the possibility to actively do something for the shared cause. Moreover, platforms may increase transparency and customer engagement for their enabling brand managers and customers to connect and talk about the sustainability issue on social media, which further improves the customer experience. According to participant 2, 4, and 5, interactive technology and platforms may make the connection between online and offline retail frictionless and enhance the experiential features of retail, delivering a superior customer experience though VR, virtual fitting, 3D scanning, and live streaming.

"Physical store… turned into a tool to attract everything that happens on social media… live commerce and TV & shopping…which have boosted physical retailing" (Interviewee 4)

Interviewee 5 underlined how platforms may make customer experience frictionless by advancing demand-led production according to store orders and customer behavior in store, making supply chain more efficient as well.

Positioning

Given the multiplication of both online and offline retail touchpoints and involved stakeholders through the implementation of platforms, the positioning of the brand in a customer's mind is determined by the overall customer experience in and with all of them. Hence, delivering a consistent and relevant positioning across such a multitude of touchpoints and stakeholders becomes critical to deliver a well-integrated customer experience in phygital retail. Interviewee 3 asserted that positioning of the customer experience in phygital retail may involve the development and opening of events and extraordinary customer services, such as cafeterias and art exhibitions in store, so that customers get to know the brand while diving into an experience of the brand itself. Participant 5 continued that this may also apply to e-commerce through pre-sale and after-sale services and advanced interfaces.

"Store should be a place where you enter not necessarily to buy something, but to spend an hour with friends drinking a glass or wine or a coffee… where you enter into a brand-related context … and live a brand experience… where the brand presents itself in an indirect way, without imposing itself on the customer, and the customer is free to live the experience without strings attached" (Interviewee 3)

Participant 5 claimed that concept stores are increasingly important for positioning, as they enable brands to bring unique experiences to customers and connect to them more deeply. As the customer experience in phygital retail may start in store and end online or vice versa, a customer may get to know and touch a product in store during an exclusive event and then buy it at home or later online while walking across the streets (participant 3, 4, and 5). Participant 3 also revealed that positioning is a collaborative process, being determined by all involved stakeholders across online and offline retail touchpoints. This entails that brands must propose a phygital customer experience in phygital retail as well. Interviewee 3 declared that digital platforms may enable brands to do so effectively while letting customers actively contribute towards the storytelling about the brand through content creation and sharing online while living their customer experience with the brand either in a physical or online store.

"A brand should become more digitally consistent from a 360° perspective… propose a phygital experience" (Interviewee 5)

Partnerships

Interviewees stressed that the establishment of partnerships with local retailers (interviewees 3, 4,

5) and distributors (interviewee 5) is more crucial than ever, as a consequence, to deliver a superior customer experience, making it more relevant and consistent thanks to better and deeper customer knowledge and engagement throughout all phygital retail touchpoints. Respondents argued that building highly integrated ecosystems is increasingly strategic in phygital retail strategies, which makes effective system thinking (respondents 1 and 5) and customer-centric approaches to retail critical.

> "[Companies must start] creating networks, ecosystems, reinforcing both financially and economically their value chain to make all operations more fluid, flexible, …. a continuous improvement cycle … of hyper-customization, digitalization, and new role of retail" (Interviewee 5)

Interviewee 1 highlighted that partnerships can successfully solve brands' frictions in implementing innovative technology in retail, further supporting the idea that building fully integrated ecosystems is increasingly strategic. Respondent 2 explained that partnerships with distributors may help reduce the impact and time of product shipping from store to a customers' home, strengthening a brand's sustainability purpose. Interviewees 2, 3, 4, and 5 added that partnerships may help improve the customer experience in phygital retail by providing innovative technology in store (e.g., re-filling stations and 3D scanning), enhancing store events (e.g., arts exhibitions and cafeterias), and supporting e-commerce services (e.g., fast shipping). Interviewee 4 alleged that partnerships are key to add experiential features to phygital retail by ensuring the frictionless connection between online and offline retail touchpoints and promoting content co-creation and engagement between the brand and its customers, for instance through live streaming technology.

The semi-structured interviews confirm that the building of a successful and relevant customer experience strategy in phygital retail requires using immersive and engaging technology to deliver a seamless and hyper-customized luxury customer experience across online and offline touchpoints thanks to a central platform that allows customers to build their own experience.

5. Discussion

Our qualitative analysis confirms that building and integrating a successful, consistent, and purpose-led customer experience in phygital retail has become pivotal for ensuring consistency and relevance to omni-customers. Findings highlight the implementation and integration of purpose, personalization, platform, positioning, and partnerships as critical for both strategizing and implementing a successful and consistent customer experience in phygital retail.

Purpose defines a shared lifestyle, extending the customer experience beyond the shopping moment. So, human interaction may not necessarily happen face-to-face, but take place across dimensions through interactive technology like live streaming, acquiring new meaning. The human dimension of retail expands to comprise not only the customer and in-store shopping assistant, but also the customers, who are actively engaged in co-designing the customer experience, and the whole online or local community with whom in-store shoppers can share their experience through social networks, AR, or video games.

Personalization becomes a key driver of customer experience, as it regards not only the product/service but the whole experience, because customers are empowered with an active role in the experience customization by choosing which retail touchpoints to include in their customer experience. Temporary concepts and formats become vital as they leverage experience, novelty, and relevance to keep the customer constantly engaged with a brand. This can be further reinforced by using interactive technology and underpinning on sapient partnerships. Future types will be game-based retail, city-led retailing, concept, and social stores.

A technology-powered *platform* (i.e., social media account, app, game, a digitally powered store) is a key core element for integrating customer experience in phygital retail strategies. It must function

as a central hub, making all experiential (online and offline) retail touchpoints converge around the single customer who actively co-designs a hyper-customized individual customer experience, while all stakeholders (e.g., retailers, suppliers, other brands, distributors, logistics operators, etc.) are actively engaged, throughout and across all its touchpoints. Thus, adopting immersive technology in phygital retail, being interactive and engaging, is vital to ensure a cohesive multisensory customer experience about the brand and empower customers so that they can customize their journey and easily hop between physical and digital retail touchpoints.

Positioning is a crucial factor of the customer experience in phygital retail, which must be built through the customer experience of the brand as a shared story-making about the brand, replacing traditional brand storytelling with one-side, two-way, or collective co-creation thanks to interactive technology as the customer experiences the brand. This may take the form of various users (both in store and online) sharing a virtual gaming experience, of a single customer designing a personalized experience through AR outside the store or a game inside the store, or of a two-way live-streaming customized interaction between the brand and the client. Therefore, transitioning towards new and more engaging retail formats (i.e., game-based retailing, AR, VR, social and live commerce) may better satisfy current customer needs and help brands deliver a superior customer experience in phygital retail.

Partnerships are also a vital experience-enhancing element for designing a successful customer experience in phygital retail, as they elevate the customer experience by providing innovative technology (i.e., entertainment and media industry) and making brick-and-mortar retail more experiential through additional (i.e., food & beverage industry, etc.) or localized (i.e., social media and local businesses or artists) offerings, transforming retail stores from simple shopping locations into communal spaces that people can visit during their daily routine - that is, experiential places.

6. Conclusions

Our analysis supports the relevance of key five elements found in the literature for managerial practice to strategize and deliver a successful customer experience in phygital retail. Customer experience acquires strategic centrality in phygital retail strategies in the fashion industry due to the "onlife" lifestyles of contemporary omni-consumers, wanting to build its own customer experience with a brand (personalization) and moving frictionlessly across them. For managerial practice, this implies that increasingly more integrated omnichannel strategies must be developed in retail, aimed at delivering an extremely frictionless, locally relevant, and consistent customer experience across a multitude of retail touchpoints. Due to escalating digitization and hyperconnectivity, brands must also be omnipresent in consumers' daily life, making customer experience a key managerial tool for brand management that must become a shared lifestyle (purpose) to achieve a consistent positioning. Such a high level of integration will be enabled by a central platform, letting customers move freely throughout touchpoints, co-designing their customer experience, and providing brands with a constantly updated stream of data about individual behavior and preferences, optimizing the retail strategy at the single customer level. By integrating all data and stakeholders (partnerships) in a single place (i.e., the platform), organizations may initiate a self-reinforcing mechanism of increasing customization of customer experience in phygital retail through more personalized products or services, higher result accountability, information sharing and faster communication (both internally, across functions, and externally, with all stakeholders). Hence, a more integrated omnichannel retail strategy is proved not only to be necessary but also future proofing to strengthen both customer experience and brand value.

A limitation in our analysis can be identified in the fact that stores could not be visited directly, and interviews were conducted online, with partial control on contextual variables. Nonetheless, multiple sources were combined to make information reliable, and a sample of questions was given beforehand to reduce uncontrollability.

Further research could add the customers' perspective through interviews, focus groups,

ethnographic research in both virtual and physical stores, or neuromarketing techniques to deepen the knowledge on how customers react to phygital touchpoints and how their attitudes towards and the legislation about data privacy may affect their phygital relation with a fashion brand, and, thus, their customer experience in phygital retail solutions. Future research could also enlarge our sample to provide more detailed insights on the phenomenon or consider other industries.

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Track 9
Small & Family Business

Exploring the productivity puzzle in family and non-family businesses through stability and crisis times

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Abstract

Frame of the research. *Over the past 20 years, Italy has performed poorly in terms of productivity compared to the others OECD countries. At firm level, firm productivity is affected by governance mechanisms and ownership structures.*

Purpose of the paper. *The paper studies the effect of non-listed family and non-family ownership on the productivity of Italian firms during periods of economic crisis and stability, in the light of the extended stewardship-based SEW theory and restricted agency-based SEW theory (Miller and Le Breton-Miller, 2014).*

Methodology. *The paper uses an unconditional quantile-based regression of total factor productivity over a set of covariates including the family nature of the firm and the time (considering a time span involving both economic stability and crisis times)*

Results. *In times of economic stability, family firms ranking high in the distribution of productivity perform worse than non-family firms. The economic crisis does not have relevant consequences on family firms' performance in terms of productivity.*

Research limitations. *Despite Italy is a well-suited context to analyse family business, our inquiry could be better tested extending the evidence beyond national boundaries.*

Managerial implications. *The paper sheds light on the transition between exploratory and exploitative behavior (or vice versa) in family versus non-family businesses when the external economic conditions change (Patel and Chrisman, 2014).*

Originality of the paper. *The novel, hand collected, balanced panel data set allows comparing a large sample of non-listed Italian family and non-family firms during a 11-year long period of time including a worldwide economic and financial crisis and a congruous number of years before and after the advent of the crisis. The empirical strategy and estimation technique permits understanding under what conditions the possibly conflicting prescriptions of the extended stewardship-based SEW theory and restricted agency-based SEW theory hold.*

Key words: *family firms; non-family firms; productivity; stewardship theory; agency theory; quantile regression*

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1. Introduction

Over the past 20 years, Italy has recorded a -0.3% annual productivity, compared to an OECD average of +0.3% (OECD, 2023). Between 2002 and 2011, productivity declined by 0.6% annually (-3.3% in 2009 alone), compared to an OECD average of +0.4%. These were the years when China definitively entered the globalized world with access to the World Trade Organization (WTO), the Eurozone was formed, and the financial crisis hit the global economy. From 2012 to 2021, productivity remained at zero in Italy. In 2022 it saw a recovery after the year of Covid (+0.8%), but it still remained far from the OECD average (+1.3%). The disappointing performance of the Italian economy since 1993 is explained largely by slow labour productivity dynamics in the now dominant services sector and, more generally, by weak aggregate TFP growth and subdued capital accumulation (Giordano and Zollino, 2021). Firm productivity is affected by several factors, both internal and external to firms. At system level, productivity depends on the quality of institutions, the efficiency of the legal system, bureaucracy, the degree of market competition, the allocation of resources to productive enterprises (including the functioning of the capital market), the quality of infrastructures, the competitiveness of human capital and the political interventions in strategically crucial domains such as the energy sector. At firm level, productivity is affected by governance and ownership (Shleifer and Vishny, 1997) and by management quality (Bartelsman and Doms, 2000). The dominant form of ownership in Italy is family firm, representing 65% of Italian companies (AIDAF, 2024), and it is to this ownership structure that one of the causes of low firm productivity is attributed (Baltrunaite *et al.*, 2022). On the other hand, family businesses, compared to non-family firms, are credited with the ability to better react to crisis situations by turning challenges into opportunities and even, in some cases, to emerge stronger than before (Calabrò *et al.*, 2021).

This paper focuses on family and non-family ownership, as an internal driver of productivity, and its role in explaining between-firm differences in performance in Italy during periods of systemic crisis or, conversely, stability. Namely, we address two research questions: to what extent differences in firm ownership explain the differentials in firm productivity during periods of stability? How do family firms perform, in terms of productivity and with respect to non-family firms, during an economic crisis?

We look for guidance in the economic literature that has explored the longstanding dilemma related to the superiority of either family or non-family firms in terms of performance, namely in the two paradigms represented by the stewardship theory and the agency theory.

Scholars who embrace a stewardship perspective generally predict a positive relationship between family involvement and performance to the extent that family members are concerned with the firm itself and express a propensity of loyalty and attachment to this family asset. In contrast, scholars who favor the agency perspective tend to predict a negative relationship, in that family owners and managers are expected to be guided by self-interest and personal use of the business (Le Breton-Miller *et al.*, 2011).

Grounded on a behavioural perspective, the paradigm based on the socio-emotional wealth (SEW) (Berrone *et al.*, 2012; Gómez-Mejía *et al.*, 2007; Gómez-Mejía *et al.*, 2011) provides a representation of the behavior of business leaders framed into the specific field of family business. It establishes the primary goal by family members to preserve SEW more than the financial endowment, also highlighting a trade-off between these two targets. Miller & Le Breton-Miller (2014) highlighted the complex nature of socio-emotional goals and linked them to the above-mentioned theories by distinguishing between socio-emotional stewardship or agency-based aims.

In addition, since the seminal study by Anderson and Reeb (2003), several empirical investigations have been conducted with the aim of analysing the causal link between family characterization and performance. These studies used various performance measures ranging from accounting and market measures to productivity indices, with mixed results. For instance, limiting the attention to studies referring to operational productivity, the evidence suggests a positive (Martikainen *et al.*, 2009; Barbera & Moores, 2013) as well as a negative (Barth *et al.*, 2005) impact of the family involvement. Creemers *et al.* (2023), using labour productivity as performance variable, show that in family firms,

the pursue of socio-emotional goals and of financial targets follow possibly conflicting or, on the contrary, consistent paths depending on where firms are positioned in the productivity distribution. Through the estimation of a quantile-based regression model, they show that at the lower tail of the labour productivity's distribution, non-economic objectives converge to the economic target of value maximization, consistently with the stewardship-based logic; at the upper tail of the labour productivity's distribution, the two objectives diverge because the greater financial comfort translates into extraction of private benefits, as predicted by the agency-based theory.

Behavioural models like SEW have introduced a more detailed situational analysis of family behaviors and their consequences across various circumstances. Moving from these premises, Minichilli *et al.* (2016) test the financial performance differences of (listed) family versus non-family firms in stable conditions as opposed to situations of economic crisis, finding that the former outperform the latter during an economic downturn. The result is corroborated by van Essen *et al.* (2015), while Lins *et al.* (2013) show that, during crisis, family firms cut their investments more than non-family firms.

This paper falls within the stream of studies on the relationship between the family nature of firms and their performance. Following Creemers *et al.* (2023), we make use of a quantile-based regression to analyse the aforementioned relationship and to verify whether the results may differ across the performance distribution. In addition, and similarly to Minichilli *et al.* (2016), we analyse a long period of time comprising the advent of the economic crisis in 2007 and both the antecedent and posterior periods. However, we differ from previous contributions in two main aspects. First, we use a measure of *total* factor productivity, based on the consideration that this index is a more exhaustive measure of firm performance than any single-factor productivity index, given that it takes into account the interrelationships between production factors (Barbera and Moores, 2013). Secondly, we consider non-listed firms, that are the backbone of the Italian (as well as of most countries') economy but represent a minority of the samples observed in empirical research on the subject.

The underlying theoretical insight is that when facing critical times "*family principals are more likely to make strategic choices that result in diminished socioemotional wealth*" (Gómez-Mejía *et al.*, 2011, p. 688). This implies that, as a response to external threats, the aims of family firms are expected to be more focalised on short-term financial targets thus making family and non-family firms more similar entities. Nevertheless, this response depends on the level of productivity attained by family firms relatively to their peers, i.e. on where firms are positioned in the total factor productivity distribution.

On the whole, our evidence contributes to the understanding of the role of family ownership through a finer-grained situational analysis that distinguishes among different levels of total factor productivity and highlights potential differences in performance of family and non-family firms in stability versus critical times.

2. Theoretical background and hypotheses development

2.1 Agency vs stewardship perspective in family firms

The debate relating to the effect of family ownership on performance can be summarized effectively in two competing views: the agency perspective and the stewardship perspective (Le Breton-Miller *et al.*, 2011; Minichilli *et al.*, 2016).

The agency perspective gives particular emphasis to the issue of risk (Le Breton-Miller *et al.*, 2011). Family owners typically tie their wealth to a single asset which is the family business. This lack of portfolio diversification means that the risk inherent in the firm is transferred directly to the wealth of the family owners. Consequently, they stand to incur greater losses from any decline in the firm's value (Beatty and Zajac, 1994). This heightened risk aversion relative to owners of non-family firms can hinder the pursuit of lucrative investment opportunities. Driven by their aversion to risk

and the close association between firm assets and personal wealth, family owners are inclined to prioritize self-interest objectives, such as extracting private benefits, potentially leading to conflicts with other non-family minority owners (Morck *et al.*, 2000; Bertrand and Schoar, 2006). Moreover, family owners may engage in nepotistic practices, favouring relatives in executive positions, which restricts the pool of talent available and undermines merit-based selection processes (Schulze *et al.*, 2001). These factors are generally considered to outweigh any benefits derived from a shorter control chain or improved control over agent behavior, as seen in situations of ownership concentration. Consequently, they predict a negative relationship between family ownership and long-term performance (Le Breton-Miller *et al.*, 2011).

The stewardship theory interprets the role of family ownership from another, almost opposite, perspective. According to Arrègle *et al.* (2007), the very fact that the business is the unique important asset for the family makes it an economic value to be protected. When the relationships between business leaders are characterized by stability, interdependence and interaction, as typically occurs in family-owned firms (Miller and Le Breton-Miller, 2005), the protection of firm assets is seen as the main step through which benefits can be distributed to the members of the family. The consequences are the opposite of self-interest and unilateral private benefit extraction. However, in this view, loyalty towards the corporate organization does not only depend on the fact that the firm can instrumentally serve as a vehicle for the diffusion of wealth for family members. The parties are in fact devoted to the family firm by virtue of a long-term commitment and service to the organization and the family itself (Miller *et al.*, 2008; Le Breton-Miller and Miller, 2009). The consequences are the intensification of investment initiatives from a long rather than a short-term perspective, as it happens in cases of patient capital.

2.2 Socio-emotional stewardship or agency-based consequences in stability times

One of the most important aspects regarding the inextricable link between business and family concerns the emotional connotation of agents, which is reflected in the existence of SEW (Gomez-Mejia *et al.*, 2011; Berrone *et al.* al., 2012). SEW refers to an emotional endowment having a non-financial nature. Based on a behavioral perspective, managers and family owners are primarily loss averse in terms of SEW, and their decision-making is seen as more guided by the need to avoid losses in this non-financial asset by also pursuing actions that could be detrimental in economic terms (Martin and Gómez-Mejía, 2016).

More recently, Miller and Le Breton-Miller (2014) have highlighted SEW as a multifaceted concept linked to underlying goals connected to both the stewardship and agency perspectives. Indeed, they introduced what they called extended stewardship-based SEW and restricted agency-based SEW. In the first case the priorities are represented by investment in image and legitimation of the family firm through the establishment of links with stakeholders from which family members as well as other non-family stakeholders can draw benefits. Under the second profile, instead, they refer to family-centric priorities that go towards forms of nepotism, agency conflicts, entrenchment of family executives and in general the search for an extraction of private benefits by the dominant family coalition.

An application of this deconstruction is presented in Creemers *et al.* (2023). By adopting a quantile-based regression, they observe that, when productivity is low, the poor performance pushes family leaders to opt for a stewardship-based form of SEW, while when the productivity is high, an agency attitude prevails.

Given these premises, we embrace the notion that, at a lower level of performance along the performance distribution, family firms conform more to a stewardship-based attitude, while, at a higher level of performance along the performance distribution, family firms conform more to an agency-based attitude than non-family firms. Therefore, our first set of testable hypotheses can be expressed as follows:

H1a: In non-critical periods and for lower levels of performance, family firms show a higher performance than non-family firms.

H1b: In non-critical times and for higher levels of performance, family firms show a lower performance than non-family firms.

Taken together, these hypotheses state that in family firms, when moving from a lower to a higher level of performance along the performance distribution, agency-based behaviors prevail. Consequently, family firms are expected to progressively lag behind non-family firms in terms of performance.

2.3 Socio-emotional stewardship or agency-based consequences in times of economic crisis

While in non-critical times family leaders are loss averse in terms of SEW, they could accept losses of SEW when, due to external shocks, the very survival of the firm is put at risk (Belda-Ruiz *et al.*, 2022). Under such conditions, the potential economic failure of the firm would also entail a loss in socio-emotional assets. Consequently, there is a notion that firms may become more economically driven (Gómez-Mejía *et al.*, 2011; Cruz *et al.*, 2011; Chrisman and Patel, 2012). For example, Gómez-Mejía *et al.* (2010) find that large, listed family firms are more inclined to diversify, and therefore to accept an increase in their risk, only when their performance follows a declining path. In other words, as underlined in Patel and Chrisman (2014), when faced with more challenging times and performance falls short of expectations, the genuine risk of jeopardizing socio-emotional wealth (SEW) and non-economic benefits compels family leaders to adopt a more risk-taking approach. In doing so, they aim to safeguard long-term SEW and consequently lean towards an exploratory rather than exploitative stance.

Based on these premises, it is anticipated that family firms will shift their focus towards economic objectives during critical periods. This is particularly pertinent for higher performance levels that may be impacted by a discrepancy between economic and non-economic goals. In essence, the gap between economic and non-economic objectives, commonly observed in scenarios dominated by agency-based behavior, diminishes. Instead, a greater alignment between objectives is established, resembling situations that align more closely with the predictions of the stewardship view. Therefore, our second testable hypothesis can be formulated as follows:

H2: In critical times and for higher levels of performance, the performance gap of family firms with respect to non-family firms becomes smaller.

3. Methodology

3.1 Econometric approach: unconditional quantile regression

In this study, we used an unconditional quantile regression to estimate the effect on performance of family-owned firms during a crisis and during stability times, over the entire distribution of the outcome variable. As noted in Creemers *et al.* (2023), this approach, proposed by Firpo *et al.* (2009), allows considering potential heterogeneous effects of a specific predictor along the distribution of a dependent variable[4]. The unconditional quantile regression is based on the transformation of the

[4] Since we are interested in identifying heterogeneous effects of changes of independent variables on the overall distribution of firm outcome, whether firms are family or non-family and face stability or crisis times, the *unconditional* quantile regression model is preferred to the *conditional* quantile regression one. In the *unconditional* quantile regression, the definitions of quantiles are not affected by individual values of model covariates but describe the distribution of the dependent variable as a whole. The *conditional* quantile regression model, instead, allows analysing the relationship between variables across the conditional distribution of the

outcome variable (*y*) into a recentred influence function (*RIF*) as follows:

$$RIF(y; q_\tau) = q_\tau + \frac{\tau - 1\{y \leq q_\tau\}}{f_Y(q_\tau)} \quad (1)$$

where τ indicates a specific quantile, q_τ is the value of the dependent variable at that quantile in the sample, $1\{y \leq q_\tau\}$ is an indicator function that equals 1 if the value of *y* for one observation is less than or equal to the value of the dependent variable at quantile τ, 0 otherwise, and $f_Y(q_\tau)$ is the density of *y* at point q_τ, estimated from the sample using a (gaussian) kernel method.

One particular feature of the *RIF* of the dependent variable *y* is that the expected value of the *RIF* is equal to q_τ even when the expectation is conditioned on a set of covariates, *x*, that is $E[RIF(y; q_\tau)] = E[RIF(y; q_\tau)|\, x] = q_\tau$. This allows defining $RIF(y; q_\tau)$ as a function of the variables of interest, obtaining the following unconditional quantile regression equation:

$$E[RIF(y; q_\tau)|\, x] = x'\beta \quad (2)$$

where β represents the change in the τ-quantile of the unconditional distribution of the dependent variable resulting from a change in the variables of interest, *x*.

3.2 Economic modelling

To evaluate the impact of the family characterization of firms on their performance during crisis and during stability times, we set up the following empirical equation:

$$E[RIF(y; q_\tau)|\, x] = \beta_0 + \beta_F FAMILY + \beta_C CRISIS + \beta_{FC} FAMILY \times CRISIS + \delta\{Control\ variables\} \quad (3)$$

where *y* represents performance and *x* the set of the variables of interest represented by: *FAMILY* (a dummy variable that equals 1 if the firm is family-owned and 0 if it is non-family, as defined in the following section), *CRISIS* (a dummy variable that equals 1 if the firm experienced the effects of the crisis of the real economy that started in year 2008 and 0 otherwise). The *FAMILY* variable coefficient measures the difference between family and non-family firms' performance at the τ-quantile of the unconditional performance distribution of the entire sample population composed of family and non-family firms. The *CRISIS* variable coefficient measures the difference between firm performance in critical and stability times at the τ-quantile of the unconditional performance distribution. The interaction variable is aimed at assessing, for the different quantile levels, the difference in behaviour of family firms, as compared to non-family firms, during critical times with respect to stability times. Eq. [3] also includes a set of control variables to minimize the possibility of confounding factors (Creemers *et al.*, 2023).

4. Dataset and variables

4.1 Data

To construct our sample, we collected financial and ownership information on firms from the AIDA Bureau Van Dijck database, which represents the most dependable source of such information for Italian privately-held companies and includes the financial statements (and details about shareholders) deposited at the Italian Chamber of Commerce. Given the prevalence of family firms in Italy, building a dataset with a congruous number of non-listed family and non-family firms over

outcome variables, thus identifying heterogenous effects experienced by population subgroups that are defined by a set of characteristics (Porter, 2014).

a long period of time represented a major challenge. The difficulty lies in finding, for each industrial sector considered in the empirical approach, a similar number of family and non-family firms and construct a balanced-enough dataset, which is required to run an unbiased estimate of the production function and apply the unconditional quantile regression. The final dataset is a balanced panel of 220 firms observed continuously from 2001 and 2011, adding up to 2,420 observations, of which 1,310 refer to family firms and 1,110 to non-family firms.

4.2 Performance

The production function expresses the maximum amount of production that can be obtained from a set of possible combinations of inputs. The part of production not explained by input levels represents what is termed as total factor productivity (*TFP*).

A common specification of the production function is given by the Cobb-Douglas functional form. The standard log-transformed Cobb-Douglas expression is as follows.

$$lnOUT_{it} = c + \beta_{LAB} lnLAB_{it} + \beta_{CAP} lnCAP_{it} + \beta_{INT} lnINT_{it} + \eta_{it} \quad (4)$$

where *OUT* is an output measure; *LAB*, *CAP* and *INT* are inputs representing labour, capital and intermediate inputs; β_{LAB}, β_{CAP} and β_{INT} are input elasticities coefficients; *c* is a constant parameter; η is an error term and the subscripts *i* and *t* refer to the *i*-th firm and the *t*-th time period respectively. *OUT* variable is represented by the logarithm of revenues while the variables *LAB*, *CAP* and *INT* are represented by the logarithm of the number of employees, total assets and cost for material and services, respectively. All the monetary variables have been deflated at the year 2010 using appropriate deflator indices from ISTAT (*Istituto Italiano di Statistica*)[5].

Based on this formulation of the production function and following Francis *et al.* (2020), the (logged) firm and time-specific *TFP*, that represents the outcome variable *y* in our empirical model represented in Eq. [3, can be estimated as the sum of the constant term and the error term, as follows:

$$y_{it} = TFP_{it} = \hat{c} + \hat{\eta}_{it} \quad (5)$$

By exploiting the panel structure of our dataset we can re-write Eq. [4] in order to explicitly take account of firm and time-specific heterogeneity. The production function thus becomes:

$$lnOUT_{it} = c + \beta_{LAB} lnLAB + \beta_{CAP} lnCAP + \beta_{INT} lnINT + \delta_i + \delta_t + \xi_{it} \quad (6)$$

where δ_i and δ_t are firm and time-specific effects while ξ_{it} is an error term. According to this specification, *TFP* can be derived as[6]:

$$y_{it} = TFP_{it} = \hat{c} + \hat{\delta}_i + \hat{\delta}_t + \hat{\xi}_{it} \quad (7)$$

[5] As far as revenues and costs of materials and services are concerned, we used by-industry production price indices as deflators (defined on the basis of the two-digit ATECO-ISTAT code level). With reference, instead, to total assets, we used a composite procedure: the current components of the aggregate were deflated by means of by-industry production prices indices, while the components subject to depreciation were deflated by means of by-industry ISTAT deflators for the net capital goods. These deflators are calculated as the ratio between the value of capital goods at purchase prices and the chain-linked value of capital goods based on the reference year 2010.

[6] Another possibility to estimate the impact of the variables of interest on productivity is to directly include them into Eq. [4] and [6]. This would allow a change in the intercept reflecting the difference in productivity between family and non-family firms (Martikainen *et al.*, 2009; Barbera and Moores, 2013) as well as between crisis and non-crisis periods. However, such an approach is not suitable in our context as the outcome variable, *y*, would be represented, in this case, by the production whose level may not uniquely depend on the achieved performance but also on differentials in the firms' operational size.

4.3 Family involvement

To designate a firm as family owned an operational threshold is needed. As argued in Gomez-Mejia *et al.* (2011), the share of equity in the hands of the family that is often used when analysing largest publicly traded American firms is generally too low for analysing contexts where ownership is more concentrated. For Spain, for instance, Cruz *et al.* (2010) adopted a threshold of 20% of family ownership, as recommended by La Porta *et al.* (1999). Faccio and Lang (2002) also used such percentage for Western European countries. This criterion also seems suitable for the case of Italy where capital tends to be, in general, concentrated in the hands of few shareholders and the effective control that the family may exert over the company is ensured by a reasonably high equity stake.

4.4 Control variables

Italy is characterized by deep spatial disparities in terms of labor productivity, unemployment, growth rates, as the South continues to fall behind in those aspects compared to the Center and especially the North (Deleidi *et al.*, 2021). The territorial polarization is such a longstanding problem that it is usually described as the "Southern Question" to denote its unsolved nature. Consequently, we introduce in the estimation three dummy variables, *NORTH*, *CENTER*, *SOUTH*, to control for the fact that the geographical location of firms might affect their performance independently from their ownership type or the historical moment, of crisis, stability or prosperity, that all firms in the country are living.

To better isolate the effect that family influence might have on the firm performance, we also control for the firm juridical form and we distinguish between "Joint Stock Companies" (*JSC*), "Limited Liability Companies" (*LLC*) and "Cooperatives" (*COOP*). This distinction serves to capture the nuances of family control by describing the level of responsibility that shareholders, whether family members or not, hold over the firm's obligations. In addition, the dummies serve as proxies for the governance structure of the firm. Joint stock companies, for instance, are obligated to nominate a director or a board of directors, which alter the agency relationships within the firm; they adhere to stricter regulation and financial control, and fulfil additional communication requirements.

Finally, we controlled for the industry (at a two-digit level), given effect of technological reasons.

4.5 Summary statistics

Table 1 reports the summary statistics of the considered variables. On average, the firms in our sample can be classified as large. In fact, the average level of output in terms of revenues is about 408 million euros; moreover, the firms in the sample employ on average 1,091 persons and present mean values of almost 474 million euros for total assets and 313 million euros for the intermediate inputs.

With respect to the geographical distribution, the largest share (almost 47%) of the firms in the sample is located in the North-West of Italy, 12% in the North-East, 36% in the Centre, while the Southern regions are less represented, with 5% of the firms. Our observations mainly refer to joint stock companies (*JSC*), representing 81% of firms, while joint stock companies (*LLC*) and joint stock companies (*COOP*) are less present, with shares of 12% and 7%, respectively. Finally, the mean age is around 40 years.

The last three columns of Table 1 show the descriptive statistics for, respectively, family and non-family businesses, and the statistics related to the t-test on the difference between the two groups of firms. that family and non-family firms in the sample present systematic differences with respect to most of the considered variables. For the output and the inputs, the mean values shown by non-family firms almost double those shown by family firms. This evident difference is also statistically significant, as shown by the statistics related to the t-test reported in the last column. In addition, some difference between family and non-family group emerges with respect to their geographical location: the North-West presents a higher concentration of non-family firms and the same applies,

with smaller but still significant differences, to the South. On the contrary, the North-East shows a higher presence of family firms, while no significant differences emerge for the Centre. Moreover, family firms are predominantly *JSC* (94.5%), with a little share of *LLC* and no *COOP*, while non-family firms, which also show a prevalence of *JSC*, are more evenly distributed across these categories. Finally, the "family" group is significantly younger than the "non-family" one (36.9 *vs* 44.6 years).

Figure 2 shows the distribution of sample family and non-family firms over output's quantiles. While family firms predominate in the central part of the output distribution (from the 10th to the 75th percentile), non-family firms prevail at the distribution's extremes.

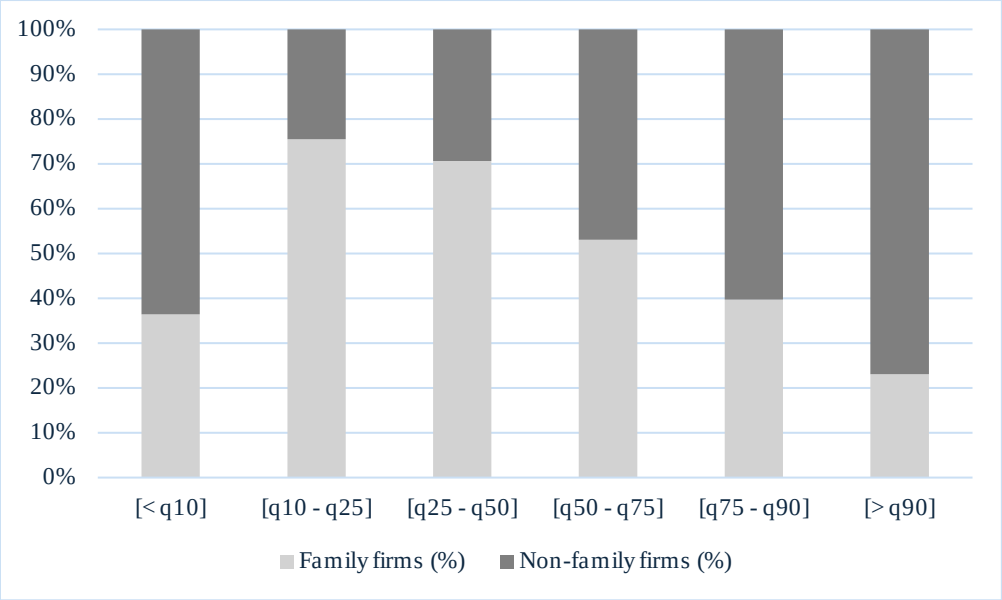
Tab. 1: Descriptive statistics

Variable	Whole sample [No. = 2,420]	S.D. whole sample	Family firms [No. = 1,310]	Non-family firms [No = 1,110]	t-statistics
OUT (000 euros)	407,811.7	971,806.5	285,655.2	551,978.4	6.780 ***
LAB (No.)	1,091.4	3,639.4	750.1	1,494.2	5.037 ***
CAP (000 euros)	473,917.0	1,039,232.0	373,841.0	592,024.8	5.174 ***
INT (000 euros)	313,452.3	862,786.3	221,328.0	422,175.5	5.744 ***
NW (%)	0.468	0.499	0.430	0.514	4.127 ***
NE (%)	0.121	0.327	0.162	0.074	-6.657 ***
CENTRE (%)	0.360	0.481	0.366	0.353	-0.677
SOUTH (%)	0.050	0.218	0.042	0.059	1.966 **
LLC (%)	0.121	0.326	0.055	0.199	11.099 ***
JSC (%)	0.811	0.392	0.945	0.652	-19.734 ***
COOP (%)	0.068	0.252	no obs.	0.149	
AGE (No.)	40.4	50.5	36.9	44.6	3.754 ***

*** statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%

Source: our elaboration

Fig. 1: Distribution of family and non-family firms across quantile-based intervals of output



Source: our elaboration

5. Empirical results and discussion

Table 2 presents the estimates of the production function, which are functional to obtain the productivity (performance) measures to be employed as response variables in the quantile regression described in equation (3).

The estimates of the Cobb-Douglas production function are satisfactory in terms of adjusted R-square and F-statistics, for both the model based on equation (4) and on equation (6), with the latter considering firm and time-specific heterogeneity. All the input parameters show the expected sign and high statistical significance. While the coefficients estimate based on equation (4) suggests almost constant returns to scale, equation (6) detects slightly decreasing returns to scale; this result is reasonable, given the relatively large dimension of the firms in the sample.

Tab. 2: Estimated coefficients of the production function

Variable	Parameter	Coefficient (model based on Eq. [6])	Coefficient (model based on Eq. [4])
lnLAB	β_{LAB}	0.140 (0.009) ***	0.150 (0.005) ***
lnCAP	β_{CAP}	0.076 (0.008) ***	0.081 (0.005) ***
lnINT	β_{INT}	0.748 (0.007) ***	0.772 (0.004) ***
Individual dummies	δ_i	yes	no
Time dummies	δt	yes	no
Constant	*c*	-0.088 (0.033) ***	-0.005 (0.003)
R-square adjusted		0.993	0.983
F		1,594.91 (0.000)	45,479.14 (0.000)

Standard errors in round brackets (for F-statistics: p-value in round brackets). Number of observations: 2,420. *** statistically significant at 1%

Source: our elaboration

Table 3 and 4 presents the estimates of the quantile regressions based on dependent variables represented by the productivity estimates of equation (7) and (5), respectively. The adjusted R-square and the Wald-statistics suggest that the models are satisfactory, with the model based on equation (7) performing slightly better.

In Table 3, the *FAMILY* coefficient qualitatively behaves as expected according to H1a and H1b: in non-critical times and for lower productivity quantiles (up to the 10th percentile), family firms perform better than non-family firms. The contrary happens for firms in the 25th and upper percentiles, with negative and significant coefficients, increasing in magnitude for higher quantiles of the productivity distribution. Therefore, we can conclude that for very low performance levels, the predictions of the stewardship theory prevail: the economic value of low-performing firms, that nevertheless represents the main family asset, needs to be protected (Arrègle *et al.*, 2007) and family and non-family stakeholders engage in economically virtuous behaviours rather than pursuing self-interests (Miller *et al.*, 2008; Le Breton – Miller and Miller, 2009; Le Breton – Miller *et al.*, 2011). Starting from immediately higher performance levels (25th percentile), however, the agency theory's predictions dominate, with non-family firms increasingly outperforming their counterparts, suggesting that, as soon as the performance improves, family members' risk aversion (Le Breton-Miller *et al.*, 2010) or nepotistic behaviour (Schulze *et al.*, 2001) limit the development of firm's full potential. This is consistent with the findings of Creemers *et al.* (2023) for labour productivity.

The results in Table 4 only partially confirms these findings, since the *FAMILY* variable's coefficient follows the same path, in terms of signs, described in Table 3, but results statistically significant (and negative) just for the 50th and upper percentiles of productivity. Therefore, when productivity is estimated according to equation (5), only H1b is confirmed.

In both tables, the parameters related to *CRISIS* show no statistical significance, suggesting that this shock did not present relevant consequences in terms of productivity within our sample (notice that this result does not imply the absence of other financial consequences unrelated to the operating activity). In addition, in Table 3, no statistical significance emerges for the coefficient of the interaction term *FAMILY* × *CRISIS*. This finding does not allow us to confirm H2: indeed, in time of crisis, family firms do not appear to behave differently than in non-critical time, for any level of productivity, including the highest levels. Thus, in our sample, the financial crisis has not acted as a motivating factor for family firms, as expected (Gómez-Mejía *et al.*, 2011; Cruz *et al.*, 2011; Chrisman and Patel, 2012). Table 4 confirms this result for the higher productivity quantiles, while

for the 10th and the 25th percentiles the sign of the interaction term is negative and significant, suggesting a distancing of low-performance family firms from their counterparts in critical periods.

With respect to control variables, the two models are quite consistent in showing a positive and significant impact of the geographical location (captured by dummies *NW*, *NE* and *CENTRE*, with *SOUTH* as baseline) for firms in the first three quantiles of productivity, while the relationship changes direction for the 75th and upper percentiles. Notably, for firms belonging to the 90th percentile, the negative sign and the high significance of the geographical dummies suggest that good performers located in the South of the country perform especially well in terms of productivity.

Finally, JSC and LLC perform better than the base category, COOP, for almost all the performance level, except for firms in the 90th percentile.

Tab. 3: Estimated coefficients of productivity model based on Eq. [7]

Variable	Parameter	Coefficient RIF($y = TFP$; q_τ)				
		$\tau = 10$	$\tau = 25$	$\tau = 50$	$\tau = 75$	$\tau = 90$
FAMILY	β_F	0.026 (0.012) **	-0.023 (0.007) ***	-0.070 (0.008) ***	-0.100 (0.011) ***	-0.142 (0.024) ***
CRISIS	β_C	-0.019 (0.017)	-0.012 (0.008)	-0.007 (0.008)	0.005 (0.013)	-0.012 (0.026)
FAMILY×CRISIS	β_{FC}	-0.031 (0.027)	-0.019 (0.013)	-0.012 (0.011)	-0.003 (0.016)	0.020 (0.031)
NW	δ_{NW}	0.103 (0.039) ***	0.096 (0.018) ***	0.055 (0.017) ***	0.003 (0.015)	-0.113 (0.029) ***
NE	δ_{NE}	0.107 (0.039) ***	0.096 (0.020) ***	0.046 (0.017) ***	0.007 (0.016)	-0.112 (0.023) ***
CENTRE	δ_{CENTRE}	0.124 (0.039) ***	0.107 (0.018) ***	0.056 (0.016) ***	-0.007 (0.016)	-0.086 (0.027) ***
JSC	δ_{JSC}	0.279 (0.045) ***	0.118 (0.019) ***	0.141 (0.014) ***	0.115 (0.016) ***	0.055 (0.029) **
LLC	δ_{LLC}	0.278 (0.048) ***	0.128 (0.020) ***	0.150 (0.014) ***	0.093 (0.018) ***	0.017 (0.036)
Industry dummies	δ_j	Yes	Yes	Yes	Yes	Yes
Constant	δ_0	-0.711 (0.125) ***	-0.396 (0.062) ***	-0.325 (0.024) ***	-0.112 (0.030) ***	0.215 (0.051) ***
R-square adjusted		0.201	0.205	0.230	0.213	0.239
Wald		160.79 (0.000)	705.53 (0.000)	749.58 (0.000)	393.78 (0.000)	195.01 (0.000)

Robust bootstrap standard errors in round brackets (for Wald-statistics: p-value in round brackets). Number of observations: 2,420. Bootstrapping based on 200 replications. Number of observations: 2,420. *** statistically significant at 1%; ** statistically significant at 5%; * statistically significant at 10%

Source: our elaboration

Tab. 4: Estimated coefficients of productivity model based on Eq. [5]

Variable	Parameter	Coefficient RIF($y = TFP$; q_τ)				
		$\tau = 10$	$\tau = 25$	$\tau = 50$	$\tau = 75$	$\tau = 90$
FAMILY	β_F	0.020 (0.010)	-0.005 (0.006)	-0.041 (0.006) ***	-0.085 (0.012) ***	-0.100 (0.024) ***
CRISIS	β_C	-0.002 (0.013)	-0.006 (0.007)	-0.002 (0.007)	0.011 (0.012)	0.003 (0.027)
FAMILY×CRISIS	β_{FC}	-0.036 (0.023)*	-0.033 (0.011)***	-0.024 (0.012)	0.004 (0.016)	0.019 (0.032)
NW	δ_{NW}	0.110 (0.035) ***	0.061 (0.017) ***	0.033 (0.013) **	-0.013 (0.016)	-0.116 (0.027) ***
NE	δ_{NE}	0.126 (0.037) ***	0.063 (0.017) ***	0.027 (0.014) **	-0.006 (0.018)	-0.092 (0.029) ***
CENTRE	δ_{CENTRE}	0.118 (0.037) ***	0.074 (0.017) ***	0.028 (0.013) **	-0.029 (0.016) *	-0.102 (0.026) ***
JSC	δ_{JSC}	0.107 (0.037) ***	0.099 (0.015) ***	0.110 (0.011) ***	0.088 (0.016) ***	0.006 (0.038)
LLC	δ_{LLC}	0.118 (0.037) ***	0.118 (0.016) ***	0.118 (0.013) ***	0.048 (0.019) **	-0.080 (0.036) **
Industry dummies	δ_j	Yes	Yes	Yes	Yes	Yes
Constant	δ_0	-0.508 (0.117) ***	-0.415 (0.044) ***	-0.281 (0.020) ***	-0.085 (0.027) ***	0.220 (0.050) ***
R-square adjusted		0.126	0.192	0.210	0.202	0.205
Wald		298.51 (0.000)	655.17 (0.000)	844.04 (0.000)	466.04 (0.000)	162.15 (0.000)

Robust bootstrap standard errors in round brackets (for Wald-statistics: p-value in round brackets). Number of observations: 2,420. Bootstrapping based on 200 replications. *** statistically significant at 1%; ** statistically significant at 5%; * statistically significant at 10%

Source: our elaboration

5.1 Robustness check

The potential correlation between input levels and unobserved firm-specific productivity could make the selection of inputs endogenous and the production function's OLS estimated coefficients biased. Levinsohn and Petrin (2003) suggest an estimation technique which makes use of intermediate inputs to control for such correlation between input levels and the unobserved firm-specific productivity. In order to corroborate our results, a production function was estimated using the method proposed by Levinsohn and Petrin (2003) (Table 5) to obtain total factor productivity measures regressed on the covariates of interest and the control variables (Table 6).

Tab. 5: Estimated coefficients of the production function using Levinsohn and Petrin (2003)'s approach

Variable	Parameter	Coefficient
lnLAB	β_{LAB}	0.175 (0.018) ***
lnCAP	β_{CAP}	0.028 (0.069)
lnINT	β_{INT}	0.804 (0.100) ***
Individual dummies	δ_i	Yes
Time dummies	δt	Yes

Standard errors in round brackets. Number of observations: 2,420. Bootstrapping based on 200 replications. *** statistically significant at 1%

Source: our elaboration

Tab. 6: Estimated coefficients of the productivity model based on Levinsohn and Petrin (2003)'s approach

Variable	Parameter	Coefficient RIF(y = *TFP*; q_τ)				
		τ = 10	τ = 25	τ = 50	τ = 75	τ = 90
FAMILY	β_F	0.004 (0.007)	-0.013 (0.006) ***	-0.041 (0.007) ***	-0.082 (0.014) ***	-0.089 (0.028) ***
CRISIS	β_C	-0.011 (0.009)	-0.002 (0.006)	0.009 (0.007)	0.020 (0.017)	0.033 (0.030)
FAMILY×CRISIS	β_{FC}	-0.017 (0.013)	-0.025 (0.008) ***	-0.014 (0.009)	-0.002 (0.022)	0.006 (0.037)
NW	δ_{NW}	0.061 (0.026) **	0.019 (0.015)	0.014 (0.013)	-0.019 (0.019)	-0.146 (0.037) ***
NE	δ_{NE}	0.064 (0.026) **	0.025 (0.017)	0.013 (0.014)	-0.018 (0.023)	-0.117 (0.040) ***
CENTRE	δ_{CENTRE}	0.068 (0.026) ***	0.042 (0.016) ***	0.016 (0.013)	-0.032 (0.019) *	-0.110 (0.038) ***
JSC	δ_{JSC}	0.089 (0.023) ***	0.077 (0.014) ***	0.085 (0.014) ***	0.098 (0.019) ***	-0.008 (0.034)
LLC	δ_{LLC}	0.090 (0.024) ***	0.083 (0.015) ***	0.087 (0.015) ***	0.033 (0.023)	-0.067 (0.039) *
Industry dummies	δ_i	Yes	Yes	Yes	Yes	Yes
Constant	δ_0	0.447 (0.077) ***	0.621 (0.021) ***	0.764 (0.021) ***	0.882 (0.032) ***	1.238 (0.062) ***
R-square adjusted		0.107	0.174	0.183	0.176	0.179
Wald		320.67 (0.000)	1.188.56 (0.000)	658.56 (0.000)	498.16 (0.000)	153.83 (0.000)

Robust bootstrap standard errors in round brackets (for Wald-statistics: p-value in round brackets). Number of observations: 2,420. Bootstrapping based on 200 replications. *** statistically significant at 1%; ** statistically significant at 5%; * statistically significant at 10%

Source: our elaboration

One of the most common approaches to investigate the difference between family and non-family business is to include in a regression model a binary variable based on the ownership stake held by the family or on the family members' involvement in executive positions. However, as pointed out by Zhang *et al.* (2022), "*family firm versus non-family firm independent variables have a higher proportion of selection bias*" (p. 99) that is a common source of endogeneity. Selection bias exists when firms that belong to a particular "treatment" category differ systematically from firms that are in the other and the factors that drive this difference register a correlation with the dependent variable (Wooldridge, 2003). In the case of family business there may be factors linked, for historical reasons, to the territory or to the type of industry other than factors like the firm age (family businesses are usually expected to be longer-lived) and the firm size (family firms are usually expected to be smaller) that could make family characterization non-random and its causal effect ambiguous.

Following Miller *et al.* (2007), Rettab and Azzam (2011), Minichilli *et al.* (2016), Zhou *et al.* (2017) and Fattoum-Guedri *et al.* (2018) we followed a two-step Heckman (1979) approach to tackle this issue. In the first step we ran a probit regression of the family binary variable (potentially endogenous) on a set of variables accounting for the probability for the firm to be family-owned. We considered the firms' AGE (measured as the number of years from the firm's foundation) and SIZE (expressed as the logarithm of revenues) (descriptive statistics of both *AGE* and revenues, represented by the variable *OUT*, are presented in Table 1). In addition, we considered location dummies NW, NE, CENTRE (representing North-West, North-East and Centre areas, respectively) and industry dummies. In the second step we used the estimates from the probit model to derive the inverse Mills ratio term (λ) to be included, as additional variable, into the estimated model (represented in our case by Eq. [3]). In particular, the statistical significance of the coefficient associated with λ-variable denotes the existence of endogeneity. The inclusion of the inverse Mills ratio allows, therefore, controlling for potential endogeneity bias.

Tab. 7: Estimated coefficients of probit (selection) model

Variable	Parameter	Coefficient
AGE	β_{AGE}	-0.003 (0.001) **
SIZE	β_{SIZE}	-0.057 (0.024) **
NW	δ_{NW}	-0.304 (0.153) **
NE	δ_{NE}	0.231 (0.166)
CENTRE	δ_{CENTRE}	-0.101 (0.154)
Industry dummies	δ_j	Yes
Constant	δ_0	0.781 (0.418) *
LR Chi-square		18.19 (0.000)

Standard errors in round brackets. Number of observations: 2,420. ** statistically significant at 5%; * statistically significant at 10%

Source: our elaboration

Tab. 8: Estimated coefficients of productivity model based on Eq. [7] and with control for endogeneity (outcome model)

Variable	Parameter	Coefficient RIF($y = TFP$; q_τ)				
		$\tau = 10$	$\tau = 25$	$\tau = 50$	$\tau = 75$	$\tau = 90$
FAMILY	β_F	0.045 (0.012) ***	-0.015 (0.008) *	-0.060 (0.008) ***	-0.093 (0.013) ***	-0.133 (0.025) ***
CRISIS	β_C	-0.021 (0.017)	-0.013 (0.007) *	-0.008 (0.009)	0.004 (0.015)	-0.013 (0.027)
FAMILY×CRISIS	β_{FC}	-0.035 (0.021) *	-0.020 (0.012) *	-0.014 (0.013)	-0.004 (0.016)	0.019 (0.033)
NW	δ_{NW}	-0.118 (0.050) **	-0.003 (0.024)	-0.053 (0.017) ***	-0.076 (0.022)	-0.226 (0.039) ***
NE	δ_{NE}	0.161 (0.039) ***	0.120 (0.021) ***	0.072 (0.017) ***	0.026 (0.020)	-0.084 (0.034) **
CENTRE	δ_{CENTRE}	0.014 (0.039)	0.058 (0.021) ***	0.003 (0.015)	-0.046 (0.019)	-0.141 (0.027) ***
JSC	δ_{JSC}	0.225 (0.038) ***	0.094 (0.017) ***	0.114 (0.015) ***	0.096 (0.017) ***	0.028 (0.030)
LLC	δ_{LLC}	0.238 (0.042) ***	0.110 (0.049) ***	0.131 (0.016) ***	0.079 (0.020) ***	-0.004 (0.037)
λ	δ_λ	0.909 (0.133) ***	0.407 (0.049) ***	0.440 (0.040) ***	0.323 (0.068) ***	0.463 (0.154) ***
Industry dummies	δ_j	Yes	Yes	Yes	Yes	Yes
Constant	δ_0	-0.982 (0.145) ***	-0.518 (0.063) ***	-0.457 (0.028) ***	-0.209 (0.043) ***	0.077 (0.084)
R-square adjusted		0.253	0.233	0.263	0.222	0.244
Wald		167.80 (0.000)	670.45 (0.000)	817.62 (0.000)	421.81 (0.000)	208.60 (0.000)

Robust bootstrap standard errors in round brackets (for Wald-statistics: p-value in round brackets). Number of observations: 2,420. Bootstrapping based on 200 replications. *** statistically significant at 1%; ** statistically significant at 5%; * statistically significant at 10%

Source: our elaboration

The robustness check proposed in this section confirm the findings discussed in the previous one. In particular, while H1b is confirmed by the results reported in both tables 6 and 8, H1a is confirmed only in the model presented in Table 8 and for the lowest decile of productivity performance. Therefore, the evidence supporting, alternatively, the stewardship or the agency theory for different levels of productivity, is confirmed. As for previous results, the *CRISIS* coefficient is almost always not significant, in both the considered models. Likewise, the coefficient of the interaction term *FAMILY* × *CRISIS* presents very limited statistical significance and does not allow confirming H2. We can conclude that the crisis shock does not act as a motivating factor for family firms. In particular, high-performance family firms do not engage in more value-oriented behaviour in critical times.

6. Conclusions

The worldwide diffusion of family firms as economic model has fostered a long academic debate involving the superiority of either family or non-family business in terms of performance, with two main paradigms emerging, namely the stewardship and the agency view. While the former supports the positive role of family members involvement in the firm governance, since their attachment to the firm as the main family assets should act as a support to economic performance, the latter highlights a negative effect of family, due to the risk that family member could be more oriented at pursuing self-interest and at using the business for personal advantage (Le Breton-Miller *et al.*, 2011). From a behavioural perspective, the priority of preserving SEW, more than the financial firm value, in family business, can be related to both the stewardship and the agency theory (Miller & Le Breton-Miller, 2014). External factors, such as macroeconomic crises, might interfere in the relationship between

family ownership and firm performance by prompting a shift in management behaviour: Minichilli *et al.* (2016) and van Essen *et al.* (2015) find that family business outperform non-family ones in time of crisis. Creemers *et al.* (2023) reconcile the predictions of the two theories by showing that, at low performance (labour productivity) levels, the stewardship view prevails with a convergence of economic and non-economic objectives. For the upper levels of the performance distribution, instead, such objectives diverge, translating into lower productivity for family business, thus confirming the agency theory.

Building on the methodological approach of Creemers *et al.* (2023), and considering the more comprehensive measure of firm performance given by the total factor productivity, this work aims at verifying whether, in non-critical times, family firms perform better than non-family firms for low levels of performance and if, on the contrary, they perform worse than non-family for high levels of TFP. In addition, this paper studies the role of the 2007 financial crisis, by verifying if, in critical times and for higher levels of TFP, the gap between the performance of the two groups narrows.

The proposed empirical analysis, based on a large sample of Italian firms, and on quantile regression models, enriched with robustness checks aimed at accounting for potential endogeneity issues, consistently confirms the hypothesis that in times of economic stability and for higher levels of performance, family firms show a lower performance than non-family firms, thus supporting the agency view: when the firm performs well, family members' risk aversion or nepotistic behaviour lead to the achievement of lower productivity levels with respect to non-family businesses. The results partially confirm the hypothesis that in non-critical times and for lower levels of performance, family firms show a higher performance than non-family firms, i.e. the prevalence of the stewardship view for firms in the lowest quantiles of the TFP distribution: this outcome implies that the necessity to safeguard family assets during periods of low performance fosters a harmony between economic and non-economic objectives. The advanced hypothesis that in critical times and for higher levels of performance, the performance gap of family firms with respect to non-family firms becomes smaller, is never confirmed by the models: the crisis shock does not represent a significant motivating factor, particularly failing to prompt high-productivity family firms to embrace more economically virtuous behavior during critical periods.

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Track 11
Strategy & Governance

Gestione della diversità e cambiamento culturale: come valutare in tempo reale l'effetto dei processi di trasformazione in corso?

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Frame of the research. *Dal 2015 L'Unione Europea, anche mediante l'EIGE (European Institute for Gender Equality) ed il GEI (Gender Equality Index) si è posta l'obiettivo di analizzare i dati relativi alla promozione della parità di genere in Europa. Nel 2022, con il nuovo requisito di ammissibilità per gli enti che si candidano alle call Horizon Europe 2021-2027, la Commissione Europea ha introdotto per tutti gli enti di ricerca che partecipano al bando Horizon l'obbligo di redigere il GEP (Gender Equality Plan), strumento politico principale per promuovere la parità di genere nella ricerca e nell'innovazione in Europa.*

Purpose of the paper. *Questo articolo presenta lo sviluppo di un innovativo strumento di misurazione dell'impatto del cambiamento istituzionale, denominato Impact Driver model, applicabile alla valutazione in itinere del Gender Equality Plan (GEP), strumento politico principale per promuovere la parità di genere nella ricerca e nell'innovazione in Europa, reso obbligatorio dalla Commissione Europea a partire dal 2022 per tutti gli enti di ricerca europei che decidono partecipazione alla Call Horizon Europe, principale strumento europeo per finanziare la ricerca.*

Methodology. *Nel testo viene descritto come la ricerca e la sperimentazione hanno consentito la realizzazione del modello, frutto dell'evoluzione di più strumenti utilizzati a livello europeo nel corso degli ultimi 10 anni. L'Impact Drivers Model è composto da 12 fattori di cambiamento, declinati ognuno per più indicatori, che vengono analizzati secondo 5 fasi di istituzionalizzazione. La forza di questo modello risiede nella sua attenzione al processo di attuazione e a ciò che lo guida. Grazie ai suoi Impact Drivers e alle fasi di istituzionalizzazione, è ben attrezzato per tenere conto dei diversi ritmi e dei diversi punti di partenza dello sviluppo istituzionale.*

Research limitations. *L'articolo applica* l'Impact Drivers Model *ad un unico ateneo. Gli sviluppi possibili di ricerca sono molteplici e può espandersi confrontando con lo stesso strumento altre università e incorporando vari metodi di ricerca.*

Inoltre, si ritiene esistano ad oggi alcuni ambiti che il GEP non indaga e di conseguenza che non sono monitorati e valutati in modo esaustivo da questi indicatori. Infine, esistono alcune tematiche di disparità di trattamento che possono sommarsi alla disparità di genere, tra cui genere non binario, etnia, età.

Per tali motivi si ritiene utile ampliare il campo di indagine relativo alla parità di genere anche a questi ambiti ad oggi non indagati.

Managerial implications. *I risultati del caso studio possono restituire una autovalutazione del gruppo di lavoro rispetto all'andamento del piano in itinere, tra cui:*

- *una valutazione relativa alle risorse umane ed economiche poste in essere per la verifica se siano sufficienti per perseguire gli obiettivi previsti;*
- *l'emersione di criticità all'interno dei diversi fattori che guidano il cambiamento;*
- *la necessità di potenziare le azioni che risultano eventualmente poco efficaci, discuterne con gli organi demandati, oppure con la governance di ateneo;*
- *la valorizzazione delle azioni che risultano complessivamente più efficaci.*

Originality of the paper. *Il caso studio considerato riguarda l'Università degli Studi di Brescia. Nel percorso di analisi del GEP di ateneo, secondo questo modello, sono stati tenuti in considerazione alcuni elementi emersi dalla valutazione da parte di enti di ricerca che lo hanno testato:*

- *alcuni indicatori sono risultati più semplici da valutare, altri più complessi;*
- *le risorse economiche e di personale per l'attuazione e la leadership sono fattori "vulnerabili" (i.e., possono modificarsi nel tempo);*
- *occorre che lo strumento sia utilizzato da chi conosce molto bene l'ente di ricerca e il suo funzionamento;*
- *può accadere che gli enti meno istituzionalizzati siano più indulgenti nel percorso di autovalutazione.*

L'analisi delle risposte date dalle persone che compongono la Commissione Genere di ateneo consente di produrre una fotografia, dopo 18 mesi dall'avvio del GEP, che esplora quali sono i fattori che consentono di generare o meno un impatto in un contesto organizzativo complesso come quello degli istituti di ricerca e di istruzione superiore, enfatizzando un approccio incentrato sulla persona e sulla qualità delle relazioni costruite con il gruppo di stakeholder.

In conclusione l'articolo fornisce alcune raccomandazioni per l'utilizzo del modello, che tengano in considerazione il contesto politico entro cui si sviluppa.

Keywords: *gender equality plan; monitoring&evaluation; impact drivers.*

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1. Introduzione

Dal 2015 i piani per la parità di genere (Gender Equality Plan, GEP) sono lo strumento politico principale per promuovere la parità di genere nella ricerca e nell'innovazione in Europa. Con il nuovo requisito di ammissibilità per gli enti che si candidano alle call Horizon Europe 2021-2027, la Commissione Europea ha introdotto un requisito istituzionale basato sulla comprensione globale della parità di genere. I GEP, diventati quindi obbligatori, devono riguardare la cultura organizzativa e l'equilibrio tra lavoro e vita privata, l'equilibrio di genere nella leadership e nel processo decisionale, la parità di genere nell'assunzione e nella progressione di carriera, l'integrazione della dimensione di genere nella ricerca e nell'insegnamento e le misure contro la violenza di genere. La Commissione Europea ha inoltre specificato quattro elementi obbligatori: il GEP deve essere un documento pubblico, devono essere dedicate risorse alla sua attuazione, deve essere basato sulla raccolta e sul monitoraggio di dati disaggregati per sesso/genere e devono essere forniti formazione e sviluppo di capacità.

Uno degli approcci utilizzati per monitorare e valutare i cambiamenti strutturali ottenuti attraverso i GEP è l'*Institutional Capacity for Gender Mainstreaming Model*. Sviluppato da Yellow Window (Mergaert, 2012; Mergaert, Arnaut, Wuiame, Forest and Ferguson, 2013; Mergaert and Wuiame, 2013), questo modello è stato concepito per valutare la capacità delle amministrazioni pubbliche, sia della Commissione Europea sia di ciascuno Stato membro dell'UE, di realizzare politiche capaci di contrastare le disuguaglianze tra donne e uomini nella società a partire da un'analisi dei meccanismi che ne sono alla base (i.e., *gender mainstreaming)*. Il modello identifica il graduale aumento della capacità di cambiamento strutturale e dei processi di uguaglianza di genere a livello istituzionale, attraverso le seguenti fasi di progetto: avvio, crescita, integrazione e istituzionalizzazione. Il punto di forza di questo modello è che si concentra sul processo di attuazione e su ciò che lo guida. In quanto tale, è ben attrezzato per tenere conto delle diverse fasi di sviluppo istituzionale e dei diversi punti di partenza, chiaramente una delle maggiori preoccupazioni che attualmente risuonano a causa delle divergenze nell'attuazione delle politiche nell'Unione Europea (Wroblewski, 2019; Wroblewski, 2020; Standing Working Group on Gender in Research and Innovation, 2021).

Un secondo è l'*Actors Mobilisation Model* (Cacace,et all, 2016; Kalpazidou Schmidt, Cacace, 2018), che si concentra sulla mobilitazione degli attori interni all'istituzione per sostenere il processo di cambiamento. Secondo questa prospettiva, ciò che accade in un'istituzione viene valutato dal punto di vista dei processi interni che vengono messi in moto per la parità di genere. Il modello comprende la creazione di un agente di trasformazione interno, l'attivazione delle dinamiche degli organi decisionali interni, l'interazione tra le dinamiche messe in atto e le circostanze strutturali, e infine i risultati che ne derivano in termini di cambiamento istituzionale sostenibile (che si verifica a livello simbolico, interpretativo, istituzionale e operativo). Come notano Kalpazidou Schmidt e Cacace, la concettualizzazione dell'approccio della mobilitazione degli attori con le sue quattro componenti non deve essere intesa come lineare, che si verifica in fasi, ma piuttosto con la sovrapposizione di queste componenti.

Alcune attuazioni concrete di tali modelli sono state sperimentate in progetti Europei. Ad esempio, i partner del consorzio incaricati del monitoraggio e della valutazione esterna (rispettivamente Knowledge & Innovation e ISAS) nei progetti Horizon 2020 LIBRA e Gender-SMART, incentrati sulla progettazione e sull'attuazione di piani per l'uguaglianza di genere, hanno utilizzato il modello *Institutional capacity development Model* per il loro lavoro, sia in combinazione con il modello *Actors Mobilisation* (LIBRA) (Cacace et all, 2019) sia integrando i due modelli (Gender-SMART) (Tenglerová, Linková 2020). Il risultato è un efficace modello di valutazione che permette di misurare i processi istituzionali e il grado di istituzionalizzazione. Il modello può essere utilizzato come strumento di autovalutazione, come strumento di sensibilizzazione e di sviluppo delle capacità, ma anche per la valutazione da parte di esperti esterni. Lo strumento, già testato da un gruppo di organizzazioni di ricerca, consente un'analisi comparativa attraverso i suoi indicatori e le sue scale graduali, fornendo preziose indicazioni sui fattori che influenzano il processo di cambiamento.

Questo testo ha l'obiettivo di illustrare la ricerca condotta presso l'Università degli Studi di Brescia, relativa alla valutazione in itinere delle azioni previste dal GEP 2022-2024, a metà circa dal suo avvio, mediante l'applicazione dell'Impact Driver Model, strumento di autovalutazione delle azioni poste in essere nella realizzazione del GEP mediante una tabella di 12 indici sintetici (i.e., Impact Driver), afferenti a diverse aree di realizzazione, declinati in ulteriori indicatori specifici (in totale 45 indicatori).

2. La genesi del GEP

Il tema della parità di genere era da tempo di interesse per la Commissione Europea. In più momenti, dal 1996 in avanti, i referenti della Commissione Europea avevano compreso la perdita economica dovuta alla discriminazione di genere e quindi la grande opportunità di aumentare il PIL europeo. La Commissione Europea definisce e persegue il *gender mainstreaming* come una strategia di "(ri)organizzazione, miglioramento, sviluppo e valutazione dei processi politici, in modo da incorporare una prospettiva di uguaglianza di genere in tutte le politiche a tutti i livelli e in tutte le fasi, dagli attori normalmente coinvolti nella definizione delle politiche" (Commissione Europea, 1996).

Proprio per questi motivi e in ottica *gender mainstreaming* nel 2007 fu creato l'EIGE (European Institute for Gender Equality) con il compito di raccogliere dati e analizzare lo status quo e le differenze presenti nei diversi paesi europei. Il passo successivo fu la messa a punto del Gender Equality Index: unico indice che fornisce, ad oggi, una mappa complessiva dei divari di genere nell'UE e negli Stati membri, basata sul quadro politico dell'Unione Europea[4].

Nel 2013, primo anno di pubblicazione del Gender Equality Index, il mondo politico ed accademico ha iniziato a prendere atto degli esiti dell'indagine a livello nazionale e delle differenze esistenti tra gli stati europei. Negli anni, l'indice, pubblicato annualmente, ha evidenziato che:

- pochi stati europei hanno messo in atto dei cambiamenti significativi, nonostante l'evidenza e la presa di coscienza della perdita economica;
- i pochi stati che hanno posto in essere delle modifiche legislative a livello nazionale hanno ottenuto dei risultati molto significativi (es. Belgio; Francia);
- i risultati non sono sempre confermati o incrementati negli anni successivi, in quanto variabili esogene legate all'economia, alla sanità (es. Covid) oppure variabili endogene (cambiamenti politici nazionali) possono determinare un'inversione di tendenza.

Sulla base di tale analisi, a distanza di alcuni anni, la Commissione Europea annuncia nel 2019 il proprio proposito, e lo attua nel 2021 rendendo obbligatorio a tutti gli enti di ricerca che si candidano a partecipare al Bando Horizon Europe 2021-2027 la redazione e la realizzazione del Gender Equality Plan (GEP). La scelta fatta dalla Commissione prevede due aspetti significativi: rendere obbligatoria l'indagine partendo dagli istituti scientifici, da dove storicamente partono i cambiamenti e rendere prescrittivo/obbligatorio l'inserimento del GEP.

ll GEP è formato da cinque aree integrate in una visione di carattere strategico entro cui vengono pianificate azioni: la cultura organizzativa e l'equilibrio tra lavoro e vita privata, l'equilibrio di genere nella leadership e nel processo decisionale, la parità di genere nell'assunzione e nella progressione di carriera, l'integrazione della dimensione di genere nella ricerca e nell'insegnamento e le misure contro la violenza di genere. Le iniziative devono essere finalizzate a correggere eventuali distorsioni

[4] La struttura del quadro concettuale del GEI è composta da otto domini, i primi sei dei quali (lavoro, denaro, conoscenza, tempo, potere e salute) sono associati in un indice principale, e da due domini satellite (disuguaglianze intersezionali e violenza). Questi ultimi, pur riferendosi concettualmente all'uguaglianza di genere, non possono essere ricompresi nell'indice centrale, in quanto misurano un fenomeno illustrativo, ovvero un fenomeno che riguarda solo un gruppo limitato della popolazione. Ciò avviene quando si esaminano questioni con una prospettiva femminile, ad esempio nel caso della violenza di genere contro le donne, oppure quando si analizzano le disparità tra donne e uomini all'interno di gruppi specifici della popolazione (persone con disabilità, genitori soli ecc.)

e diseguaglianze di genere e perseguire l'obiettivo di attivare un cambiamento organizzativo e culturale a livello istituzionale (Commissione Europea, 2021).

La Commissione Europea (2021) ha inoltre specificato quattro elementi obbligatori: il GEP deve essere un documento pubblico, devono essere dedicate risorse alla sua attuazione, deve essere basato sulla raccolta e sul monitoraggio di dati disaggregati per sesso/genere e devono essere forniti formazione e sviluppo di capacità.

3. Il GEP ed i Processi di monitoraggio e valutazione

Tra gli elementi di obbligatorietà previsti dalla Commissione Europea per i GEP, gli strumenti di monitoraggio e valutazione, ricoprono un ruolo cruciale. Tali strumenti possono infatti assumere forme ed efficacia differenti, e possono compromettere il potenziale di trasformazione delle iniziative pianificate. Se da un lato gli strumenti di monitoraggio e valutazione sono strumenti di supporto ad azioni efficaci e di attribuzione delle responsabilità, dall'altro, definendo indicatori che possono servire a valutare le azioni e le risorse stanziate, si migliora la conoscenza dei cambiamenti in atto.

A partire dal 2015 i progetti finanziati dall'Europa e realizzati dagli enti di ricerca hanno visto il susseguirsi di numerose forme di monitoraggio e valutazione, con lo sforzo di produrre indici sintetici calcolati sulla base di un mix di parametri qualitativi e quantitativi (Progetto UNIPD-GEI) che considerassero solo il personale accademico, oppure di metodi quantitativi che considerassero fattori endogeni ed esogeni (progetto PLOTINA - UGII Index). Tuttavia, dovendo fare sintesi, hanno posto sullo stesso piano di valutazione aspetti tra loro non comparabili, o con poca possibilità di comparazione[5].

Negli ultimi anni, nuovi progetti europei hanno introdotto proposte avanzate per il monitoraggio e la valutazione. Questi approcci non solo includono la valutazione dell'efficacia delle azioni, ma affrontano anche il complesso tema del "cambiamento sociale". Quest'ultimo richiede uno scenario temporale di lungo periodo, superiore rispetto alla consueta durata temporale di un progetto, come evidenziato da Minto et al. (2020).

Un confronto tra esperti di monitoraggio e valutazione coinvolti in diversi progetti europei, relativi all'attuazione dei GEP (LIBRA; Gender-SMART; CASPER) ha portato a identificare aspetti critici. Tra questi rientrano la possibilità di comparare alcuni risultati tra gli enti di ricerca coinvolti, i tempi necessari prima che gli effetti degli interventi dei GEP diventino evidenti e soprattutto la necessità di sviluppare sistemi di monitoraggio e valutazione coerenti tra loro (Ferguson 2021).

In particolare, ad oggi due sono i modelli di valutazione dei GEP sviluppati:

Il primo è l'*Institutional Capacity for Gender Mainstreaming Model* (Mergaert et al. 2013; Mergaert e Wuiame 2013) che, concepito per valutare la capacità di *gender mainstreaming* delle pubbliche amministrazioni, si focalizza sui fattori che guidano il processo di cambiamento istituzionale.

Il secondo è l'*Actor Mobilisation Model* (Cacace et al. 2016; Kalpazidou Schmidt e Cacace 2019) che si concentra sulla valutazione di quanto la mobilitazione degli attori interni agli enti può sostenere il processo di cambiamento istituzionale per favorire l'uguaglianza di genere.

I primi tentativi di integrazione di questi modelli sono stati fatti nell'ambito dei progetti di cambiamento istituzionale di Horizon 2020 LIBRA e Gender-SMART, dove sono stati utilizzati per il monitoraggio esterno e la valutazione esterna. In LIBRA, l'*Institutional capacity development Model* è stato utilizzato in combinazione con l'*Actor Mobilisation Model* (Cacace et al. 2019), mentre in Gender-SMART i due modelli sono stati integrati in modo più sostanziale (Tenglerová e Linková 2020). Nel progetto CASPER finalizzato a valutare la fattibilità dell'introduzione di un sistema di premi e/o certificazioni sull'uguaglianza di genere negli istituti di ricerca e di istruzione superiore in Europa, finanziato dalla Commissione Europea all'interno della call Horizon 2020, questo lavoro precedente è stato ripreso e sviluppato ulteriormente.

[5] Per esempio, UGII ha fatto la somma semplice della disparità di accesso all'università (maschile o/ femminile) e il dato relativo al genere prevalente nella governance o nei professori ordinari.

Tale integrazione ha consentito di proporre un'analisi comparativa delle azioni poste in essere in diverse istituzioni, con un focus specifico sui processi. Il risultato è stato un efficace modello composto da 11 Impact Driver (ID), composti essi stessi da più indicatori, che ha permesso di valutare i processi posti in essere e il grado di istituzionalizzazione in diversi step di realizzazione.

Il modello è stato creato per essere utilizzato quale strumento di autovalutazione e per incrementare la sensibilizzazione e lo sviluppo delle capacità. Per quanto riguarda il suo utilizzo quale strumento di valutazione da parte di enti esterni si ritiene possa essere utilizzato in modalità parallela, ossia si ipotizza che dopo una prima analisi autovalutativa, ne segua una seconda svolta da valutatori esterni esperti, che possa portare ad un confronto costruttivo rispetto al percorso in corso e a miglioramenti futuri (Mergaert et al 2022).

Lo strumento è stato testato da sette organizzazioni di ricerca aventi sede in diversi paesi d'Europa ed ha consentito di raccogliere da un lato un'analisi comparativa attraverso i suoi indicatori e le sue fasi graduali, fornendo elementi di approfondimento sui fattori che influenzano il processo di cambiamento, dall'altro di valutare lo strumento e di porre in evidenza aspetti efficaci ed elementi di difficoltà per la valutazione.

Il modello proposto è stato poi ripreso e migliorato mediante l'aggiunta di un ulteriore Impact Driver dedicato alla raccolta dati (Mergaert, Cacace, Linkova 2022). Ciò lo ha reso uno strumento più completo ed efficace per l'analisi del processo che conduce al cambiamento istituzionale in termini di parità di genere e per approfondire la comprensione dei suoi fattori facilitanti e ostacolanti.

3.1 Institutional Capacity for Gender Mainstreaming Model

Il primo modello prende spunto da un modello valutativo per l'integrazione della dimensione di genere utilizzato dall'Istituto per la promozione della parità di genere African Development Bank Group (2011). E' stato costruito grazie alla revisione di 26 rapporti di valutazione tematici e nazionali con approccio *gender mainstreaming*.

Il modello si basa sulla teoria del cambiamento secondo la quale l'esistenza di una serie di prerequisiti (i.e., Impact Drivers), consente di realizzare un cambiamento efficace. Se tali fattori di cambiamento individuati come importanti non sono presenti, è improbabile che il processo di cambiamento produca impatti. La valutazione della presenza o meno di Impact Drivers può quindi supportare una valutazione della capacità istituzionale di integrazione della dimensione di genere. In particolare, secondo questo primo modello, sono quattro gli Impact Drivers che devono essere presenti per raggiungere l'integrazione della parità di genere:

- una leadership efficace,
- risorse finanziarie e umane adeguate,
- disponibilità di procedure e processi adeguati,
- incentivi organizzativi e strutture di responsabilità adeguati.

Con un approccio *gender mainstreaming* e per conto dell'EIGE, sono stati successivamente identificati 9 Impact Drivers per la buona governance, ossia apertura, partecipazione, responsabilità, efficacia e coerenza (Consiglio d'Europa 1998; Mergaert 2012; Commission of European Communities 2001*).*

Oltre alla definizione degli elementi chiave che guidano un cambiamento efficace, era di fondamentale importanza integrare il modello con uno strumento che andasse a porre in evidenza i progressi dell'ente nel tempo. Pertanto, partendo dai quadri concettuali esistenti (UNIFEM 2010; Taylor 2010; Brown 2008; Commissione Europea 2007), il concetto di Impact Driver è stato combinato con un modello di sviluppo della capacità istituzionale sviluppato su cinque fasi.

La logica di fondo di tale implementazione è che il raggiungimento del cambiamento in materia di uguaglianza di genere è il risultato della crescita della capacità di un'organizzazione di integrare le questioni di genere lungo una serie di fasi intermedie pre-identificate. Le cinque fasi sono state etichettate come: Progetto, Isolamento, Crescita, Integrazione e Istituzionalizzazione. A seguito di

revisioni è stata inserita una nuova fase temporale, non presente nel modello originale, che corrisponde al punto di partenza e rappresenta il punto zero.

Per determinare la capacità istituzionale, è stata generata una griglia con l'attribuzione di un'evoluzione (i.e., rubriche) per ogni indicatore e motore d'impatto atta a identificare lo stadio di istituzionalizzazione. Le rubriche sono strumenti che aiutano a formalizzare i processi di valutazione o di assessment, delineando criteri concordati che segnano diversi livelli di performance. Le rubriche possono essere personalizzate per soddisfare le esigenze specifiche del contesto, piuttosto che fare riferimento a criteri esterni apparentemente 'oggettivi', cioè il tipo e il grado di variazione tra i diversi criteri possono essere scelti caso per caso" (UNIFEM 2010).

Il modello descritto incorpora quindi la consapevolezza che la capacità istituzionale è una capacità dinamica, che si evolve nel tempo ed è influenzata da vari fattori (Commissione Europea, 2007). Valutando quindi la capacità istituzionale per ogni driver d'impatto, si ottiene una visione raffinata dei particolari punti di forza e di debolezza della capacità dell'istituzione.

La forza di questo modello risiede nella sua attenzione al processo di attuazione e a ciò che lo guida. Grazie ai suoi Impact Drivers e alle cinque fasi di istituzionalizzazione, è ben attrezzato per tenere conto dei diversi ritmi e dei diversi punti di partenza dello sviluppo istituzionale, che è chiaramente una delle principali preoccupazioni che attualmente risuonano a causa della divergenza dell'attuazione delle politiche nell'UE (SWG GRI 2018, 2021; Wroblewski 2022).

3.2 Actor Mobilisation Model

Il secondo modello a differenza del primo, non si concentra sul raggiungimento di risultati specifici nel continuum della istituzionalizzazione, ma sulla modalità di attivazione dei processi di cambiamento interni che dovrebbero portare a tali risultati (Cacace et al. 2016; Kalpazidou Schmidt e Cacace 2018).

Il processo di cambiamento è scomposto in quattro componenti, che possono essere considerate separatamente a fini analitici, anche se sono fortemente interconnesse, tanto che la sequenza non è sempre lineare, ma dipende da fattori contestuali. Queste componenti sono:

- la creazione di un o una agente di trasformazione interno all'organizzazione;
- l'attivazione delle dinamiche interne all'organizzazione, con l'emergere di atteggiamenti e comportamenti di sostegno o di resistenza nei confronti del processo;
- l'interazione tra le dinamiche interne all'organizzazione generate dal GEP e le circostanze strutturali che possono rafforzare o ostacolare il processo di cambiamento;
- i risultati che ne derivano in termini di cambiamento istituzionale sostenibile.

All'inizio l'agente può essere una persona o un piccolo gruppo. Durante il processo di cambiamento istituzionale ci si aspetta che l'agente di trasformazione formalmente incaricato integri internamente altri gruppi e persone impegnate nella parità di genere (e.g., associazioni di studenti, centri di ricerca, docenti con temi di ricerca differenti, ma compatibili), e esternamente con la creazione di partnership con stakeholder che possano supportare il processo e promuovere alleanze.

Un cambiamento istituzionale di questa portata può generare difficoltà di attuazione, oltre che di carattere formale anche di carattere culturale e sociale. Il risultato dell'interazione tra il processo di cambiamento e il contesto culturale definisce la gamma dei risultati sostenibili raggiungibili. Nel modello di mobilitazione degli attori, i risultati sono classificati in base a quattro dimensioni del cambiamento istituzionale (i.e., interpretativa, simbolica, istituzionale, operativa) e secondo quattro aree strategiche di cambiamento istituzionale nella ricerca (i.e., reclutamento, sviluppo della carriera, equilibrio vita-lavoro, dimensioni di sesso e genere della ricerca).

Punto di forza di tale modello risiede nella coerenza tra le 4 fasi di integrazione e la finalità del GEP. Affinché lo strumento di pianificazione divenga efficace occorre infatti che alla base della sua elaborazione ci sia un effettivo coinvolgimento della struttura organizzativa (i.e. governance, corpo docenti, personale tecnico amministrativo, studenti). Diversamente non si arriverà a un cambiamento interno efficace e di lungo periodo. Il rischio è che il processo si fermi a un piano teorico o di formalismo burocratico, che fatica a prendere consistente avvio in quanto non supportato da una

volontà effettiva e soprattutto da strumenti efficaci per l'attuazione (Brescianini et al., 2023). Lo stesso EIGE riporta come gli ostacoli alla creazione, all'attuazione, al monitoraggio e alla valutazione di un GEP siano diversi e frequenti (EIGE, 2022). Nell'ambito degli interventi ad oggi attuati a livello europeo sono stati registrati più tipologie e livelli di impedimento, che è bene considerare *ex ante* in quanto possibili elementi a svantaggio dell'implementazione dei GEP. Nel repertorio EIGE si annoverano: la fisiologica resistenza propria di ogni processo di cambiamento culturale e di paradigma; lo scarso coinvolgimento degli e delle stakeholder nelle prime fasi del processo di sviluppo del GEP; la mancanza di autorità istituzionale e organizzativa del personale responsabile dell'attuazione del GEP; l'assunto che l'implementazione di un GEP sia un "problema delle donne" con scarsa partecipazione da parte degli uomini; la mancata comprensione dell'importanza e del bisogno di azioni positive che promuovano la parità di genere; la considerazione che iniziative di promozione delle pari opportunità si pongano in contrasto con l'approccio meritocratico che un ambiente accademico e votato alla ricerca dovrebbe mantenere; la convinzione che il GEP non sia necessario in quanto le donne sono ben rappresentate in alcuni settori di ricerca; l'idea che le disuguaglianze di genere si possano risolvere autonomamente senza interventi particolari; la mancata allocazione di risorse dedicate; la mancanza di competenze in materia di studi di genere (EIGE, 2022).

4. Analisi empirica

4.1 Il caso studio: Autovalutazione in itinere del GEP dell'Università degli Studi di Brescia

A livello nazionale la Conferenza dei Rettori delle Università Italiane definisce il Gender Equality Plan come segue: "Il GEP si colloca in un'ottica programmatoria e si inserisce all'interno del Piano Strategico, ponendosi tra le direttrici di sviluppo dell'Ateneo. Le azioni in esso previste sono poste in relazione con il Bilancio di Genere sia nella fase previsionale che in quella di rendicontazione" (CRUI, 2021). Nelle linee guida CRUI vengono definite anche le cinque aree minime di intervento: cultura dell'organizzazione e equilibrio vita privata/vita lavorativa; equilibrio di genere nelle posizioni di vertice negli organi decisionali; parita' di genere nel reclutamento e nelle progressioni di carriera; integrazione della dimensione di genere nella ricerca e nei programmi degli insegnamenti; contrasto della violenza di genere, comprese le molestie sessuali. In questo quadro di riferimento istituzionale italiano, la stesura del GEP dell'Università degli Studi di Brescia ha preso avvio a dicembre 2021.

In esito ad un convegno di apertura, e a successivi incontri fra le figure che hanno steso il Bilancio di Genere approvato ad aprile 2021, è emersa la volontà da parte degli organi di governance dell'Università di Brescia di dare vita ad un GEP Team dedicato alla costruzione condivisa del GEP, un gruppo multidisciplinare, partecipato da docenti dei diversi dipartimenti, personale tecnico amministrativo e studenti. Da subito è stato condiviso l'obiettivo di produrre un documento che recepisse le indicazioni del Vademecum CRUI, che utilizzasse le indicazioni scaturite dal Bilancio di Genere per valorizzare quanto già svolto e si proponesse quale documento pianificatorio per il triennio 2022-2024. Operativamente si è proceduto con l'affidamento del ruolo di coordinamento ad una figura interna al GEP Team e sono state definite le aree di approfondimento (le 5 definite dal GEP sulla base del Vademecum CRUI) con attribuzione della responsabilità ad una persona referente.

Da ogni gruppo sono state stilate delle bozze di schede che, per ogni Area di intervento, hanno definito degli obiettivi, condivisi successivamente in modalità trasversale. Da qui per ogni obiettivo,

ogni gruppo di lavoro ha espresso la proposta di attività funzionali al raggiungimento degli obiettivi, e la pianificazione di risorse interne e risorse finanziarie[6] necessarie per la loro realizzazione[7].

Nella scrittura e analisi delle azioni è emersa anche la necessità di creare un'unità tecnico-amministrativa dedicata alla parità di genere con risorse dedicate[8] ed una Commissione Genere con il compito di definire il cronoprogramma delle azioni, la loro effettiva realizzazione, il monitoraggio dell'efficacia delle stesse, e di interfacciarsi con gli altri organi di governance presenti in Ateneo.

A seguito approvazione del GEP, avvenuta nel giugno 2022, il Senato accademico ha dato il via alla strutturazione della Commissione Genere, incaricata all'attuazione delle azioni per il triennio 2022-2024.

Il modello qui considerato *Impact Drivers Model* utilizzato per la valutazione *in itinere* del GEP è composto da 12 fattori di cambiamento, declinati ognuno per più indicatori, che vengono analizzati secondo 6 fasi di istituzionalizzazione. Esso si basa su precedenti analisi dei processi di cambiamento istituzionale verso l'uguaglianza di genere posti in essere da autorevoli istituti e con obiettivi che si sono evoluti nel tempo.

Rispetto ai temi relativi al coinvolgimento della governance e all'attenzione agli agenti di cambiamento citati nei modelli sopra presentati, nel percorso di avvio del GEP dell'Università degli Studi di Brescia questi aspetti non sono stati sottovalutati. Per facilitare i processi partecipativi, si è ritenuto necessario strutturare una governance di gestione e realizzazione delle azioni GEP capace di valorizzare il contributo delle singole persone, con la precisa volontà di trasferire il contributo individuale sia all'interno del gruppo di lavoro, sia all'esterno, nell'ambito dei dipartimenti a cui afferiscono le componenti della commissione, implementando progettualità partecipate anche di carattere sperimentale. Tale strumento è divenuto elemento di sviluppo di progetti trasversali e occasione per valorizzare le competenze poste in essere in chiave di innovazione, da trasferire alle nuove generazioni.

4.2 Il metodo

Si è valutato che il modello Gender Equality Impact Drivers definito nel 2022 da Mergaert, Cacace e Linkova, sia adeguato al caso di specie, in quanto adatto alla rilevazione dell'impatto per diverse ragioni. In primis, i 12 Impact Drivers identificati (Allegato 1) risultano essere sufficientemente strutturati per accogliere le diverse dimensioni del piano triennale definito, soprattutto in termini di miglioramento delle conoscenze interne, coinvolgimento e diffusione della cultura della parità di genere interna ed esterna all'ente di ricerca e orientamento della governance al cambiamento.

In secondo luogo, 5 step di progressione consentono la determinazione temporale dei progressi che questi fattori di cambiamento portano e raccontano la fase in cui si trova l'ente di ricerca, con anche la possibilità di leggere alcuni fattori più sviluppati e avanzati di altri e poter agire su alcuni di essi.

Inoltre le 4 componenti del modello della mobilitazione degli attori interni rappresentano in modo molto sintetico quanto sostenuto in precedenza dalle stesse autrici in un precedente articolo: il cambiamento culturale di un ente deve avvenire mediante il coinvolgimento della governance e della base, mediante un processo partecipativo top-down&bottom-up. L'agire in assenza di agenti di cambiamento interni, autorevoli, che "contaminino" con la promozione di iniziative che hanno per tema la parità di genere differenti stakeholder interni ed esterni, non porterà ad un vero processo di trasformazione stabile.

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6 In particolare è stato definito un costo previsionale per ogni azione di ogni area di intervento, dividendo le tipologie di costo in risorse interne necessarie per la realizzazione delle azioni, e in costi esterni da pianificare nel Bilancio di Ateneo.

7 Tenuto conto del fatto che si trattava della stesura del primo documento, si è scelto di non produrre un documento unicamente di carattere pianificatorio, ma di accogliere e proseguire il percorso di pianificazione avviato con il Bilancio di genere. Si cita "il documento GEP in questa sua prima redazione conterrà sia indicazioni strategiche sia azioni operative".

8 L'esperienza nella redazione del Bilancio di genere ha messo in luce l'utilità della creazione di un ufficio che abbia il compito di coordinare dal punto di vista operativo le attività ad oggi in carico a diversi uffici amministrativi e organi tra cui il CUG; ufficio Statistica, ufficio Legale, Centro Studi LOG.

Infine le 4 componenti ritenute strategiche per la verifica dell'effettivo cambiamento interno all'istituzione (i.e., reclutamento, avanzamento di carriera, equilibrio vita privata-lavorativa e la dimensione di genere nella ricerca) tengono in considerazione aspetti relativi alla segregazione orizzontale e verticale, alla verifica dell'effettiva neutralità della ricerca soprattutto negli studi STEM, al rispetto delle norme presenti (e.g., commissioni per promozioni e candidature) e al monitoraggio ed efficacia delle attività poste in essere.

Nel percorso di analisi del GEP dell'Università di Brescia secondo questo modello sono stati tenuti in considerazione alcuni elementi emersi dalla valutazione da parte di enti di ricerca che lo hanno testato:
- alcuni indicatori sono risultati più semplici da valutare, altri più complessi;
- le risorse economiche e di personale per l'attuazione e la leadership sono fattori "vulnerabili" (i.e., possono modificarsi nel tempo);
- occorre che lo strumento sia utilizzato da chi conosce molto bene l'ente di ricerca e il suo funzionamento;
- può accadere che gli enti meno istituzionalizzati siano più indulgenti nel percorso di autovalutazione.

I risultati del caso studio possono restituire una autovalutazione del gruppo di lavoro rispetto all'andamento del piano *in itinere*, tra cui:
- una valutazione relativa alle risorse umane ed economiche poste in essere per la varifica se siano sufficienti per perseguire gli obiettivi previsti;
- l'emersione di criticità all'interno dei diversi fattori che guidano il cambiamento;
- la necessità di potenziare le azioni che risultano eventualmente poco efficaci, discuterne con gli organi demandati, oppure con la governance di ateneo;
- la valorizzazione delle azioni che risultano complessivamente più efficaci.

Il questionario, riportato con il dettaglio degli indicatori in ALLEGATO 1, è stato sottoposto via mail a tutte le componenti della Commissione Genere. La valutazione dell'impatto delle azioni poste in essere nella realizzazione del GEP presso l'Università degli Studi di Brescia è ottenuta mediante una tabella di 12 indici sintetici (i.e., Impact Driver), afferenti a diverse aree di realizzazione, declinati in ulteriori indicatori specifici (in totale 45 indicatori). Per la misurazione di questi indicatori si è utilizzata una scala likert da 0 a 5 che esprime il livello di realizzazione inteso come processo mediante il quale quella specifica azione è stata accolta e inserita stabilmente all'interno dell'organizzazione: da 0 (Punto di partenza / attività non attuata) si giunge a 5 (istituzionalizzazione dell'attività).

Le persone rispondenti sono state 9 su 11 inviti. La composizione delle persone rispondenti è di 4 docenti (ordinari e associati); n. 2 ricercatrici, n. 2 personale tecnico amministrativo e n. 1 studente.

4.3 I risultati

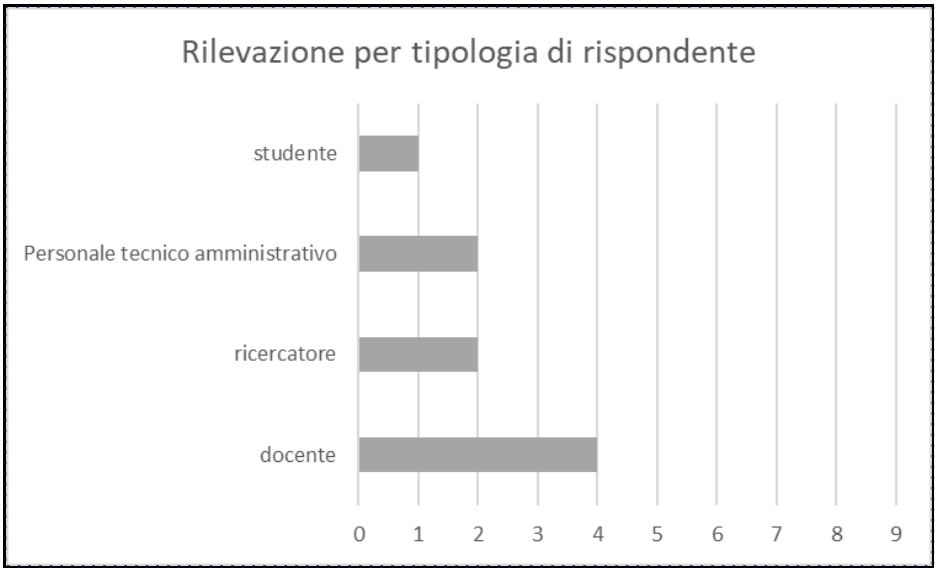
L'indagine è stata svolta a gennaio 2024, a metà circa dall'avvio del GEP dell'Università di Brescia. Le risposte relativamente alla valutazione degli Impact Driver (ID) sono riportate in Tabella 1 e le persone rispondenti sono identificate con le lettere da A a I.

Tab. 1: Risultati della rilevazione

n.	Impact driver	A	B	C	D	E	F	G	H	I	MEDIA
1	Core team of change agents	3	3	3	3	5	4	3	2	4	**3,33**
2	Capacity/skills of the change agents for driving institutional change for GE	3	2	2	2	3	4	3	2	3	**2,67**
3	Leadership actively committed to GE/GM	2	2	2	1	3	3	2	3	1	**2,11**
4	Availability of resources	3	3	3	2	3	4	2	2	2	**2,67**
5	Data collection and statistical analysis	2	3	3	3	3	4	2	1	3	**2,67**
6	Involvement of internal stakeholders	1	1	2	1	3	4	2	2	1	**1,89**
7	Involvement of external stakeholders and experts	1	2	2	0	3	4	1	1	3	**1,89**
8	Coverage of the different dimensions / areas of GE institutional change	3	2	3	5	4	5	2	3	3	**3,33**
9	Transparency and accountability	3	3	2	1	3	4	2	1	2	**2,33**
10	Institutional policy-making based on a robust understanding of GE	1	1	1	1	2	4	1	1	1	**1,44**
11	Organisational culture	2	2	2	2	2	3	1	1	1	**1,78**
12	Organisational governance	2	2	2	1	1	3	1	1	1	**1,56**
	Totale	**26**	**26**	**27**	**22**	**35**	**46**	**22**	**20**	**25**	**27,67**

Come si evince dai dati sintetici di Tabella 1 emergono alcune risposte molto coerenti fra loro, mentre invece su alcuni fattori di cambiamento si registrano diversi punti di vista. Questo può essere dovuto al Dipartimento di provenienza, oppure al diverso ruolo svolto dalle persone che hanno partecipato all'indagine, che consente (o non consente) un punto di osservazione (Figura 1).

Fig. 1: Risultati della rilevazione per tipologia di rispondente



In generale si riscontrano valutazioni più positive tra le rispondenti nella fascia d'età 20-40 rispetto alle altre fasce d'età.

Sono presenti due risposte che hanno una visione più ottimistica della media (risposte E e F) mentre è presente una risposta con voti in generale più bassi rispetto alla media (risposta H).

L'ID 1 relativo alla presenza degli agenti di cambiamento riceve un punteggio più elevato, (media 3,33), insieme all'ID 8 relativo alla copertura delle diverse dimensioni. Il GEP dell'Università di Brescia è infatti in linea con le indicazioni CRUI che prevedono 5 aree orientate a comprendere tutto l'ambito universitario.

Appena sotto si colloca l'ID 2 (media 2,67) che rileva la Capacità degli agenti di cambiamento di condurre la struttura ad un cambiamento dell'istituzione, insieme agli ID 4 (Disponibilità di Risorse umane ed economiche) e ID 5 (Disponibilità e raccolta dati). Molto vicino anche in termini di significato si colloca l'ID 9 relativo alla Trasparenza e all'attività di rendicontazione (media 2,33). Troviamo a seguire l'ID relativo al Coinvolgimento della Leadership (media 2,11) che fa ben sperare rispetto ai risultati futuri del piano.

Se analizziamo gli ID che hanno ottenuto una media inferiore a 2 troviamo gli ID 6 e ID 7, rispettivamente Coinvolgimento di stakeholders interni e esterni ed esperti (media 1,89 per entrambi gli ID); ID 11 Cultura organizzativa (media 1,78); ID 12 Governance (media 1,56) e fanalino di coda ID 10 che fa riferimento alle Regole istituzionali basate su una solida comprensione del cambiamento culturale necessario, che vede una votazione quasi unanime a livello 1, con soltanto una valutazione con punteggio 4, emergente da una delle due votazioni ottimiste (media 1,44).

Riassumendo, i risultati hanno restituito un'autovalutazione molto equilibrata, che racconta:

- il grande lavoro svolto dopo il primo periodo di attività, poichè scegliere di divenire agenti di cambiamento non è scontato, implica la scelta di svolgere seriamente e con coerenza tale ruolo (ID 1 e ID 2);
- l'impostazione solida del GEP, che ricomprende e lavora su tutte e 5 le aree previste (ID 8);
- lo stanziamento di risorse reputate sufficienti (ID 4) e la presenza di una raccolta dati puntuale e della trasparenza nella rendicontazione (ID 5 e ID 9);
- i tempi necessari per un cambiamento organizzativo e della governance verso una cultura di parità di genere, e il fatto che tutta la struttura comprenda la necessità del cambiamento (ID 11 e 12) e lo viva nella quotidianità (ID 10);
- la presenza della leadership ingaggiata nel percorso (ID 3).

5. Conclusioni

Questo studio propone una valutazione delle azioni poste in essere nella realizzazione del GEP presso l'Università degli Studi di Brescia, mediante una tabella di 12 indici sintetici (i.e., Impact Driver), afferenti a diverse aree di realizzazione, declinati in ulteriori indicatori specifici (in totale 45 indicatori).

L'analisi delle risposte date dalle persone che compongono la Commissione Genere di ateneo ci consente di avere una fotografia, dopo 18 mesi dall'avvio del GEP, che esplora quali sono i fattori che consentono di generare o meno un impatto in un contesto organizzativo complesso come quello degli istituti di ricerca e di istruzione superiore, enfatizzando un approccio incentrato sulla persona e sulla qualità delle relazioni costruite con il gruppo di stakeholder.

L'università degli studi di Brescia si è dotata degli strumenti necessari (i.e., GEP; Commissione Genere, risorse umane ed economiche adeguate, con competenze tecniche specifiche; raccolta dati e Bilancio di genere. Ora occorre procedere costanti e far sì che l'organizzazione interiorizzi questi temi e li veicoli all'interno della quotidianità delle aree di intervento (i.e. area didattica; area della ricerca; gestione delle risorse umane; avanzamento di carriera, ruoli apicali). Ad oggi esistono tutte le premesse affinché ciò avvenga, ma non è possibile sapere in quanto tempo questo avverrà.

Gli sviluppi possibili di ricerca sono molteplici. Questa ricerca pionieristica può espandersi confrontando con lo stesso strumento altre università e incorporando vari metodi di ricerca. Inoltre, si ritiene esistano ad oggi alcuni ambiti che il GEP non indaga e di conseguenza che non sono monitorati e valutati in modo esaustivo da questi indicatori (Picardi et al., 2023). Esistono alcune tematiche di disparità di trattamento che possono sommarsi alla disparità di genere, in particolare si fa riferimento:

- all'identificazione della persona ad un genere o la scelta omosessuale invece che eterosessuale;
- all'etnia di una persona intesa sia come nazionalità sia come paese di provenienza.
- all'età avanzata di una persona

Per tali motivi si ritiene utile ampliare il campo di indagine relativo alla parità di genere anche a questi ambiti ad oggi non indagati.

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ALLEGATO 1

Gender Equality Impact Driver Model

IMPACT DRIVERS	Nr.	INDICATORS
CORE TEAM OF CHANGE AGENTS	1.1	A core team of change agents exists the size and composition of which are commensurate with the size and complexity of the organisation
	1.2	The core team of change agents comprises motivated people
	1.3	The core team of change agents has a formal mandate and ownership over the endeavour
	1.4	The core team of change agents has access to an extended group of change agents
CAPACITY/SKILLS OF THE CHANGE AGENTS FOR DRIVING INSTITUTIONAL CHANGE FOR GE	2.1	Proficiency in the use of participatory approaches and co-creation techniques
	2.2	Active understanding of strategic framing and of the political nature of change processes
	2.3	Capacity to deal with resistances
	2.4	Institutional learning about GEP implementation
	2.5	Ability to mobilise and engage stakeholders
LEADERSHIP ACTIVELY COMMITTED TO GE/GM	3.1	GE is a priority in the strategic documents of the organisation
	3.2	GE is present in the public discourse of leaders
	3.3	There is an explicit and visible commitment of leaders to GM
AVAILABILITY OF RESOURCES	4.1	Gender knowledge and internal expertise are available and used
	4.2	There are funds dedicated to GE
	4.3	There are capacity-building initiatives on GE issues
	4.4	Support materials (guidelines, toolkits, directory of resources etc.) are available
DATA COLLECTION AND STATISTICAL ANALYSIS	5.1	Institutional gender disaggregated data are collected
	5.2	Institutional gender disaggregated data and statistics are public and accessible
	5.3	Intersectional gender disaggregated statistics are collected and published
INVOLVEMENT OF INTERNAL STAKEHOLDERS	6.1	Leadership engagement with the core team of change agents and GE work
	6.2	Variety of internal stakeholder groups engaged (coverage)
	6.3	Numbers of people / size of groups that engage with GE efforts
	6.4	Degree of adherence to GE goals
	6.5	Internal stakeholders start initiatives themselves
INVOLVEMENT OF EXTERNAL STAKEHOLDERS AND EXPERTS	7.1	NGOs/CSOs are involved in the institutional gender equality work
	7.2	The gender dimension is addressed in events
	7.3	External partnerships with relevant institutions have been established for gender equality work
	7.4	External gender expertise (experts) is available and used
COVERAGE OF THE DIFFERENT DIMENSIONS / AREAS OF GE INSTITUTIONAL CHANGE	8.1	Comprehensiveness of the GEP/GM work in terms of areas addressed
	8.2	Comprehensiveness and sophistication of the work within addressed areas
TRANSPARENCY AND ACCOUNTABILITY	9.1	Some GM elements are mandatory (self-imposed)
	9.2	Incentives and/or sanctions are in place
	9.3	GE is included in unit reports and assessment for internal monitoring
	9.4	GE reporting is done and is publicly available
INSTITUTIONAL POLICY-MAKING BASED ON A ROBUST UNDERSTANDING OF GE	10.1	Structured understanding of gender issues: differences versus inequalities, mechanisms, structures & systems
	10.2	Based on data analysis, consistent policies are designed
	10.3	Contextualised GE and GM goals exist
ORGANISATIONAL CULTURE	11.1	GE is expressed as an organisational value, both formally and informally
	11.2	The existence of gender inequality is acknowledged
	11.3	Obstacles to GE/GM are addressed
ORGANISATIONAL GOVERNANCE	12.1	Gender analysis is considered in strategic planning
	12.2	Gender analysis is considered in internal monitoring
	12.3	Gender analysis is considered in internal audits and institutional assessments
	12.4	Gender-sensitive routines exist
	12.5	Gender-specific routines exist

The influence of «ethical disillusionment» on «corruption tolerance»: some insights from structural equation modeling

ERNESTO D'AVANZO[1] ELIO BORGONOVI[2]

Abstract

Frame of the research. *This research is situated within the broader discourse on the interplay between ethics and corruption, a topic of enduring importance and complexity. The study delves into the subtleties of how individual perceptions and societal norms intertwine to shape behaviors and attitudes towards corruption.*

Purpose of the paper. *The primary aim is to dissect the relationship between «ethical disillusionment» - the cynicism towards the integrity of ethical discourse - and «corruption tolerance» - the acceptance of corruption as a normative aspect of organizational life. The research intends to shed light on the predictive power of disillusionment in ethics for tolerating corrupt practices.*

Methodology. *the study employs Structural Equation Modeling (SEM) to analyze survey data from Italian managers, focusing on the constructs of «ethical disillusionment» and «corruption tolerance». SEM's robust analytical framework provides both the measurement model to validate the constructs and the structural model to explore the causal relationships between them.*

Results. *Findings from the SEM indicate a significant positive relationship: a one-unit increase in «ethical disillusionment» leads to a 0.59-point increase in «corruption tolerance». This model accounts for 34.9% of the variance in 'Corruption Tolerance' and is statistically significant with a p-value of 0.002.*

Research limitations. *The study is limited by its sample size and the specific socio-economic context of Italy, which may not be generalizable. The SEM model, while robust, is also contingent on the accuracy and representativeness of the observed variables.*

Managerial implications. *For practitioners, the results highlight the need for authentic ethical engagement within organizations. Addressing «ethical disillusionment» is crucial for reducing «corruption tolerance» and fostering a culture of integrity.*

Originality of the paper. *The paper's originality lies in its analytical approach to understanding the causal impact of ethical perceptions on corruption attitudes, particularly within the Italian context, providing valuable insights into the mechanisms by which ethical norms shape individual and collective behavior towards corruption.*

Key words: *Ethical disillusionment; corruption tolerance, structural equation modeling; organizational ethics; Italian socio-economic context; anti-corruption strategies.*

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1. Introduction

The relationship among «corruption», «ethics», and moral «dilemmas» is a complex and multifaceted one that touches upon the foundational *principles of morality*, the structure of *ethical reasoning*, and the practical challenges faced when ethical principles confront real-world situations.

At its core, «corruption» refers to the abuse of power for personal gain or the manipulation of «procedures» and «rules» to favour certain outcomes that deviate from the ideals of *fairness*, *justice*, and *integrity*. «Ethics», in contrast, is the systematic study of what is *right* and *wrong*, encompassing a broad spectrum of *theories* that guide individuals and societies in making decisions that reflect moral values. «Moral dilemmas» arise when there are conflicting ethical principles or values, creating situations, where choosing one *course of action* necessarily involves compromising or violating another ethical principle.

Ethical foundations of corruption - From an ethical perspective, corruption is inherently wrong as it violates the principles of *honesty*, *integrity*, and *fairness*. These principles are foundational to various *ethical theories*, including «deontological ethics», which emphasizes the importance of duty and rules, and «virtue ethics», which focuses on the importance of moral character and the virtues that constitute a good life. Corruption undermines *trust in institutions, erodes social cohesion*, and can lead to significant social, economic, and political harm.

Moral dilemmas in corruption - Moral dilemmas often emerge in contexts of corruption when individuals face choices that pit personal gain or the interests of a small group against the welfare of the larger community or the demands of justice and fairness. For example, a public official might struggle with the choice between accepting a bribe that would provide immediate financial benefits to their family and upholding their ethical duties to the public. Such *dilemmas* highlight the tension between different ethical principles, such as the conflict between utilitarian considerations of outcome and deontological considerations of duty and integrity.

Ethical reasoning and corruption - Addressing corruption ethically involves engaging in moral reasoning to navigate dilemmas and make choices that align with ethical principles. This requires a critical examination of the values at stake, the potential consequences of different actions, and the ethical duties owed to various stakeholders. Ethical reasoning in the face of corruption also involves a commitment to principles of transparency, accountability, and justice, seeking not only to avoid wrongdoing but to actively promote the common good.

Practical challenges - In practice, combatting corruption and resolving moral dilemmas related to it can be challenging due to factors like *systemic inequality*, *power dynamics*, *cultural norms* that may condone or overlook corrupt practices, and the complexity of global interactions that blur the lines between different ethical standards. Efforts to address corruption ethically must therefore be multifaceted, involving *legal frameworks*, *institutional reforms*, *education*, and the cultivation of *ethical leadership* and *civic virtue*.

To sum up, the relationship among *corruption, ethics*, and *moral dilemmas* is characterized by the «tension» between unethical practices and the principles that define ethical behaviour, the challenges of navigating conflicts between competing values, and the ongoing effort to apply ethical reasoning in pursuit of *justice, integrity*, and the *common good.*

As mentioned above**,** the perception of corruption is influenced by *individual* and *societal ethical standards*, *cultural norms*, and the *transparency* and *accountability of institutions*. Individuals' understanding and tolerance of corrupt practices are shaped by their *moral beliefs*, the *ethical climate* of their *environment*, and their *experiences with corruption*, either directly or through media and social networks. Conversely, heightened awareness and rejection of corruption can lead to stronger ethical commitments and behaviours, both at personal and institutional levels.

This study probes the *constructs* of *ethics* and *corruption*, not as monolithic entities, but as *multifaceted ones*, influenced by a spectrum of *observable variables* (i.e., indicators). Participants were surveyed to gauge the resonance between ethical principles and various related notions, employing a Likert scale to encapsulate the gradations of concurrence. This methodological choice

acknowledges the complexity of measuring *ethics* and *corruption*, steering clear of *reductionist* approaches that might otherwise oversimplify these latent variables.

In light of the complexities characterizing the interplay between *ethical conduct* and *corruption*, this work embarks on an «exploratory journey», using *structural equation modelling* (hereafter SEM), to uncover *latent patterns* within the Italian socio-economic landscape. The research is predicated on the imperative to cultivate a profound comprehension of ethical and corrupt behaviours, deemed crucial for guiding, *academic entities*, *public institutions*, and *policy framers* towards a reformed paradigm where ethics converge with *economic pragmatism*.

Since this work aims at exploring the intricate relationship between «ethical perceptions» and «attitudes towards corruption», in the context of Italy's challenging economic and political climate, the goal is to unveil if it does exist a significant *causal* relationship among the *constructs* of «ethical disillusionment» and «corruption tolerance». On the whole, the analysis aims at shedding light on the extent to which «disillusionment» with ethical discourse in business and societal contexts influences the normalization «of corrupt practices».

As well known, the SEM framework bifurcates into the *measurement model*, which attests to the *observable indicators*' reliability and validity, and the *structural model*, which delves into the causal dynamics. This bifurcation underscores a comprehensive assessment, ensuring the SEM's integrity through stringent adjustment requisites epitomized by specific indicators.

The subsequent narrative will outline the «operationalization» of these *constructs* and the resulting empirical insights, thus contributing a narrative to the academic discourse on the ethics-corruption nexus. But, before that, the work will focus on related work and a brief literature review, in order to offer a more adequate framework for the experimental framework that will be presented in the successive section.

2. Related work and literature review

The nexus of *ethics* and *corruption* has been extensively explored across various disciplines, revealing a multifaceted and complex interaction. This survey focuses on the intersection of «ethical disillusionment» and the «normalization of corruption», drawing from both seminal theories and contemporary empirical studies.

Ethical disillusionment, a *construct* reflecting *skepticism* towards the sincerity of the ethical discourse in business and public policy, has garnered significant attention. Works by scholars such as Treviño and Weaver (2003) have underscored the impact of organizational culture on ethical conduct. The authors provide a foundation for this construct, arguing that the ethical behaviour of individuals within organizations is significantly influenced by the prevailing organizational culture. Their work suggests that when ethical values are not deeply embedded in the organizational culture, a disconnect arises between espoused values and actual behavior, leading to disillusionment. This is complemented by the work of Ashforth and Anand (2003), who investigate how perceived ethical climates influence individual behaviour within firms, postulating that climates characterized by cynicism towards ethical guidelines can lead to normalized unethical practices. These studies collectively underscore the importance of genuine ethical leadership and culture in mitigating «ethical disillusionment».

Corruption tolerance or normalization, as represented in the literature, represents the societal acceptance of corrupt practices. Rose-Ackerman and Palifka (2016) provides a detailed analysis of the mechanisms that facilitate corruption, besides providing the institutional reforms necessary to counteract them. Their analysis provides a macro-level view of corruption, aligning with the indicators identified in the SEM model that relate to systemic issues within the socio-economic context. Transparency International's reports serve as a barometer for the prevalence of corruption globally and the effectiveness of policy measures. These reports bring to light the perception of

corruption, which echoes the empirical findings of our study and emphasizes the need for transparent and accountable systems to combat corruption normalization.

Policy implications and training programmes - The relationship between *ethics* and *corruption* has significant implications for *policy* and *training*. Works by Klitgaard (1988) suggest that a multi-pronged approach is necessary to effectively combat corruption, a stance that is echoed in the recommendations for organizational and public policy stemming from the current research. Klitgaard's work aligns with our study's emphasis on «ethical disillusionment» and its impact on «corruption tolerance», suggesting that anti-corruption strategies must consider underlying attitudinal causes. Training programs and policies that do not address the root causes of «ethical disillusionment» are likely to be ineffective. Therefore, our study's findings support the implementation of holistic and authentic ethical training that goes beyond compliance to foster a genuine ethical culture.

Contributions from Italian Context - Focusing on the Italian socio-economic landscape, the study acknowledges the work of La Palombara (1994), who examines the influence of culture on corruption in Italy. La Palombara's findings resonate with our study's emphasis on the cultural underpinnings of «corruption tolerance», suggesting that any efforts to address corruption must consider the cultural context. This perspective is particularly relevant for the SEM model's indicators related to cultural dimensions of corruption, reinforcing the argument that policy interventions must be culturally sensitive and tailored to the specific socio-economic environment.

3. Data and Method

As said above, this work seeks to dissect the intricate relationship between ethical perceptions, dubbed here as «ethical disillusionment» and attitudes towards corruption, referred to as «corruption tolerance», employing a SEM methodology, in order to elucidate the causal pathways connecting these constructs. The analysis is grounded on the data from a survey investigating the consistency between ethics and related concepts, aiming to discern the collective mindset of professionals influential in shaping public opinion in Italy.

Such a method probes the multidimensional nature of ethics and corruption, revealing a nuanced understanding of their interplay within the fabric of Italian society. This exploration is not merely academic; it is a quest for actionable insights that can steer us toward a paradigm where integrity and transparency are not aspirational but foundational to the economic and societal order.

3.1 Data

The *dataset* for this study was sourced from a comprehensive survey capturing a wide range of variables relevant to ethical perceptions and corruption attitudes within Italian organizations. After a data cleaning process to remove any incomplete or incorrect records, we obtained a valid sample size of 72 respondents. The dataset, and run among Italian managers, during the first two weeks of May 2018, is made of 157 observations, described by 72 variables. During the pre-processing step, 5 variables have been deleted because they were incomplete and with noise, so the final number of variables amounts to 67. The answers were given on a Likert scale from 1 to 7, in which 7 represents the highest degree of adhesion between «ethics» and related concepts. The survey included items addressing the role of ethics in economic debates, the authenticity of ethical discussions in firms, the competitive ramifications of ethical behavior, and the perceived prevalence and nature of corruption in Italy (Table 1).

Tab. 1: All observed variables

	Observed variables in dataset
Gender	Gender
Age	Age
V3	corporate / institutional role in public administration / other institutions
V4	5. Membership of the sector
V5	6. Type of organization
V7	Today ethics has become a really important topic in economic debate
V8	The ethics debate is mostly image and facade, often used in an instrumental way, and basically does not touch the actual behavior of firms / organizations
V9	The current competition system penalizes businesses that adopt ethical behavior
V10	The current system of competition benefits in the medium to long term businesses that adopt ethical behavior, although it may seem that in the short term result in disadvantages
V11	The ethical sense is stronger in the private sector than the public sector
V12	It ‘s more difficult to apply ethical principles in politics and in the governance of public administrations
V13	The ethical sense is stronger in the non-profit sector than the for-profit companies
V14	The adoption of ethical behavior was adversely affected by the recent crisis
V15	The sense of ethics is less strong in the finance sector than firms in the real economy
V16	The difficulty of assuming ethics behaviors depends on the lack of clear and transparent rules
V17	There are areas where you can not or does not make sense to apply ethics
V18	The spread of the ethical sense is highly dependent on the individual values of the people
V19	The spread of the ethical sense depends largely on the culture of the countries
V20	In all sectors the presence of clear rules promotes ethical behavior
V21	Ethical behavior spread to the organizations on the basis of their riders behavior of those who are at the top, of those who have positions of significant responsibility
V22	In the public sector on average it finds a higher sense of ethics than that found in the private sector
V23	The crisis has a positive impact on the adoption of ethical behavior
V24	In Italy the corruption / bribery phenomenon is a widespread practice to get advantages in relationships between companies (generally private entities) and public administration (procurement, supply, concessions, permits, etc.)
V25	In Italy the corruption / bribery phenomenon is a widespread practice in relations between private companies/individuals (supplies between businesses, extensions of credit by banks, etc.)
V26	In Italy, in recent years, much it has been said, but little has been done to combat the phenomenon of corruption / bribery
V27	The phenomenon of corruption / bribery is widespread abroad, although in some countries it is fought more effectively
V28	The corruption / bribery phenomenon is mainly linked to the culture of a country and is not of a strictly economic nature
V29	The Law 231/2001 and 190/2012 (on legal liability private / public) contributed substantially to combat the phenomenon of corruption / bribery
V30	Lobbying is not regulated and transparent favors phenomena of corruption
V31	The lobbying regulated and transparent can be positive because of complex problems, it brings to the attention of both those who decide public policies, and the interests of different stakeholders that can be balanced
V32	The lobbying would not in itself negative when adjusted and made transparent
V33	The lobbying and the phenomenon of corruption / bribery can be considered coincident and go hand in hand
V34	The Law 231/2001 and 190/2012 have contributed little or nothing to combat the phenomenon of corruption / bribery and have only caused the increase of formal obligations on the undertakings and private entities
V35	Finding formally correct methods to get bribes or implement other forms of corruption in order to avoid the risk of failure of businesses / organizations or lay off a significant number of employees (eg. More than 50%)
V36	Choose to retain earnings, contrary to the provision, to avoid the dismissal of some employees
V37	Do not punish / sanction the behavior of employees who have violated ethical norms not for their own interests but to bring more profit to the company
V38	Apply safeguard measures to the work / family
V39	Higher costs for environmental prevention and protection of the territory, even when it is not required by law
V40	Not to pay past debts (eg. Trade payables, payables to the tax authorities) decide to program the company out of business and then necessarily constituting another
V41	Seek new markets for abandoning recognized markets as ethically compromised even if the latter are high-profit
V42	Finding formally correct methods to get bribes or implement other forms of corruption at the international level when it is believed that this is the general practice
V43	Keep the secret for competitive reasons known effects of pollution which, however, have no direct bearing on the health of workers and residents, to safeguard the survival and the work of its employees
V44	Keep the secret for competitive reasons on known effects of pollution, however, knowing that there may be risks (not certainty) for the health of workers and / or residents, to safeguard the survival and the work of its employees
V45	Consciously accept legally allowed forms of tax evasion facing a tax burden that would put the company out of the competition market
V46	Close the business or transfer it abroad face a higher risk of being involved in the phenomena of bribery and corruption, leading to unemployment in their own territory
V47	Correctness
V48	Morality
V49	Justice
V50	Impartiality
V51	meritocracy
V53	Legality
V54	Other (specify)
V55	Correctness
V56	Morality
V57	Justice
V58	Impartiality
V59	meritocracy

V73	Optimize / maximize the data results certain constraints, such as those of the market, competition for business, laws and policies in public administration, the resources available from donations and contributions to non-profit institutions, etc.
V74	If none of the above definitions the full matches, to submit another definition of ethics in which he is identified
V75	supervisory boards
V76	Specifically, the D.L. 231/2011 and 190/2012 on corporate responsibility for public authorities
V77	Application of laws / guidelines / anti-corruption protocols
V78	ethical certification SA 8000
V79	social balance, social impact indicators and other CSR instruments
V80	Ethical code
V82	Social network
V83	Other (specify)
V84	The example of the behavior of the direct boss
V85	Organizational actions to spread the culture of ethics
V86	The actions and examples of company's Management and Top Management
V87	The spread of markedly ethical corporate culture
V88	The application of reward systems (even economic) in favor of ethical behavior

3.2 Method

3.2.1 Construct operationalization

The *construct* «ethical disillusionment» was operationalized using two observed variables (items) that reflect various facets of ethical considerations in the business and economic discourse (Table 2):

- The perception that ethics discussions are superficial and do not influence actual firm behavior.
- The view that the current competition system penalizes ethical behavior.

The *construct* «corruption tolerance» was operationalized using five observed variables, which tap into different dimensions of corruption perceptions:

- The prevalence of corruption to gain advantages in public-private interactions.
- The commonality of corrupt practices among private companies.
- The perceived ineffectiveness of recent efforts to combat corruption.
- The international variations in corruption and its countermeasures.
- The cultural versus economic roots of corruption.

Tab. 2: constructs and observed variables

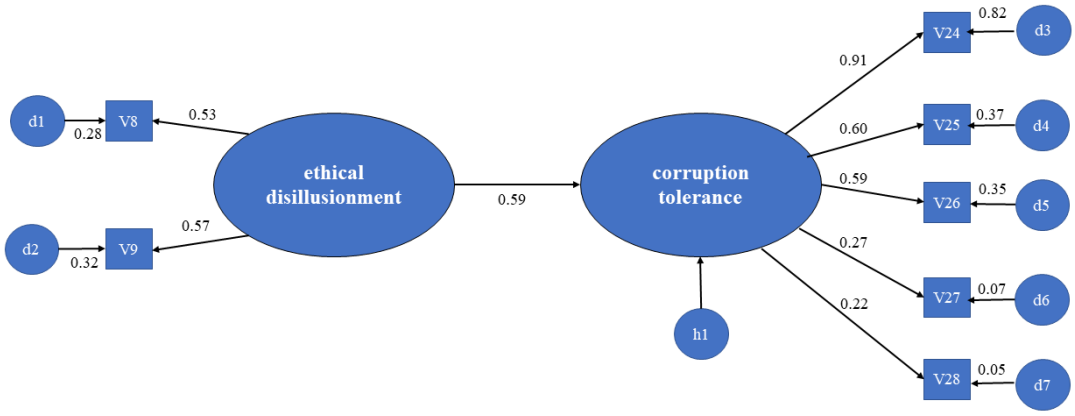
Item	**Construct: «ethical disillusionment»**
V8	The ethics debate is mostly image and facade, often used in an instrumental way, and basically does not touch the actual behavior of firms / organizations
V9	The current competition system penalizes businesses that adopt ethical behavior
Item	**Construct: «corruption tolerance»**
V24	In Italy the corruption / bribery phenomenon is a widespread practice to get advantages in relationships between companies (generally private entities) and public administration (procurement, supply, concessions, permits, etc.)
V25	In Italy the corruption / bribery phenomenon is a widespread practice in relations between private companies/individuals (supplies between businesses, extensions of credit by banks, etc.)
V26	In Italy, in recent years, much it has been said, but little has been done to combat the phenomenon of corruption / bribery
V27	The phenomenon of corruption / bribery is widespread abroad, although in some countries it is fought more effectively
V28	The corruption / bribery phenomenon is mainly linked to the culture of a country and is not of a strictly economic nature

Source: our elaboration

3.2.2 Structural Equation Modeling

The SEM was conducted following the proposed model (Figure 1), which illustrates the hypothesized relationship between the latent variables. Each observed variable was assigned to its respective *latent construct*, with factor loadings estimated to measure their contributions to the constructs.

Fig. 1: SEM Model



Source: our elaboration

A regression analysis within the SEM framework was performed to evaluate the relationship between the *constructs*. The analysis revealed that a one-point increase in «ethical disillusionment» corresponds to a 0.59-point increase in «corruption tolerance». The model's *R-squared* value of 0.349 indicates that «ethical disillusionment» explains approximately 34.9% of the variance in «corruption tolerance». The statistical *significance* of this relationship was confirmed with a *p-value* of 0.002, suggesting that the findings are robust at a 98% *confidence level*.

The global fit of the model was assessed using the *Comparative Fit Index* (CFI), which yielded a value of 0.96, indicating an excellent fit between the hypothesized model and the observed data. This suggests that the model is an appropriate representation of the underlying relationship between ethical perceptions and corruption attitudes among Italian professionals.

Tab. 3: Goodness of model fitting

Fit index	Score	Reference scores	
		Good	Acceptable
$\chi 2/df$	1.464	$0 \leq \chi 2/df \leq 2$	$2 \leq \chi 2/df \leq 3$
CFI (Comparative fit index)	0.961	$0.97 \leq NFI \leq 1.00$	$0.95 \leq NFI \leq 0.97$
TLI (The Tucker-Lewis coefficient)	0.916	As close as possible to 1	
RMSEA (Root mean square error of approximation)	0.055	$0 \leq RMSEA \leq 0.05$	$0.05 \leq RMSEA \leq 0.10$

Source: our elaboration

3.3 Interpretation of results and discussion

3.3.1 How «ethical disillusionment» contributes to «corruption tolerance»

SEM analysis offers a robust insight into how the first *construct* contributes to the second one. The positive relationship between them, as indicated by the SEM results, suggests that individuals who are disenchanted with the state of ethics in business and public life are more likely to tolerate, if not accept, corruption.

The observed variables for «ethical disillusionment» - such as the belief that ethics is simply a façade and that ethical behaviour is penalized in competitive business environments - paint a picture of a professional culture that is skeptical of genuine ethical commitments. This skepticism is not without consequence; it appears to erode the moral high ground needed to combat corruption. As ethical standards are perceived to be more about appearance than substance, the rationale for engaging

in or rejecting corrupt practices becomes less about moral choice and more about practical necessity or resignation to the status quo.

The significant positive *regression coefficient* (0.59) suggests that for each incremental increase in «ethical disillusionment», there is a substantial increase in «corruption tolerance». This relationship is statistically significant, with a p-value of 0.002, providing a high degree of confidence in the model's predictive power. The R-squared value indicates that Ethical Disillusionment alone accounts for 34.9% of the variability in «corruption tolerance». This substantial proportion underscores the influence of ethical perceptions on attitudes towards corruption.

«Corruption tolerance», as measured by attitudes towards the widespread nature of corruption, perceived ineffectiveness of anti-corruption measures, and cultural acceptance of corrupt practices, indicates a normalization of corruption within the societal and organizational fabric. This normalization can be a significant barrier to reform efforts, as it suggests a deeply ingrained expectation that corruption is an inevitable aspect of doing business or engaging with public institutions in Italy.

The excellent *model fit*, as shown by the CFI value of 0.96, reinforces the validity of the constructs and the hypothesized relationships. The findings tell us that to address «corruption tolerance» effectively, there must be a fundamental shift in how ethical behaviour is valued and manifested within organizations. Enhancing ethical standards, ensuring that ethical discourse translates into concrete actions, and rewarding ethical behaviour in competitive environments could serve to reduce «ethical disillusionment» and, consequently, «corruption tolerance».

In summary, the SEM analysis reveals that «ethical disillusionment» is a significant predictor of «corruption tolerance», suggesting that efforts to cultivate a more ethically engaged and less cynical professional culture may be an effective strategy for reducing the tolerance of corrupt behaviour. This shift may not only impact individual organizations but could also contribute to a broader cultural change toward greater integrity and less tolerance for corruption in Italy.

3.3.2 Theoretical Implications

For theory - The robust relationship between Ethical Disillusionment and Corruption Tolerance highlighted by the SEM model has theoretical implications for the study of business ethics and corruption. It challenges and refines existing theories that often treat ethics and corruption as distinct constructs, suggesting instead that they are closely interrelated. The model supports the theory that the perceived authenticity of ethical discourse has a tangible impact on the normalization of corruption. This aligns with and extends the theory of ethical climate, which posits that the organizational environment significantly influences individual moral behaviour.

For organizational behaviour - The model's findings contribute to *organizational behaviour* theory by illustrating how employees' perceptions of their company's ethical discourse can influence their acceptance of corrupt practices. This suggests that organizational behaviour is not merely a reflection of individual ethical orientations but is also shaped by collective perceptions and attitudes. It challenges organizations to consider how their internal and external communications about ethics might affect employee behaviour and to explore new strategies for fostering a culture of genuine ethical engagement.

3.3.3 Practical Implications

For organizational practices - Practically, the results indicate that organizations need to reassess how they approach ethics and compliance. It is insufficient to have a set of ethical guidelines or codes of conduct if these are not perceived as sincere or impactful by employees. Organizations may need to revamp their ethics training, ensuring it is deeply embedded in all levels of decision-making and is demonstrated through the behaviour of leadership. The findings suggest that organizations should focus on creating an environment where ethical behaviour is visibly rewarded and where ethical discussions lead to actionable outcomes.

For public policy - On a policy level, the evidence that «ethical disillusionment» contributes to is a significant predictor of «corruption tolerance» has implications for how anti-corruption policies are crafted and implemented. Policymakers should recognize that combating corruption extends beyond legal and regulatory frameworks to include the promotion of ethical norms and values within society. This might involve educational programs that emphasize ethical decision-making, public campaigns to raise awareness about the importance of ethics in business, and creating more transparent systems for reporting and addressing corruption.

In summary, by addressing «ethical disillusionment», organizations and policymakers can make significant strides in reducing «corruption tolerance», fostering a culture where integrity and transparency are not just aspirational goals but lived realities.

3.3.4 The exogenous nature of «ethical disillusionment» *and its impact on* «corruption tolerance» *as an endogenous variable*

In the SEM analysis, «ethical disillusionment» is treated as an *exogenous variable* while «corruption tolerance» is considered *endogenous*. This distinction is pivotal for understanding the directional influence and implications of these attitudes within an organizational setting.

Exogenous nature of «ethical disillusionment» - «Ethical disillusionment» as an *exogenous* variable implies that it is presumed to be influenced by factors outside the model and acts as a *predictor* or *independent variable* within the model structure. This *construct* represents a set of *attitudes* that are formed prior to and independent of the attitudes towards corruption. These attitudes could be shaped by broader *societal norms*, *previous experiences*, *individual moral development*, and the *perceived discrepancy* between *ethical discourse* and actual behaviour observed in businesses and institutions.

Impact on «corruption tolerance» as an endogenous variable - «Corruption tolerance», on the other hand, is an *endogenous variable*, one that is influenced within the model by «ethical disillusionment». It is a dependent variable, suggesting that it is an *outcome* of the *attitudes* captured by the exogenous construct of «ethical disillusionment». As such, «corruption tolerance» can be viewed as a *reaction* to or a *consequence* of the level of «ethical disillusionment» present within the organizational or societal context.

The significant positive relationship between these two *constructs* indicates that increases in «ethical disillusionment» are likely to result in increased «corruption tolerance». This relationship implies that when individuals are disillusioned by the ethical practices around them, they may be more prone to tolerate, if not engage in, corrupt behaviour as a rational response to a system perceived as inherently flawed or hypocritical.

This has profound implications for organizational culture and the efficacy of anti-corruption initiatives. If employees or members of an institution are disillusioned ethically, they may be less responsive to traditional anti-corruption measures, which often rely on reinforcing ethical standards and promoting integrity. It suggests that for such measures to be effective, they must first address the underlying attitudes of disillusionment and work to rebuild trust in the sincerity and effectiveness of ethical commitments.

The treatment of «ethical disillusionment» as exogenous suggests that it is a fundamental attitude that can significantly shape an individual's worldview and subsequent behaviours. It is indicative of a deep-seated skepticism that may lead individuals to question the sincerity of ethical practices and the effectiveness of ethical guidelines in the real world. This disillusionment can stem from witnessing the lack of congruence between what organizations profess ethically and what they practice, leading to a diminished trust in the system's ethical standards.

4. Conclusion

The framework introduced in this work provides a possible approach to understand the complex dynamics between ethics and corruption within organizational contexts. The SEM analysis, supported by a dataset and a theoretically informed model, offers valuable insights into the factors contributing to corruption attitudes, paving the way for targeted interventions and policies to foster ethical behavior.

As said above, the model introduced employs a SEM analysis to explore the nuanced relationships between two *latent constructs*: «ethical disillusionment» and «corruption tolerance». This SEM model is rooted in the narrative that individuals' beliefs about the authenticity and impact of ethical discourse and their perceptions of the prevalence and nature of corruption are deeply interconnected.

«Ethical disillusionment» is operationalized through a series of observed variables that collectively gauge the respondents' sentiments regarding the ethical discourse within economic and business contexts. These variables measure perceptions such as whether «ethics is merely a topic of debate with little impact on actual behavior», «whether the competitive environment penalizes ethical behavior», and «whether ethical conduct is seen as beneficial in the long term». This construct reflects a sense of skepticism or disenchantment with the current state of ethics in business, suggesting that what is often discussed as «ethical» may not translate into practice, thereby influencing behaviors and attitudes towards corruption.

«Corruption tolerance», on the other hand, encapsulates the *attitudes* towards the acceptance and normalization of corrupt practices. It is reflected in the perceived widespread nature of corruption in public-private interactions, its prevalence within private sector dealings, the perceived futility of anti-corruption efforts, and the cultural underpinnings of corrupt behavior. This construct indicates a level of resignation or acceptance of corruption as a part of organizational and societal operations, potentially stemming from or contributing to the disillusionment with ethics.

The SEM model is designed to capture the directional influence of «ethical disillusionment» on «corruption tolerance». It posits that a higher degree of disillusionment with ethics within professional and organizational domains may lead to a greater tolerance or normalization of corrupt practices. This is quantitatively expressed in the model where a unit increase in «ethical disillusionment» predicts a 0.59 unit increase in «corruption tolerance», with the model explaining 34.9% of the variance in «corruption tolerance».

The model's fit was assessed using the Comparative Fit Index (CFI), and a value of 0.96 suggests an excellent fit, reinforcing the strength and relevance of the hypothesized relationship. This high level of fit implies that the proposed theoretical framework - where attitudes towards ethics significantly inform perceptions of corruption - is well-supported by the observed data.

This narrative weaves together the statistical findings with the theoretical underpinnings, presenting a story that goes beyond numbers. It reveals a deeper societal and organizational issue: the gap between ethical discourse and action, and how this gap fosters an environment where corruption is not only expected but also accepted. The implications of this model are profound, as they suggest that to reduce corruption, there must be a concerted effort to bridge this gap, to move from disillusionment to genuine ethical engagement within all levels of business and governance.

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Enhancing Insolvency Prediction Accuracy: a Random Forest-based Algorithmic Approach

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Abstract

Frame of the research. *Insolvency prediction stands as a pivotal concern for managers, investors, and regulatory bodies alike, given its implications for the sustainability and stability of firms. The capability to furnish precise forecasts not only facilitates proactive decision-making but also safeguards the interests of stakeholders. This study undertakes an exploration into the transformative potential of the Random Forest algorithm in reshaping the landscape of insolvency prediction, offering a scholarly contribution that transcends the boundaries of conventional methodologies.*

Purpose of the paper. *The aim of this paper is to conduct an in-depth investigation into the efficacy of employing Random Forest algorithm to enhance the accuracy of insolvency prediction models, with a specific focus on Italian firms. This work aspires to not only mitigate the shortcomings prevalent in traditional methods but also to illuminate the path towards developing more resilient predictive frameworks, thereby equipping stakeholders with invaluable and sustainable tools to navigate the complications of contemporary economical landscapes.*

Methodology. *We adopt a quantitative research methodology, employing Random Forest algorithm to develop our predictive model, and leveraging the ensemble of decision trees to capture complex interactions among variables. We utilize historical financial data from a sample of Italian companies. The dataset includes a comprehensive range of financial indicators, such as liquidity ratios, profitability metrics, and leverage ratios, and non-financial indicators.*

Research limitations. *The main limitation of this study is the reliance on historical financial data, which may not fully capture dynamic market conditions and macroeconomic factors. Additionally, the predictive accuracy of Random Forest algorithm may be influenced by the quality and completeness of the dataset. Another limitation pertains to the veracity of financial data. It is essential to acknowledge that in some instances, accounting practices aimed at masking financial distress may be employed.*

Managerial implications. *The implications of our findings are profound for managers tasked with safeguarding organizational solvency and shareholder value. By embracing Random Forest-based predictive analytics, managers can proactively identify and address financial vulnerabilities, minimizing the risk of insolvency and maximizing long-term stability. Enhanced predictive accuracy also empowers managers to allocate resources more efficiently.*

Originality of the paper. *While previous research has explored various machine learning techniques for predictive analytics, scant attention has been directed specifically towards leveraging and improving Random Forest to assess the insolvency risk inherent within Italian firms. Our study lays the groundwork for the integration of innovative and AI-based insolvency prediction methodologies in Italy. Furthermore, results provide valuable information for strategic decision-making, advancing the understanding and implementation of predictive analytics within this domain.*

Keywords: *insolvency prediction; algorithm; random forest; machine learning; bankruptcy; strategic management.*

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1. Introduction

1.1 Trends and innovations in insolvency prediction

Insolvency prediction stands as a central concern for stakeholders across managerial, investment, and regulatory spheres, given its profound implications for enterprise sustainability and market stability (Rujoub *et al.*, 1995; Altman, 1968; Beaver, 1966). The ability to furnish precise predictions not only empowers proactive decision-making but also equips businesses with the strategic foresight necessary to navigate the complexities of contemporary financial landscapes, while safeguarding stakeholder interests (Gujarati & Porter, 2009; Keasey *et al.*, 1997). Furthermore, the significance of insolvency prediction cannot be overstated in the realm of today's management (Min & Lee, 2005). Businesses operate within dynamic and uncertain environments, where the ability to anticipate and effectively respond to financial distress can mean the difference between survival and demise (Pinches & Trieschmann, 1977; Altman, 1968). Accurate predictions enable stakeholders to take preemptive measures to mitigate risks, preserve value, and ensure the continuity of operations (Beaver, 1966). Moreover, in an interconnected global economy, the ramifications of corporate insolvency extend far beyond individual firms, impacting suppliers, customers, employees, and the broader financial ecosystem (Gujarati & Porter, 2009; Min & Lee, 2005).

Despite the acknowledged importance of insolvency prediction, traditional methods have exhibited limitations in their effectiveness (lo Conte *et al.*, 2023; Gujarati & Porter, 2009; Jones *et al.*, 2009). Conventional statistical techniques, such as regression analysis and discriminant analysis, often struggle to capture the nonlinear and complex relationships that characterize modern financial data (lo Conte & Sancetta, 2022; Keasey *et al.*, 1997; Pinches & Trieschmann, 1977). Furthermore, these methods may rely on assumptions that are not always valid in real-world scenarios, leading to suboptimal predictive performance (lo Conte & Sancetta, 2023; Jones *et al.*, 1987). In recent years, the proliferation of machine learning algorithms has provided a promising avenue for improving the accuracy and robustness of insolvency prediction models. Machine learning techniques, with their ability to analyze vast amounts of data and uncover intricate patterns, offer a compelling alternative to traditional methodologies (Altman & Sabato, 2007; Min & Lee, 2005). Among these techniques, Random Forest algorithm has emerged as particularly promising for insolvency prediction due to his versatility, scalability, and ability to handle high-dimensional data (Smith & Johnson, 2023; Chen & Wang, 2022; Breiman, 2001). In particular, Random Forest is an ensemble learning method that construct multiple decision trees and combine their outputs to make predictions[4]. By aggregating the predictions of individual trees, this algorithm can reduce overfitting, enhance generalization, and capture complex interactions among variables (Jones & Li, 2024; Breiman, 2001). This ensemble approach not only improves predictive accuracy but also provides insights into the relative importance of different features in the prediction process (Smith & Wu, 2023; Liaw & Wiener, 2002).

1.2 Unlocking insights: harnessing the power of machine learning

The utilization of machine learning methodologies for insolvency prediction has garnered substantial attention within academic literature (Hsieh *et al.*, 2018). In fact, machine learning holds significant importance for strategic management in distressed firms due to its ability to analyze vast amounts of data and extract valuable insights (Smith & Johnson, 2023; Smith *et al.*, 2021; Zieba *et al.*, 2016). However, despite the promising potential demonstrated in academic research, the real-world application of these techniques in the context of insolvency prediction remains limited. Many firms, especially smaller ones, may lack the resources or expertise to implement sophisticated machine learning models effectively (Hosaka, 2018). Also, regulatory constraints, data availability issues, and the need for interpretability in decision-making processes pose practical challenges to the

[4] Ensemble learning techniques consist of a collection of classifiers, such as decision trees, whose predictions are combined to determine the most prevalent outcome. Bagging, alternatively termed bootstrap aggregation, and boosting are among the most renowned ensemble methods.

widespread adoption of machine learning for insolvency prediction in practice (Alaka, 2017; Goodfellow *et al.*, 2016; Zhang *et al.*, 1999).

There exists a notable gap pertaining to its application specifically within the Italian business context (Ferrari & Ricci, 2022). While there is a growing body of research on this topic globally, studies specifically focusing on Italy are relatively scarce or not so well structured (Rossi & Bianchi, 2023; Ferrari & Ricci, 2022; Mensah, 1984). Given the unique economic and regulatory landscape in Italy, including factors such as regional disparities, varying industry compositions, and distinct legal frameworks, there is a need for research tailored to this context. Understanding how machine learning models perform in predicting insolvency within the Italian business environment could provide, in fact, valuable insights for financial institutions, policymakers, and businesses operating in the country. On the other side, researchers can contribute to the development of more accurate and contextually relevant predictive models, thereby enhancing predictive management practices and decision-making processes, and giving insights that could potentially inform regulatory policies aimed at mitigating the impact of corporate insolvency on the broader economy (Friedman, 2001).

In particular, while prior research has explored diverse statistical techniques for predictive analytics, scant attention has been devoted to the utilization of Random Forest for assessing insolvency risk within Italian firms (Rossi & Bianchi, 2023; Zavgren, 1983). This void presents an opportunity for scholarly inquiry to advance the domain of predictive analytics in Italy and furnish insights crucial for informed decision-making in management. Therefore, this study seeks to address this gap by conducting a comprehensive examination into the efficacy of employing the Random Forest algorithm to enhance the accuracy of insolvency prediction models tailored to Italian firms. By harnessing its inherent flexibility and ensemble learning capabilities, we aim to transcend the limitations inherent in conventional approaches and construct more robust predictive frameworks (Sarangi *et al.*, 2013; Breiman, 2001).

In summary, the paper demonstrates that, within a sample of failed and non-failed Italian companies, the Random Forest-based predictive model exhibits good accuracy. However, it also underscores certain limitations that warrant consideration. These limitations include challenges related to data availability and quality, potential biases in the dataset, the complexity of interpreting results from machine learning algorithms, and the need for continuous model refinement to adapt to evolving business dynamics. Additionally, limitations may arise from the inherent assumptions and constraints of the Random Forest algorithm itself, such as its susceptibility to overfitting or its reliance on predefined features.

Finally, this work is structured as follows: the ensuing paragraph delves into the theoretical underpinnings that contextualize the research endeavor. It elucidates the foundational concepts, principles, and frameworks that form the basis for understanding the application of the Random Forest algorithm in predicting corporate insolvencies. Through a comprehensive review of the theoretical landscape, the paragraph establishes a conceptual framework that underpins the subsequent empirical investigation, providing a robust foundation for interpreting the research findings within the Italian context. Subsequently, the research question is explicitly stated, and the methodology, based on Random Forest algorithm, is outlined. Following this, the empirical analysis, results, and discussion are presented. Finally, managerial and theoretical implications, limitations, and a paragraph concerning future research trajectories are provided.

2. Theorethical background

2.1 Foundational approaches to corporate insolvency prediction

The issues of corporate insolvency and bankruptcy have monopolized scientific literature for years (Beaver, 1966; Altman, 1968, 1983, 2002; Altman *et al.*, 1995; Alberici, 1975; Taffler, 1976, 1982; Wilcox, 1976; Argenti, 1976; Lawrence & Bear, 1986; Flagg *et al.*, 1991; Kern & Rudolf, 2001), and

in Italy, some authors investigated the causes of crises (Argenti, 1976; Coda, 1977, 1990; Guatri, 1986; Confalonieri, 1993; Sciarelli, 1996; Piciocchi, 2003; lo Conte & Sancetta, 2022), while others analyzed and outlined specific tools capable of managing the crises themselves (Ohlson, 1980; Guatri, 1986; Caprio, 1997; Danovi *et al.*, 2000; Falini, 2008). However, the most famous and disruptive study was certainly that of Altman: the first formulation of his Z- Score was intended for US publicly traded manufacturing firms (Altman, 1968). Subsequently, the model was updated and adapted to the situation of not listed companies (Scott, 1981; Altman, 1993; Danovi & Quagli, 2012).

But the foundation of methodological approaches to insolvency prediction can be traced back to 1932, with Paul Joseph FitzPatrick's (1932) seminal work, representing one of the earliest scholarly endeavors in this area: the study examined financial ratios as potential predictors of failure within a dataset of 19 company pairs. However, Beaver (1966) was the first one to introduce a statistical approach to the field, analyzing a dataset of 13 balance sheet ratios from 38 companies (19 failed, 19 ongoing). Beaver's analysis also involved comparing the average values of 30 financial ratios across 38 economic sectors, encompassing 79 failed and 79 non-failed companies. As said before, the transition towards multivariate research gained momentum with Altman's seminal work in 1968. Altman's introduction of the discriminant function represented a notable advancement in insolvency prediction methodology (Altman, 1968)[5]. However, the author later emphasized the necessity of updating the discriminant function's formulation, particularly in redefining coefficients to suit industry-specific contexts and company sizes.

This landscape evolved significantly over subsequent decades, with a notable increase to 28 papers in the 1970s, 53 studies in the 1980s, and 70 publications before the close of the 1990s (Shi & Li, 2019; Sun *et al.*, 2014). The early 2000s witnessed a further 11 studies, collectively indicating a growing interest and research output in the domain of insolvency prediction (Shi & Li, 2019).

2.2 Breakthroughs in predictive analytics for corporate financial distress

In contemporary times, a novel methodological paradigm has emerged, characterized by an orientation towards the analysis of extensive datasets, commonly referred to as "*big data*" (Shi & Li, 2019). This approach stems from the confluence of several factors, including the widespread availability of substantial volumes of data, enhanced computational capabilities facilitating large-scale processing, and the application of innovative analytical techniques. Today, the utilization of neural networks stands as a prominent technique in predictive modeling, alongside other machine learning methodologies such as Support Vector Machines, Random Forest, and Gradient Boosting (Sun *et al.*, 2014). While the conceptual framework of Artificial Neural Networks (ANNs) can be traced back to the 1950s, it is only in recent years that they have demonstrated significant analytical prowess, owing to advancements in computational capacity and the evolution of specialized software (Zhang *et al.*, 1999; Breiman *et al.*, 1984). In Italy, pioneering endeavors in the construction of predictive models for corporate default prediction using neural networks emerged in 2007 (Sarangi *et al.*, 2013; Angelini *et al.*, 2007). This marked a notable milestone in the application of machine learning techniques within the Italian context, signifying the intersection of technological advancements with predictive analytics in the domain of corporate insolvency prediction.

Jackson and Wood (2013) authored a study of of particular interest since a comparison was made between traditional statistical models and neural networks. On the other side, Zhang *et al.* (2013) conducted a study on a sample of 1000 companies, with half of them experiencing insolvency. Employing a combination of Genetic Algorithm (GA) and the Ant Colony Algorithm (ACA), they selected 25 financial ratios for each company (Muller *et al.*, 2009). The research aimed to assess different configurations, revealing classification errors ranging from 8.9% with GA to 7.9% with GACA during fitting on validation data. Le & Viviani (2018) underscored the superior performance of Machine Learning (ML) tools compared to traditional statistical methodologies. Their analysis focused on a sample comprising 3000 US banks, of which 1438 were in a state of insolvency and

[5] Throughout the 1970s, Multiple Discriminant Analysis (MDA) dominated the literature, serving as a prominent methodology in insolvency prediction techniques.

1562 were operational. The study contrasted the outcomes derived from two conventional statistical techniques, namely Discriminant Analysis and Logistic Regression, against those of three machine learning approaches, specifically Artificial Neural Network, Support Vector Machines, and K-Nearest Neighbours. This comprehensive investigation aimed to evaluate the predictive capabilities of these methodologies within the banking domain, offering insights into the efficacy and applicability of modern ML techniques relative to established statistical methods.

2.3 The Italian context

In recent years, the application of machine learning (ML) techniques for predicting insolvency has garnered increasing attention within the academic and business communities in Italy (Ferrari & Ricci, 2022; Angelini *et al.*, 2007). Researchers have sought to leverage the power of machine learning algorithms to enhance the accuracy and effectiveness of insolvency prediction models tailored to the Italian context (Barile *et al.*, 2021; Rossi *et al.*, 2020).

For instance, studies such as those conducted by Rossi *et al.* (2020) and Biancone *et al.* (2019) have explored the feasibility and performance of machine learning-based approaches in predicting corporate insolvencies among different types of Italian firms. These investigations typically involve the analysis of extensive datasets comprising financial and non-financial indicators, with machine learning algorithms such as Support Vector Machines, and Artificial Neural Networks being among the methodologies employed (Barile *et al.*, 2021; Le & Viviani, 2018).

Moreover, the pioneering work of Galli *et al.* (2018) introduced a novel ensemble learning framework for insolvency prediction in Italy, demonstrating promising results in terms of predictive accuracy and robustness. By integrating multiple machine learning models and leveraging ensemble techniques, their approach showcased improved predictive capabilities compared to traditional statistical methods. Overall, these studies underscore the potential of machine learning-based approaches in enhancing insolvency prediction models specific to the Italian business landscape, but limitations are still present. Firstly, the quality and availability of data may pose challenges (Ferrari & Ricci, 2022). Incomplete or inaccurate data can adversely impact the performance of machine learning models, leading to suboptimal predictions. Moreover, accessing relevant data sources, especially for non-financial indicators, may be limited, thereby constraining the comprehensiveness of insolvency prediction models. Secondly, the interpretability of machine learning models is often cited as a limitation. While machine learning algorithms like Artificial Neural Networks and Random Forest can offer high predictive accuracy, their inner workings are often opaque, making it difficult to understand the factors driving specific predictions. This lack of transparency may hinder the acceptance and trustworthiness of machine learning-based insolvency prediction models, particularly in regulatory or compliance-sensitive contexts. Ethical considerations also play a crucial role in the development and deployment of machine learning-based insolvency prediction models (lo Conte & Sancetta, 2022; Barile *et al.*, 2021). Biases inherent in training data or model design can result in discriminatory outcomes, disproportionately affecting certain groups or individuals. However, there remains a noticeable paucity of research specifically focusing on the application of Random Forest algorithm in Italy, on a national scale.

3. Purpose of the paper

The primary objective of this paper is to conduct an extensive examination of the efficacy of utilizing the Random Forest algorithm to enhance the accuracy of insolvency prediction models, with a specific emphasis on the context of Italian companies. By leveraging the intrinsic flexibility and ensemble learning capabilities inherent in this machine learning technique, our investigation aims to transcend the limitations inherent in conventional methods (Alaka, 2017). Furthermore, this study aspires not only to address the shortcomings prevalent in traditional approaches but also to elucidate

a trajectory towards the development of more robust predictive frameworks. This endeavor involves scrutinizing ROC curves and iteratively refining the model to achieve more precise results.

In the Italian context, previous studies have underscored both the potential and limitations of employing machine learning methodologies for insolvency prediction. For example, Rossi *et al.* (2020) has demonstrated the feasibility of machine learning techniques in financial distress prediction. However, such studies also highlight challenges such as data availability, quality, and interpretability, which can impact the effectiveness of predictive models (Rossi *et al.*, 2020).

Machine learning algorithms like Random Forest present, in fact, important limitations. For instance, the "*black-box*" nature of these algorithms may hinder interpretability, making it challenging to discern the factors driving specific predictions (Biancone *et al.*, 2019; Ching-Chiang *et al.*, 2014). Additionally, issues related to model overfitting, bias, and the need for continuous model refinement pose significant challenges in the development and deployment of machine learning-based predictive frameworks (Le & Viviani, 2018).

Therefore, this paper seeks to build upon existing research by delving deeper into the application of Random Forest algorithm in insolvency prediction on a sample of 1.978 Italian firms. By critically examining both the potential and limitations of this approach, we aim to provide valuable insights that can inform the development of more effective and reliable predictive models tailored to the complexities of the Italian business landscape.

Therefore, the overarching research question guiding this investigation is:

- "*How does the implementation of the Random Forest algorithm improve the accuracy of insolvency prediction for Italian firms and how can we refine the model to improve its precision?*".

In addition to addressing these pertinent research inquiries, our paper offers valuable insights for future academic investigations in the domain of insolvency prediction. Through a thorough examination of both the potentials and limitations of the Random Forest algorithm within the specific context of Italy, our objective is to pinpoint areas warranting further exploration and refinement. Furthermore, our findings are poised to enrich the ongoing scholarly discourse surrounding the development and application of machine learning methodologies. By laying the groundwork for subsequent studies to build upon our research, we aim to contribute to the advancement of insolvency prediction modeling.

Moreover, our study also sheds light on governance issues inherent in implementing predictive models for insolvency prediction. That said, we aim to identify potential governance challenges and propose strategies for addressing them effectively.

4. Methodology

4.1 The Random Forest algorithm

In this section, we expound upon a fundamental illustration elucidating the core principles of the Random Forest algorithm. Utilizing Random Forest as the methodological backbone of our paper, we aim to provide a comprehensive overview of its operational intricacies and inherent strengths, highlighting its robustness and versatility in addressing the complexities of insolvency prediction within the Italian context.

Preceding the development of Random Forest, several works explored the concept of randomization in constructing forest-like structures, including seminal contributions by Dietterich (2000), Breiman (2000), Ho (1998), and Amit & Geman (1997). Since its inception, the Random Forest algorithm has found successful application across diverse domains. Noteworthy examples include its utilization in predicting customer retention and profitability (Larivi`ere & Van den Poel, 2005), forecasting criminal behavior within populations of probationers and parolees (Berk *et al.*,

2009), predicting protein-protein interactions (Qi *et al.*, 2005), and classifying microarray data (D´ıaz-Uriarte & Alvarez de Andr´es, 2006). In the context of insolvency prediction, Random Forest have demonstrated remarkable utility and efficacy in the international context (Galli *et al.*, 2018).

To better understand our study, a brief examination of the main characteristics of the algorithm is necessary. The Random Forest is a powerful supervised algorithm belonging to the category of bagging methods, widely utilized for classification and regression tasks. It is an ensemble learning technique that combines the results of multiple decision trees (hence the term "*forest*" in its name) to enhance the accuracy and stability of predictions[6]. Random Forest is employed in a broad range of applications, including image classification, text analysis, stock price prediction, medical diagnosis, and operates by constructing a multitude of decision trees during the training phase (Berk, 2006). Each tree is trained on a random subset of the training data and makes independent predictions. The final prediction is then determined by aggregating the predictions of all individual trees, typically through averaging or voting (Dietterich, 2000). This ensemble approach mitigates overfitting and variance issues commonly encountered in single decision tree models, resulting in more robust and reliable predictions[7]. In the context of insolvency prediction for Italian firms, Random Forest can be particularly advantageous. By analyzing a diverse set of financial variables, it can effectively identify the most influential factors contributing to the likelihood of insolvency. Furthermore, its ability to handle large datasets and nonlinear relationships makes it well-suited for capturing complex patterns inherent in financial data.

The Random Forest algorithm, depicted in *Figure 1*, operates through the following steps:

1. *Bootstrap Sampling:* a random sample with replacement (bootstrap) is selected from the training dataset to create several subsets (known as training sets for trees). This entails the selection of some data multiple times, while others may not be included at all. In this manner, various training subsets for trees are created (Qi *et al.*, 2005; Breiman, 2001);

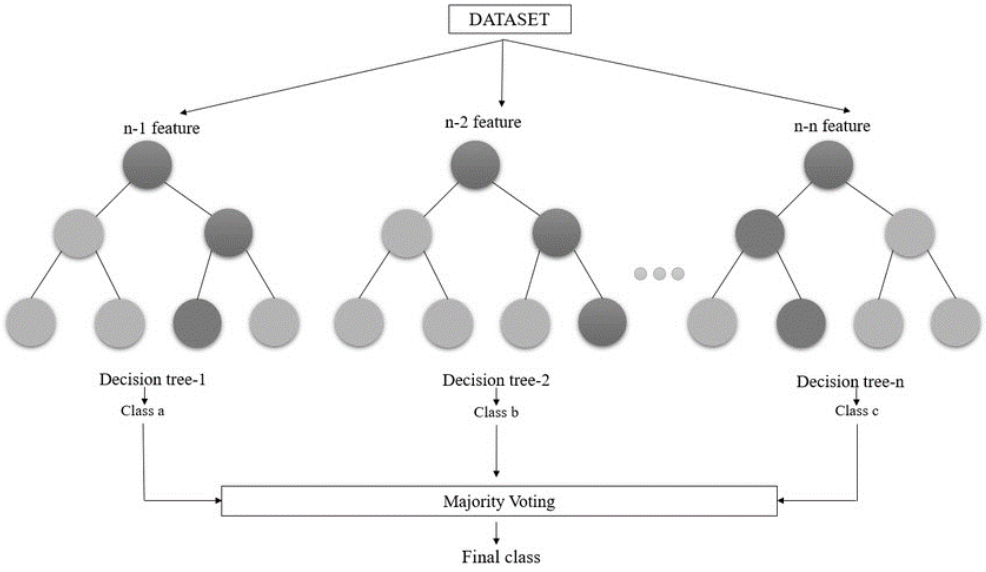
2. *Tree Creation:* for each bootstrap subsample, a decision tree is created. Decision trees are constructed using a random subset of features and follow the node impurity reduction-based splitting process (e.g., Gini index for classification or mean squared error reduction for regression). Each tree is constructed independently of the others;

3. *Majority Vote (Classification) or Average (Regression):* after creating all the trees, the predictions of each tree are combined to obtain a final prediction. In classification, this can be achieved through majority voting to determine the predicted class (in other words, the final prediction is the most frequent prediction made by the forest), while in regression, the average of the tree predictions can be calculated (Dietterich, 2000).

[6] Decision trees are a machine learning technique that iteratively partitions the dataset into subsets based on the data's characteristics, creating a tree-like structure where each node represents a decision based on a feature, and the branches of the tree represent the possible choices or decision paths.

[7] Ensemble learning is a strategy that combines various machine learning models to enhance overall performance. The concept is that the combination of diverse models can compensate for individual model weaknesses and yield superior results. Random Forest leverages this concept by creating an ensemble of decision trees and combining their predictions to obtain a final forecast.

Fig. 1: Generalized structure for Random Forest algorithm



Source: Breiman, 2001

In our experimental setup, we employed *R*, an open-source software environment renowned for its capabilities in statistical computing and graphics. Specifically, we utilized a '*randomForest*' package, taylored on our dataset and based on the original code authored by Leo Breiman and Adele Cutler.

4.2 Data collection

4.2.1 Sampling

The selection of the survey samples and the acquisition of the necessary data for empirical analysis were conducted using the AIDA database, managed by Bureau van Dijk. Within the AIDA database, access is provided to the financial statements of private Italian capital companies, which may be active or undergoing insolvency proceedings. In this context, it is imperative to delineate the methodology employed for company selection, data acquisition, and dataset creation. We delineated two sample of firms: "*failed firms*" and "*non-failed firms*", of equal number.

To select companies to be included in the "*failed firms*" sample, specific search filters were applied:

- *legal form: all legal forms with available financial statements were considered (S.R.L, single-member S.R.L, simplified S.R.L, limited liability consortium company, single-member S.P.A, S.P.A, S.C.A.R.L.P.A, S.A.S, S.C.A.R.L);*
- *legal events: bankrupt or ceased due to bankruptcy, insolvency status, judicial liquidation, dissolution and liquidation, bankruptcy agreement, liquidation, as these statuses reflect the actual insolvency situation;*
- *timeframe for bankruptcy reference: from January 1, 2016, to December 31, 2018*[8]*;*
- *sector: all sectors, with ATECO 2007 code*[9].

After applying these filters, information from 989 companies was extracted from the database. To select companies to be included in the "*non-failed firms*" sample, the following specific search filters were applied:

[8] The timeframe was chosen to avoid distortions due to the *covid-19* pandemic.

[9] ATECO code refers to the product classification of companies. We decided to use all the ATECO codes present in the database as the studies on the Italian case lack uniformity in this sense and to understand the phenomenon of insolvency of Italian companies operating in different sectors. Future research will carry out analyzes by specific sector.

- *legal form: all legal forms with available financial statements were considered (S.R.L, single-member S.R.L, simplified S.R.L, limited liability consortium company, single-member S.P.A, S.P.A, S.C.A.R.L.P.A, S.A.S, S.C.A.R.L).*
- *legal status: active;*
- *years with available financial statements: 2015, 2016, 2017, 2018;*
- *sector of companies considered: all sectors, with ATECO 2007 code.*

After applying these filters, information from 989 companies active from January 1, 2015, to December 31, 2018, was extracted from the database. We had a total sample of 1.978 firms.

4.2.2 Financial variables

After selecting the companies based on the aforementioned criteria, the next step involved choosing the variables to include in our model. The Random Forest algorithm, in order to create random forests, requires standard variables for both samples. For the insolvency context, we use financial and non-financial variables (Rossi *et al.*, 2020; Le & Viviani, 2018). We selected the variables based on previous scientific studies (Biancone *et al.*, 2019) and based on practical practices. Variables, from AIDA database, are:

- *Debt to equity ratio;*
- *Debt to EBITDA ratio;*
- *Current ratio;*
- *Financial expenses to turnover ratio;*
- *Average accounts receivable turnover;*
- *Average accounts payable turnover;*
- *Return on turnover;*
- *Legal form;*
- *ATECO 2007 code.*

In our model, the value 1 is assigned to all failed companies, while the value 0 is assigned to non-failed ones.

5. Analysis and results

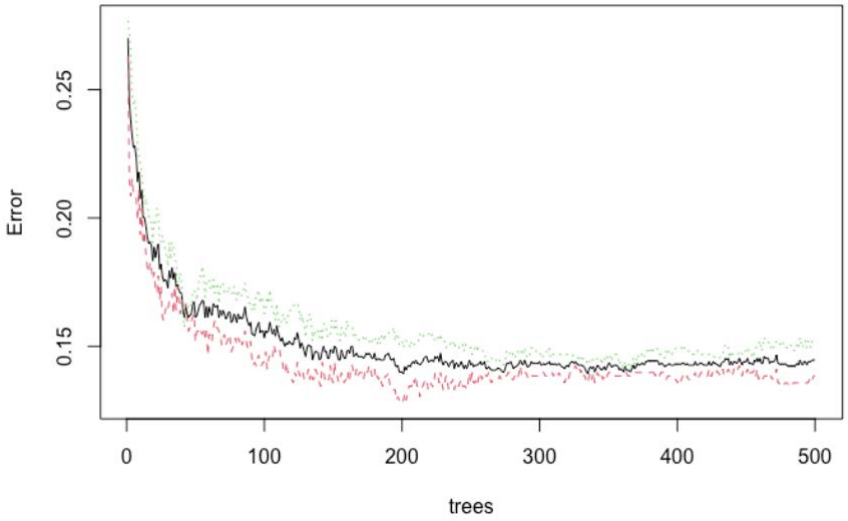
Initially, the data is divided into two datasets, one for training and one for testing purposes (Breiman, 2001). The model is trained on the training dataset and then validated on the testing dataset. The training dataset comprises 1500 observations, while the testing dataset contains 478 observations. In both datasets, the proportion of zeros and ones is balanced. For the Random Forest model, all available variables were utilized except for the company name. The chosen number of candidate variables for each split is 2, whereas the default value of the model is 3. However, with our selection, the error rate is lower:

```
random_model
randomForest(formula = as.factor(Failed) ~ . - Company_Name, data = data_training, mtry = 2)
Type of random forest: classification
Number of trees: 500
No. of variables tried at each split: 2
Out-of-Bag (OOB) estimate of error rate: 14.47%
```

The final model with 500 trees and 2 candidate variables at each split yields an error rate of 14.5%.

This error rate represents the average prediction errors across each training instance *xi* by aggregating the predictions of only those trees that did not contain *xi* among the training instances. The error rate is relatively low, as observed in the confusion matrix, being lower for values equal to zero and slightly higher for values equal to 1. *Figure 2* depicts the prediction error concerning the number of trees.

Fig. 2: Prediction error based on the number of trees



Source: our elaboration

The black line in *Figure 2* represents the estimated absolute test error; the green line represents the estimated test error on the positive class; the red line represents the estimated test error on the negative class. The prediction error significantly decreases until the number of trees reaches 200, after which it remains essentially constant. Overall, the estimation error is quite low.

Implementing our model and selecting the standard cut-off value of 0.5, we obtain the first confusion matrix (*Figure 3*)[10]. This matrix provides a detailed breakdown of the model's performance in terms of true positives, true negatives, false positives, and false negatives, allowing for a comprehensive evaluation of its predictive capabilities.

Fig. 3: Confusion matrix (cut-off value equals to 0.5)

PREDICTIONS			
	0	1	Sum
0	223	62	285
1	22	171	193
Sum	245	233	478

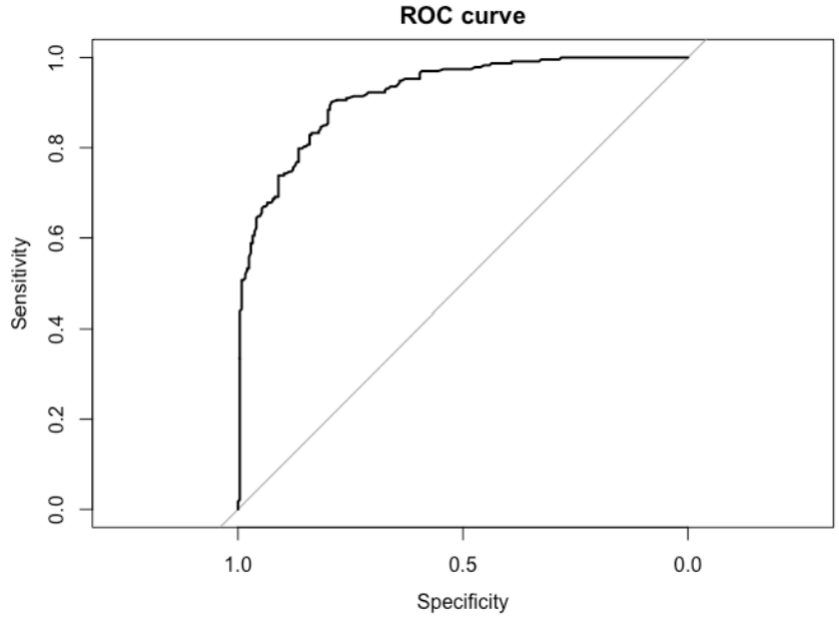
Source: our elaboration

394 out of 478 observations are correctly classified, with the majority pertaining to non-failed companies. With a cut-off value equals to 0.5, the following values are obtained: sensitivity: *VP / (VP + FN) = 0.91*, representing the true positive rate on companies estimated as non-failed; specificity: *VN / (FP + VN) = 0.73*, representing the true negative rate on companies estimated as failed[11]. To provide a visual representation of the performance of this binary classification model at various threshold levels, we then delineate the ROC curve based on our model and variables (*Figure 4*).

Fig. 4: ROC curve

[10] The "*cut-off*" or "*classification threshold*" is a value utilized in a classification model to determine which category to assign to an input instance.

[11] *VP -> True positives. FN -> False negatives. VN -> True negatives. FP -> False positives.*



Source: our elaboration

In this case, the area under the ROC curve, as depicted in *Figure 4*, is equal to 0.92. This confirms the goodness of the model. Using the ROC curve, the optimal cut-off value is identified as 0.361. We then update and refine the predictions based on the new cut-off, resulting in the following confusion matrix (*Figure 5*):

Fig. 5: Confusion matrix (cut-off value equals to 0.361)

NEW PREDICTIONS			
	0	1	Sum
0	194	23	217
1	51	210	261
Sum	245	233	478

Source: our elaboration

404 out of 478 observations are correctly classified, with the majority pertaining to companies that have failed. Comparing this with the previous confusion matrix, there is an increase in the number of correctly classified failed companies. This is a significant result because an error in predicting failure is more serious than an error in predicting non-failure. With the new cut-off, the model achieves a sensitivity of 0.79, meaning it accurately identifies 79% of positive cases. Similarly, a specificity of 0.90 indicates that 90% of negative cases are correctly identified, demonstrating a notable ability to recognize situations that require particular attention.

6. Discussion and conclusion

In this paper, a thorough investigation into the topic of corporate insolvency was conducted. The primary objective was to examine how the application of the Random Forest algorithm, in conjunction with key indicators, could aid in the identification of enterprises at risk of insolvency, thereby guiding strategic business decisions aimed at mitigating this risk. Furthermore, a forward-looking analysis of

the results was conducted from an economic and business perspective, thereby contributing significantly to the understanding of the dynamics associated with corporate insolvencies.

The significance of this research lies in its provision of an advanced analytical tool and practical insights for management, facilitating the formulation and implementation of effective recovery and restructuring strategies. Through these measures, the study aims to prevent the occurrence of business insolvencies and promote organizational resilience in the face of financial distress.

Furthermore, the algorithm's sensitivity of 0.79 implies that out of all the instances where a positive outcome is true, the model accurately detects approximately 79% of them. This suggests a robust capability in identifying cases where a company is at risk of insolvency. Similarly, the specificity of 0.90 indicates that the algorithm correctly identifies around 90% of instances where the outcome is negative, affirming its proficiency in discerning situations where companies are not facing insolvency issues. These metrics highlight the algorithm's ability to effectively distinguish between positive and negative cases, crucial for decision-making processes in risk assessment and management. Moreover, the area under the ROC curve, which stands at 0.92, provides further insight into the model's performance. This metric, ranging from 0 to 1, represents the overall discriminatory power of the model across all possible threshold values. A value close to 1 indicates a strong ability to differentiate between positive and negative cases. In this case, the AUC of 0.92 suggests a high level of accuracy and reliability in the model's predictions, bolstering confidence in its effectiveness for estimating corporate insolvency probability.

Additionally, the model's correct classification of 404 out of 478 observations (84.5%) underscores its practical utility and robustness. This high accuracy rate demonstrates the model's efficacy in accurately assessing the likelihood of insolvency for a significant portion of the dataset. As such, these results provide empirical evidence supporting the Random Forest algorithm as a valuable tool for corporate insolvency risk estimation, with implications for informing strategic decision-making and risk management practices in business contexts.

7. Theoretical and Managerial implications

From a theoretical point of view, this study contributes significantly to the understanding of corporate insolvency assessment by applying the Random Forest algorithm in conjunction with key financial and non-financial indicators. By conducting a thorough investigation into the dynamics of corporate insolvency, the research enriches existing theoretical frameworks concerning insolvency prediction methodologies in Italian business contexts. The utilization of advanced analytical techniques, such as machine learning algorithms, underscores the evolution of predictive modeling methodologies and their applicability in identifying enterprises at risk of insolvency. Moreover, the forward-looking analysis conducted from an economic and business perspective enhances theoretical discourse by shedding light on the proactive management of corporate insolvency risks. That said, this research lays the groundwork for future theoretical inquiries into the refinement and augmentation of predictive modeling techniques for insolvency prediction, contributing to the advancement of knowledge in the field.

Furthermore, the findings of this study also hold significant managerial implications for strategic decision-making and risk management practices. By providing an advanced analytical tool and practical insights for management, the research facilitates the formulation and implementation of effective recovery and restructuring strategies aimed at mitigating the risk of insolvency. The high sensitivity and specificity of the Random Forest algorithm underscore its proficiency in identifying cases of potential insolvency, thereby enabling managers to make informed decisions in risk assessment. The robust performance metrics, including the area under the ROC curve and the high accuracy rate, reinforce the reliability and effectiveness of the algorithm in estimating corporate insolvency probability. Managers can leverage these insights to enhance organizational resilience and sustainability by proactively addressing potential insolvency risks. Furthermore, the empirical evidence supporting the Random Forest algorithm as a valuable tool for corporate insolvency risk

estimation highlights its practical utility in guiding resource allocation strategies.

Additionally, managerial recommendations that come out from this work include regular financial health assessments, enhanced financial transparency, diversification of revenue streams, strengthened cash flow management, and investment in talent development, while strategic insights involve developing contingency plans, forging strategic partnerships, monitoring market trends, fostering a culture of innovation, and engaging stakeholders effectively.

8. Research limitations

One of the primary limitations of this research lies in its dependence on historical financial data. While historical data offer valuable insights into past trends and patterns, they may not entirely reflect the dynamic nature of market conditions and broader macroeconomic factors. Consequently, the predictive capacity of the Random Forest algorithm utilized in this study may be constrained by the static nature of historical data, potentially leading to inaccuracies in forecasting future outcomes. Furthermore, the accuracy of predictions generated by the Random Forest algorithm could be influenced by the quality and completeness of the dataset used for model training. Incomplete or biased data may introduce noise or inaccuracies into the model, thereby impacting its predictive performance. Thus, the reliability of the algorithm's predictions is contingent upon the availability of high-quality, comprehensive data.

Another significant limitation relates to the veracity of financial data, particularly concerning potential distortions introduced by accounting practices aimed at concealing financial distress. In some cases, companies may employ tactics to manipulate financial statements in an attempt to mask underlying financial difficulties, thereby skewing the accuracy of the data used for predictive modeling. Consequently, the effectiveness of the Random Forest algorithm in identifying insolvency risk may be compromised by the presence of misleading or fraudulent financial information.

9. Future research

9.1 Prevention of fraudulent behavior

Future research endeavors should aim to address the challenges present in previous paragraphs by incorporating more comprehensive datasets, integrating alternative data sources, and implementing techniques to mitigate the impact of data quality issues and financial distortions. In addition to traditional methods, such as financial ratio analysis and trend analysis, the utilization of statistical tools like Benford's Law can provide valuable insights into potential irregularities or anomalies within financial data. Benford's Law, also known as the first-digit law, states that in many naturally occurring datasets, the leading digits of numerical values tend to follow a specific distribution pattern. Deviations from this expected distribution can indicate the presence of anomalies, including fraud or manipulation. Moreover, the integration of AI-based technologies presents a promising avenue for enhancing fraud detection capabilities. Machine learning algorithms, such as neural networks and anomaly detection models, can analyze large volumes of financial data with greater speed and accuracy than traditional manual methods. By leveraging AI techniques, researchers and practitioners can develop more sophisticated and adaptive fraud detection systems capable of identifying subtle patterns and trends indicative of fraudulent behavior.

That said, future research endeavors could explore the synergistic application of Benford's Law and AI-based technologies to further enhance fraud detection capabilities. Additionally, the integration of AI technologies can enable real-time monitoring, enhancing the efficiency and effectiveness of insolvency prevention efforts in various organizational contexts.

9.2 Individual impact of financial and non-financial variables

Future research endeavors could also delve deeper into the assessment of the individual impact of financial variables on the algorithm's performance and its predictive ability regarding insolvency. Specifically, there is potential for investigating how each financial variable contributes to the overall predictive accuracy of the algorithm and its efficacy in identifying firms at risk of insolvency. Moreover, considering the crucial role of governance structures in shaping corporate financial health, future studies could explore the influence of governance aspects on the algorithm's performance. There is scope for research to focus on specific factors such as the ATECO code or the type of firm, aiming to discern patterns regarding insolvency propensity among different types of firms in Italy. Investigating the characteristics and governance practices of different types of firms may shed light on the underlying drivers of insolvency and inform targeted intervention strategies.

For example, when considering the application of the Random Forest algorithm in predicting insolvency for small family-owned businesses, it's crucial to highlight the specific challenges that may arise due to the nature of restricted managerial societies. Key points to consider could be:

- *limited decision-making scope:* in many Italian family-owned businesses, decision-making authority is concentrated within a small group of individuals, often family members or close associates. This restricted managerial structure can lead to challenges in implementing effective risk management strategies, as decisions may be influenced by personal relationships or short-term interests rather than long-term business sustainability;
- *lack of professional management:* family-owned businesses may lack professional managerial expertise, relying instead on the experience and intuition of family members. Without formal training or experience in financial analysis, managers may struggle to interpret the insights provided by the Random Forest algorithm accurately. This can result in suboptimal decision-making and a higher risk of insolvency;
- *conflict of interest:* in family-owned businesses, conflicts of interest between family members or between family and non-family stakeholders can arise, particularly concerning financial decision-making. These conflicts may hinder the adoption of risk management measures recommended by the Random Forest algorithm, as they may not align with the personal interests or agendas of certain stakeholders. This can compromise the effectiveness of insolvency prediction and prevention efforts;
- *resistance to change:* family-owned businesses often have entrenched traditions and resistance to change, which can inhibit the adoption of new technologies and methodologies, such as machine learning algorithms.

In summary, future research endeavors could extend the current understanding by examining the nuanced influence of financial variables and governance aspects on insolvency prediction models. Additionally, focusing on sector-specific or firm-specific factors may facilitate a more granular understanding of insolvency dynamics, thereby enhancing the effectiveness of risk management strategies and regulatory interventions in mitigating the incidence of insolvency in the Italian business landscape.

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Track 13
Sustainability

I diversi approcci della corporate governance alla sostenibilità e i loro effetti sulle performance ESG

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Abstract

Frame della ricerca. *La Stakeholder Theory collega CG (Corporate Governance) e performance ESG, evidenziando il ruolo del consiglio di amministrazione, del management esecutivo e degli altri stakeholder nel processo decisionale efficace, nella responsabilità e nella trasparenza.*

Obiettivo della ricerca. *In questo lavoro, adottando la Stakeholder Theory, si vuole valutare come i vari approcci di CG agli aspetti ESG (cioè, attraverso risorse interne o esterne) influenzino la performance ESG complessiva delle imprese. Viene discussa la progressione gerarchica degli approcci di CG, dai consulenti esterni all'istituzione di un comitato ESG dedicato.*

Metodologia. *E' stata condotta un'analisi quantitativa su un campione di 280 aziende manifatturiere europee quotate in borsa. In aprticolare abbiamo costruito una metodologia a 2 step. In primo luogo, abbiamo effettuato un'analisi del contenuto dei rapporti di sostenibilità, dei siti web e dei documenti di corporate governance delle imrpese del camione. In secondo luogo abbiamo identificato, attraverso un'analisi cluster, gruppi di aziende con un approccio omogeneo di CG agli aspetti ESG.*

Risultati. *I risultati della cluster analysis presentano un quadro dei diversi approcci di CG agli aspetti ESG delle aziende del campione. Gli aspetti considerati per costruire i cluster sono: sono la presenza di un comitato ESG, la presenza di un team ESG, la presenza di un CSO e la presenza di un comitato ESG composto esclusivamente da amministratori indipendenti. In particolare l''analisi ha identificato 6 cluster di aziende: ESG esterno, ESG culturale, ESG operativo, ESG strategico, ESG operativo e strategico e ESG dedicato. I risultati dimostrano che un approccio di CG strutturato e completo ha un impatto sostanzialmente positivo sulla performance ESG. In particolare, confrontando con le imprese appartenenti al cluster ESG esterno emergono una maggioranza significativa dei valori di ESG Score e dei tre pilastri della sostenibilità.*

Limiti della ricerca. *L'analisi si sviluppa su un campione di imprese quotate e non considera le piccole e medie imprese. Le analisi sono su un orizzonte temporale di un solo anno.*

Implicazioni manageriali. *Un approccio strutturato e completo, esemplificato dai cluster ESG dedicato e ESG operativo e strategico, ha un impatto sostanzialmente positivo sulla performance ESG. Ciò suggerisce che, anche secondo la Stakeholder Theory, quando le imprese danno priorità alle considerazioni ESG all'interno delle loro strutture di governance e le integrano nei processi decisionali operativi e strategici, ottengono migliori risultati ESG. I risultati possono rappresentare un'indicazione preziosa per le organizzazioni che cercano di migliorare i loro sforzi di sostenibilità attraverso meccanismi efficaci di corporate governance.*

Originalità. *Il lavoro presenta una analisi originale degli approcci di CG e grazie alla stakeholder theory mette in relazione questi diversi approcci identificati alle performance ESG.*

Key words: *Corporate Governance; ESG performance; Stakeholder Theory*

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1. Introduzione

Negli ultimi decenni si è assistito a un aumento significativo della letteratura e dell'attenzione delle aziende verso la sostenibilità e le questioni ESG (Environmental, Social, and Governance) (Clément *et al.*, 2023; Giese *et al.*, 2019) che sono diventate sempre più rilevanti a seguito della consapevolezza globale e della pressione crescente degli stakeholder (Zumente & Bistrova, 2021). Se da un lato gli obiettivi ESG possono migliorare la reputazione delle imprese (Galletta *et al.*, 2023; Murè *et al.*, 2021), favorire l'innovazione (Hughes *et al.*, 2021; Wang *et al.*, 2021), creare un mondo più sostenibile (Ng, 2021) e inclusivo (Rastogi *et al.*, 2023), dall'altro lato le imprese devono migliorare la loro performance ESG perché strettamente legate a una migliore gestione del rischio (Nobanee *et al.*, 2021), a risultati finanziari a lungo termine (Zhou *et al.*, 2022) e a vantaggi competitivi (Hussain *et al.*, 2018). In ultima analisi, i cambiamenti normativi stimolano il miglioramento delle prestazioni ESG (Agoraki *et al.*, 2023) per creare valore condiviso (Camilleri *et al.*, 2023), bilanciando la crescita economica con considerazioni sociali e ambientali (Fatemi *et al.*, 2018).

Secondo la letteratura (Cuello Nieto, 1997; Moldavska & Welo, 2019), le imprese dovrebbero avere un approccio olistico alle questioni ESG, un approccio che comprenda sia gli aspetti operativi ma soprattutto strategici. Per garantire una reale diffusione dei principi ESG a tutti i livelli aziendali, è infatti necessario un approccio top-down (Gotsch *et al.*, 2023), che enfatizzi il ruolo della Corporate Governance (CG) nella gestione delle questioni ESG. L'implementazione di una politica ESG efficace è infatti responsabilità del CG (Campanella *et al.*, 2021; Ellili, 2022a) e consiste in un percorso di trasformazione (Wöhrmann, 2022) che richiede un impegno significativo in termini di risorse e di tempo (Eliwa *et al.*, 2021). Dando priorità agli interessi e alle preoccupazioni dei vari stakeholder e allineando i meccanismi di CG con gli obiettivi di performance ESG, le imprese possono rafforzare il loro impegno verso la sostenibilità, il successo a lungo termine, la creazione di valore condiviso e la gestione responsabile (Orazalin, 2020; Uyar *et al.*, 2021; Perrini & Tencati, 2006).

Nel presente articolo, al fine di indagare il legame tra CG e ESG si fa riferimento alla Stakeholder Theory (Velte & Stawinoga, 2020), che sottolinea l'importanza degli interessi di tutti gli stakeholder rilevanti nei processi decisionali (Driver & Thompson, 2002; Huse, 2003; Peng, L. S. & Isa, 2020). Se adeguatamente comunicata all'interno e all'esterno dell'azienda, la scelta di intraprendere una strategia e un impegno agli obiettivi ESG trasmette un messaggio potente e significativo a tutti i gruppi di stakeholder. Per gli investitori, rappresenta un forte impegno nella gestione del rischio e un chiaro orientamento alla crescita sostenibile (Busch *et al.*, 2016; Sciarelli *et al.*, 2021). Per i clienti rappresenta l'impegno a ridurre l'impatto ambientale di prodotti e servizi (Tang *et al.*, 2023). I e le dipendenti possono sentirsi più motivati e orgogliosi di lavorare per un'azienda sensibile a questioni etiche e sociali (Verheyden *et al.*, 2016). Una nomina di questo tipo può anche influenzare positivamente l'intera catena di fornitura, spingendo clienti e fornitori a migliorare il loro impatto e ad allinearsi ai valori dell'azienda (Baid & Jayaraman, 2022). Inoltre, questa decisione può avere un impatto più ampio, incoraggiando altre imprese a seguire questo approccio e ad adottare pratiche più sostenibili per rimanere competitive (Khan, 2019).

Per questi motivi, adottando la Stakeholder Theory, ci proponiamo di valutare come i possibili approcci della CG agli aspetti ESG influenzino la performance ESG complessiva delle imprese.Nel loro approccio agli aspetti ESG, le imprese hanno bisogno di risorse competenti e qualificate che possono trovare internamente (e.g., team ESG, Sustainability manager, Chief Sustainability Officer) o acquisire esternamente (e.g., consulenti) per raggiungere le competenze mancanti (Cardon & Stevens, 2004). La nomina di figure interne o esterne dedicate alle tematiche ESG è cruciale per dimostrare l'impegno delle imprese verso la sostenibilità (Baraibar-Diez & D. Odriozola, 2019; Peters *et al.*, 2019).

Per capire come i diversi approcci alla CG influenzano le performance ESG, abbiamo condotto un'analisi quantitativa su un campione di 280 aziende manifatturiere europee quotate in borsa. In aprticolare abbiamo costruito una metodologia a 2 step. In primo luogo, abbiamo effettuato un'analisi

del contenuto dei rapporti di sostenibilità, dei siti web e dei documenti di corporate governance delle imrpese del camione. In secondo luogo abbiamo identificato, attraverso un'analisi cluster, gruppi di aziende con un approccio omogeneo di CG agli aspetti ESG.

2. Corporate Governance ed ESG

La CG rappresenta un insieme di regole, processi e strutture organizzative, inteso come compensazione degli interessi dei diversi stakeholder, che sono alla base del corretto funzionamento di un'impresa, (Du Plessis *et al.*, 2018; Wearing & Wearing, 2005). La CG si occupa delle regole e dei processi attraverso i quali vengono prese le decisioni. Indica inoltre il percorso da seguire per raggiungere gli obiettivi aziendali e, di conseguenza, la misurazione e la divulgazione dei risultati ottenuti (Gilson, 2001). La CG comprende tre attività principali: amministrazione, controllo e disclosure (Agyei-Mensah, 2016; Ellili, 2022b), che contribuiscono alla trasparenza (Hermalin & Weisbach, 2007), alla responsabilità (Brennan & Solomon, 2008) e all'efficacia del processo decisionale (Cutting & Kouzmin, 2000) all'interno delle imprese.

L'amministrazione si riferisce al quadro e ai processi che un'organizzazione implementa e gestisce per la CG (Zaman *et al.*, 2022). Il controllo si riferisce ai meccanismi e alle pratiche per garantire che l'impresa operi con integrità, gestisca efficacemente i rischi e sia conforme alle leggi e ai regolamenti applicabili al proprio business (Becht *et al.*, 2003). Infine, per disclosure si intende la comunicazione tempestiva e trasparente delle informazioni rilevanti ai gruppi di stakeholder (Eng & Mak, 2003). In particolare, pratiche di disclosure efficaci migliorano la trasparenza, facilitano il processo decisionale informato e creano fiducia. La disclosure comprende l'informativa finanziaria e non, la comunicazione ai gruppi di stakeholder, i meccanismi di denuncia e le iniziative di trasparenza. La funzione di disclosure svolge un ruolo fondamentale quindi anche nel contesto ESG, in quanto è essenziale comunicare in modo trasparente e responsabile la performance e gli impegni di un'azienda in merito agli aspetti ESG (Michelon & Parbonetti, 2012). Nonostante questa importanza strategica, gli studi di CG si concentrano principalmente sulle funzioni di amministrazione e controllo (Hilb, 2005).

Gli studi sulla CG si sono sviluppati inizialmente in risposta alla necessità di proteggere gli investimenti degli azionisti dai manager opportunisti (Roberts & Van den Steen, 2000). Dalla fine del secolo scorso, tuttavia, il perimetro di riferimento della CG si è esteso a tutti gli stakeholder, incorporando una forma più estesa di monitoraggio delle attività aziendali, compreso l'impatto sulla società e sull'ambiente (Naciti *et al.*, 2021). Lo spostamento dell'attenzione aziendale dagli interessi degli azionisti a una prospettiva più ampia e complessa è stato formalizzato dagli studiosi di management nella Stakeholder Theory (Parmar *et al.*, 2010). All'inizio, si concentrava principalmente sulla gestione dei conflitti tra vari gruppi all'interno delle aziende (Phillips, 1997), come gli azionisti, i lavoratori e i clienti: l'obiettivo era trovare un equilibrio tra questi interessi (Orts & Strudler, 2002), senza necessariamente considerare gli aspetti legati alla sostenibilità o alla responsabilità sociale. Nei decenni successivi, la Stakeholder Theory ha compiuto un passo significativo, ampliando il concetto stesso di stakeholder per includere una gamma più ampia di attori, come le comunità locali, le organizzazioni non governative, i governi e persino l'ambiente (McGahan, 2021). Negli ultimi anni, infatti, gli stakeholder hanno assunto un ruolo sempre più rilevante, spingendo le aziende a migliorare le loro pratiche sostenibili e a rivedere i loro impatti ambientali e sociali (Kujala *et al.*, 2022). Con il nuovo millennio, la teoria ha integrato sempre più nel suo quadro concettuale le questioni legate alla sostenibilità, come le preoccupazioni ambientali e sociali. Le aziende hanno quindi iniziato a considerare questi aspetti come parte delle loro operazioni e strategie. Allo stesso tempo, le aziende hanno sviluppato politiche e pratiche di responsabilità sociale d'impresa in risposta alle preoccupazioni degli stakeholder e per affrontare questioni come l'etica, i diritti umani e la responsabilità ambientale (Dmytriyev *et al.*, 2021; Freeman & Dmytriyev, 2017).

Dalla continua evoluzione ed espansione della Stakeholder Theory (Freeman *et al.*, 2020), emerge l'importanza della gestione degli aspetti ESG come parte integrante delle decisioni aziendali per creare valore sostenibile (Freeman, 2023; Freudenreich *et al.*, 2020) e rispondere alle preoccupazioni della società (Jones *et al.*, 2017) e dell'ambiente (Cordeiro & Tewari, 2015).

Si è assistito a una proliferazione della ricerca e della letteratura sulla sostenibilità e sull'ESG. Questa letteratura copre un'ampia gamma di argomenti, tra cui lo sviluppo di framework ESG (Singhania & Saini, 2023) e di metriche (Atkins *et al.*, 2023), casi di studio di aziende che implementano strategie di sostenibilità di successo (Engert & Baumgartner, 2016) e l'impatto dei fattori ESG sulla performance finanziaria (Mardini, 2022). Le aziende riconoscono infatti sempre più che l'integrazione della sostenibilità e dei fattori ESG nelle loro strategie di core business non è solo un imperativo morale, ma è anche essenziale per la redditività a lungo termine in un mondo che cambia (Armstrong, 2020).

Questa evoluzione parallela dei concetti di CG, da un lato, e ESG, dall'altro, è stata ampiamente affrontata dalla letteratura precedente (Chandrakant & Rajesh, 2023; Hussain *et al.*, 2018; Mahmood *et al.*, 2018; Peng, X. & Zhang, 2022). Tuttavia, questi studi si concentrano sui meccanismi alla base delle scelte strategiche, mentre poca attenzione è dedicata alle ripercussioni di tali scelte in termini di performance ESG.

3. Performance ESG

La valutazione della performance ESG di un'azienda rappresenta una procedura non immediata e univoca, costruita come un mix di valutazioni dei tre principali aspetti coinvolti: Ambiente, Sociale e Governance. Indicatori e metriche specifici possono essere adottati a partire dagli standard di rendicontazione adottati dalle aziende (es. GRI, SASB, IR, EFRAG).

Allo stesso tempo, è possibile

- basarsi su indicatori emessi da terzi, come rating ESG o indici ESG specifici (Pan *et al.*, 2021);
- valutare i KPI adottati dalle aziende e riportati nei report di sostenibilità;
- basarsi su questionari, interviste e indagini da somministrare alle singole aziende.

Se da un lato le diverse possibilità di misurazione potrebbero dare risultati diversi a seconda del settore, del Paese e degli obiettivi specifici dell'azienda (Garcia *et al.*, 2017), dall'altro la mancanza di un approccio standardizzato per la misurazione delle performance ESG rende difficile la valutazione comparativa tra aziende molto diverse.

Diversi studiosi si sono occupati della misurazione della performance ESG, evidenziando i principali fattori alla base di una buona performance ESG (Fatemi, 2018), tra cui l'efficienza dei processi e la riduzione dei consumi di materie prime ed energia (Aras & Crowther, 2008; Porter & Linde, 1995; Russo & Fouts, 1997); l'attrazione e la ritenzione dei talenti (Bhattacharya et al, 2008; Greening & Turban, 2000); la fedeltà dei clienti (Gunesh & Geraldine, 2015); la reputazione (Cahan *et al.*, 2015). Anche se la letteratura suggerisce all'unanimità che la struttura di governance e i sistemi di controllo esterni delle aziende svolgano un ruolo cruciale nel migliorare le performance ESG (Van Hoang *et al.*, 2021; Попов and Макеева, 2022), scarsi sono gli approfondimenti che mettano in realzione gli approcci ESG e le perfonce ESG.

4. Gestione ESG attraverso risorse interne ed esterne

Nelle prime fasi di 'adozione di pratiche ESG, le imprese possono essere fortemente aiutate da consulenti esterni, in grado di fornire indicazioni preziose, framework e best practice (Hannemann *et al.*, 2019). Nel corso del tempo, man mano che le imprese acquisiscono esperienza e competenza in materia di ESG, il ruolo dei consulenti può diventare sempre più residuale, parallelamente all'assunzione di risorse dedicate a costruire le loro capacità ESG interne. Queste risorse possono essere dipendenti ESG, middle manager ESG, manager fino ad arrivare ad amministratori, come il

Chief Sustainability Officer. Queste figure all'interno dell'azienda possono essere presenti alternativamente tra loro o costituire il team ESG, al quale possono partecipare anche esperti esterni e indipendenti. In alcuni casi, il consiglio di amministrazione può istituire un comitato ESG dedicato, la cui responsabilità principale è quella di supervisionare e guidare gli sforzi ESG dell'azienda e garantire che siano in linea con la strategia e i valori generali dell'impresa (Burke *et al.*, 2019; Valle *et al.*, 2019). Il peso specifico di figure quali dipendenti, dirigenti, funzionari o membri di comitati all'interno di un'azienda è direttamente correlato all'entità dell'impegno dell'azienda nei confronti delle tematiche ESG e al messaggio che desidera trasmettere ai suoi stakeholder. L'impegno e il coinvolgimento di queste figure sono indicatori chiave del grado di importanza che un'azienda attribuisce alle tematiche ESG, influenzando positivamente la performance ESG.

Dal momento che non esistono regole generali o standard universali per i ruoli e i titoli di coloro che si occupano di questioni ESG all'interno di un'azienda (Cadman, 2011), la struttura organizzativa e i ruoli possono variare notevolmente da un'organizzazione all'altra. Ciò è dovuto a diversi fattori, tra cui le tradizioni di CG, i codici di autoregolamentazione e le scelte individuali delle aziende (Cankar, 2005). Inoltre, la struttura per la gestione degli ESG può variare in base alle dimensioni, all'età, al settore e alla posizione geografica dell'azienda. La chiave è disporre di risorse e meccanismi dedicati per affrontare le sfide e le opportunità legate agli aspetti ESG, in modo da favorire la sostenibilità e la creazione di valore a lungo termine (Miller *et al.*, 2014).

Riassumendo, è possibile individuare una progressione gerarchica degli approcci di CG direttamente proporzionale all'internalizzazione della funzione ESG, dalla delega iniziale a consulenti esterni fino all'istituzione di un comitato ESG dedicato. Sulla base di queste premesse, la presente ricerca valuta come i diversi approcci di CG (ovvero, individui con funzioni e poteri diversi in materia di ESG) si riflettono sulla performance ESG delle imprese. La domanda di ricerca è la segunete:

RQ: In che modo diversi approcci di CG agli ESG influenzano la performance ESG complessiva dell'azienda?

5. Metodologia e dati

5.1 Metodologia

Abbiamo sviluppato un approccio in due fasi per valutare gli approcci di CG e il loro effetto sulla performance ESG. In primo luogo, applicando una content analysis, abbiamo esaminato i rapporti di sostenibilità, i siti web e i materiali di CG di 280 aziende manifatturiere quotate in Europa e abbiamo identificato le variabili di CG (Branco & Rodrigues, 2008; Chetty *et al.*, 2015; Gautam & Singh, 2010; Kansal *et al.*, 2014; Purnomo & Widianingsih, 2012). Ogni variabile di corporate governance è stata costruita attraverso content analysis manuale e tutti gli autori hanno contribuito indipendentemente nella raccolta di questi dati. Gli autori hanno compilato un database raccogliendo informazioni sulla presenza di un CSO, di un comitato per la sostenibilità e della sua costituzione (se completamente indipendente) e di un team dedicato alla sostenibilità. Successivamente, confrontando le informazioni raccolte, sono state costruite 4 variabili dummy (ESG Committee, ESG Team, ESG Officer, INDESG Committee), pari a 0 se l'azienda non adotta il meccanismo di CG o se l'informazione non è presentata nei documenti analizzati dell'azienda selezionata, pari a 1 altrimenti. Questa procedura ha permesso agli autori di effettuare confronti, evitare incongruenze e garantire l'affidabilità dei risultati (Krippendorff, 2018). La content analysis è stata effettuata manualmente per diversi motivi. Le informazioni provengono da varie fonti e sono presentate in forme diverse (ad esempio, testi, figure come organigrammi e tabelle). Inoltre, le aziende adottano diverse terminologie quando si parla di sostenibilità. Ad esempio, per quanto riguarda l'adozione di un comitato ESG, le aziende possono avere comitati con nomi diversi, come comitato CSR, comitato ESG, comitato per

la sostenibilità e l'etica, che però hanno gli stessi compiti e responsabilità. Infine, le informazioni testuali richiedono approfondimenti che vanno oltre il numero di parole o frasi.

In secondo luogo, abbiamo condotto un'analisi dei cluster per classificare le aziende selezionate in gruppi distinti in base ai loro approcci coerenti di CG ai fattori ESG. In particolare, abbiamo utilizzato le 4 variabili dell'approccio di CG per raggruppare le aziende. Attraverso una cluster analysis per agglomerazione gerarchica (Johnson e Wichern, 2007), che si basa sulla costruzione di un dendrogramma (cioè una rappresentazione grafica che facilita l'identificazione dei gruppi), abbiamo identificato 6 cluster, che si riferiscono a diversi approcci di CG verso l'ESG: ESG esterno, ESG culturale, ESG operativo, ESG strategico, ESG operativo e strategico, ESG dedicato. I diversi cluster sono poi stati analizzati per individuare e verificare le performance ESG tra cluster e nei cluster.

5.2 Dati

Il campione di ricerca si riferisce al 2022 e comprende 280 imprese europee quotate manifatturiere. I Paesi dell'Unione Europea sedi delle imprese analizzate, sono soggetti alla direttiva sulla rendicontazione non finanziaria (CSR Europe, 2017). Per facilitare l'analisi dei contenuti, abbiamoquindi scelto imprese che hanno adottato gli standard GRI nella loro rendicontazione. Gli standard GRI sono una linea guida universalmente riconosciuta per la rendicontazione efficace degli aspetti economici, ambientali e sociali. Abbiamo raccolto i dati dai rapporti annuali, dai rapporti di sostenibilità, dalle linee guida di corporate governance e da altri documenti pertinenti. Il database finale è stato compilato attraverso un processo di consolidamento che ha coinvolto tre fonti primarie: le comunicazioni aziendali, i dati di Refinitiv e Orbis. I dati economici e finanziari sono stati estratti dal database Orbis, mentre per le performance ESG abbiamo utilizzato il database Refinitiv.

5.3 Variabili

L'ESG Score di Refinitiv, che utilizza informazioni private e pubbliche delle aziende, è stato scelto come proxy della ESG performance (Arouri *et al.*, 2019; Gomes e Marsat, 2018; Jackson *et al.*, 2020). In particolare, ESG è un punteggio numerico assegnato a ciascuna impresa che riflette la sua performance complessiva in termini di sostenibilità ambientale, pratiche sociali e criteri di corporate governance, considerati i tre pilastri fondamentali della sostenibilità. I tre pilastri sono stati misurati con gli score specifici: ambientale (Environmetal Pillar), sociale (Social Pillar) e governance (Governance Pillar).

Per valutare i diversi approcci di CG alla sostenibilità abbiamo poi costruito una variabile che classifica le aziende in 6 diverse categorie di approccio di CG (approcci di CG). Per farlo abbiamo sviluppato una cluster analysis a partire da 4 variabili dummy di corporate governance che misurano:

- la presenza di un Comitato ESG (ESG Committee),
- la presenza di un Team ESG (ESG Team),
- la presenza di un Chief Sustainability Officer (CSO),
- la presenza di un Comitato ESG completamente indipendente (INDESG Committee) .

La Tabella 1 presenta la definizione delle variabili e le fonti.

Tab. 1: Definizione delle variabili

Variabile	Definizione	Fonte
ESG Committee	Variabile dummy che assume il valore 1 se l'impresa nomina un comitato ESG, 0 altrimenti	NFD
ESG Team	Variabile dummy che assume il valore 1 se l'impresa nomina un team ESG, 0 altrimenti	NFD
ESG Officer	Variabile dummy che assume il valore 1 se l'impresa nomina un Chief Sustainability Officer, 0 in caso contrario.	NFD
INDESG Committee	Variabile dummy che assume il valore 1 se l'impresa nomina un comitato ESG completamente indipendente, 0 altrimenti	NFD
ESG Performance	Livello di performance ESG dell'azienda con valore da 0 (minimo) a 100 (massimo)	Refinitv
ENVIRONMENTAL PILLAR	Livello di performance ambientale dell'azienda con valore da 0 (minimo) a 100 (massimo)	Refinitv
SOCIAL PILLAR	Livello di performance sociale dell'azienda con valore da 0 (minimo) a 100 (massimo)	Refinitv
GOVERNANCE PILLAR	Livello di performance di governance dell'azienda con valore da 0 (minimo) a 100 (massimo)	Refinitv

Fonte: Nostra elaborazione

6. Risultati

6.1 Statistiche descrittive

Per quanto riguarda le variabili di corporate governance, il 70% delle imprese ha un team ESG, mentre il 46% ha nominato un comitato ESG. Tra i comitati ESG, il 20% è composto esclusivamente da amministratori indipendenti. Per contro, circa un quarto delle imprese (28%) ha nominato un CSO all'interno del proprio Consiglio di Amministrazione.

Nel campione, il valore medio del punteggio ESG performance è pari a 67,25. L'impresa con la peggiore performance ha ottenuto un punteggio di 24,87, mentre quella con la migliore performance ha ottenuto un punteggio di 93,58.

Le imprese del campione sono quasi esclusivamente imprese di grandi dimensioni, sia in termini di fatturato sia di numero di dipendenti, e sono prevalentemente imprese attive e di lunga data, con un'età media di 66,41 anni. Infine, le imprese sono distribuite in 14 Paesi europei, concentrate principalmente in Germania (79 imprese), Italia (50 imprese), Francia (33 imprese) e Finlandia (28 imprese).

Tab. 2: Statistiche descrittive

Variabile	Media/%	SD	Min	Massimo
ESG Committee	46%	0,50	0,00	1,00
ESG Team	70%	0,46	0,00	1,00
ESG Officer	28%	0,45	0,00	1,00
INDESG Committee	20%	0,40	0,00	1,00
ESG Performance	67,28	15,07	24,87	93,58
ENVIRONMENTAL PILLAR	63,51	21,13	7,24	98,37
SOCIAL PILLAR	71,68	15,97	17,06	97,34
GOVERNANCE PILLAR	64,63	19,23	16,93	96,49

Fonte: Nostra elaborazione

6.2 Cluster analysis

I risultati della cluster analysis, riportati nella Tabella 3, presentano un quadro dei diversi approcci di CG agli aspetti ESG delle aziende del campione. Le variabili utilizzate sono la presenza di un comitato ESG, la presenza di un team ESG, la presenza di un CSO e la presenza di un comitato ESG composto esclusivamente da amministratori indipendenti. In particolare l''analisi ha identificato 6 cluster di aziende.

Tab. 3: Cluster analysis

Approccio CG	AZIENDE	ESG Committee	ESG Team	ESG Officer	INDESG Committee	Descrizione
ESG esterno	35	0	0	0	0	L'azienda non presenta alcuna struttura dedicata all'ESG. Si avvale di un consulente ESG esterno. Le fonti esterne influenzano la cultura ESG.
ESG culturale	33	0	0.73	1	0	L'azienda ha individuato un amministratore incaricato di sviluppare le politiche e le strategie ESG: il Chief Sustainability Officer. La cultura ESG è gestita dal consiglio di amministrazione, ma è rappresentata da un unico membro esecutivo.
ESG operativo	80	0	1	0	0	L'azienda ha istituito un team ESG. Si tratta di una funzione aziendale operativa, responsabile dell'esecuzione di iniziative concrete in materia di ESG. La cultura ESG è diffusa a partire dal livello intermedio.
ESG strategico	51	1	0.37	0	0.73	L'azienda ha nominato un comitato consiliare ESG, spesso composto da membri indipendenti. Questo comitato identifica e delinea le politiche e le strategie ESG. La cultura ESG è diffusa secondo un approccio top-down.
ESG operativo e strategico	37	1	1	0	0	L'azienda ha nominato un comitato direttivo ESG e un team ESG. L'approccio è duplice: operativo e strategico. La cultura ESG segue un duplice approccio: una prospettiva olistica e una metodologia top-down.
ESG dedicato	44	1	0.82	1	0.42	La società ha nominato un comitato ESG e un amministratore dedicato agli aspetti ESG (CSO). La maggior parte delle aziende dispone di un team ESG. La cultura ESG è onnicomprensiva e si basa su una moltitudine di risorse dedicate.

Fonte: Nostra elaborazione

35 imprese sono state classificate nel cluster ESG esterno. Queste aziende non hanno adottato strutture interne di CG per gli aspetti ESG. Tuttavia, queste aziende hanno divulgato informazioni ESG e per questo motivo si presume che si siano basate su risorse esterni.

Il cluster ESG culturale invece è composto da 33 aziende che hanno nominato un CSO. Pertanto, la cultura ESG si diffonde dall'alto anche se non è supportata da un comitato ESG. Alcune delle aziende di questo cluster dispongono anche di un team ESG.

Il cluster denominato ESG operativo comprende le aziende che hanno creato un team ESG. Queste aziende non hanno un comitato ESG o un CSO. In questo caso, la cultura ESG si diffonde dal basso nelle varie funzioni aziendali, alle quali il team ESG si rivolge per gli aspetti operativi, anziché per quelli strategici o politici. Questo è il cluster più popolato, con 80 aziende.

Gli ultimi tre cluster contengono aziende che hanno nominato un comitato ESG. Nel cluster ESG strategico sono incluse 51 aziende che hanno nominato un comitato ESG ma non un CSO. Queste aziende hanno nominato un gruppo di amministratori per implementare le politiche e le strategie ESG. Anche in questo caso, la cultura ESG è diffusa dall'alto. Nel 73% dei casi, questo comitato è composto esclusivamente da amministratori indipendenti.

Questa percentuale scende al 42% nel cluster ESG dedicato, dove ci sono 44 aziende che hanno nominato un CSO oltre a un comitato ESG. L'approccio della CG agli aspetti ESG è completo e prevede figure e gruppi dedicati. Sono le aziende più strutturate, con l'82% che ha anche un team ESG.

In conclusione, il cluster denominato ESG operativo e strategico è composto da 37 aziende che hanno nominato sia un comitato ESG che un team ESG. Nessuna di queste aziende ha un CSO e nessuno dei comitati ESG è composto esclusivamente da amministratori indipendenti. Questi risultati indicano un forte impegno interno all'azienda nei confronti degli aspetti ESG, che mira a diffondere la cultura ESG sia dal basso che dall'alto.

Tab. 3: Valori medi delle performance ESG per cluster

Cluster	Imprese	Età	Dipendenti	Ricavi
ESG esterno	35	65	11468	5.610.314,35
ESG cultura	33	65	62608	23.436.162,31
ESG operativo	80	72	16522	6.614.104,18
ESG strategico	51	54	17998	9.890.898,78
ESG operativo e strategico	37	66	30429	15.944.165,74
ESG dedicato	44	75	39925	17.113.111,43
Media nel campione	*280*	*67*	*27106*	*11.950.819,88*

Fonte: Nostra elaborazione

Confrontando i vari cluster, come mostrato in Tab. 4, è possibile notare differenze significative rispetto alle caratteristiche delle imprese che li compongono. Il valore medio dei ricavi e dei dipendenti delle imprese appartenenti al cluster ESG esterno è infatti notevolmente inferiore a quello delle imprese appartenenti al cluster ESG dedicato. Le imprese che adottano approcci di CG interni sono dimensionalmente più grandi e ottengono mediamente ricavi maggiori. Non emergono invece differenze significative per quanto riguarda le età delle imprese.

Intrepretando i dati secondo la Stakeholder Theory, è possibile delineare come un maggiore coinvolgimento degli stakeholder aziendali, attraverso l'internalizzazione delle funzioni ESG, aumenti la performance ESG complessiva.

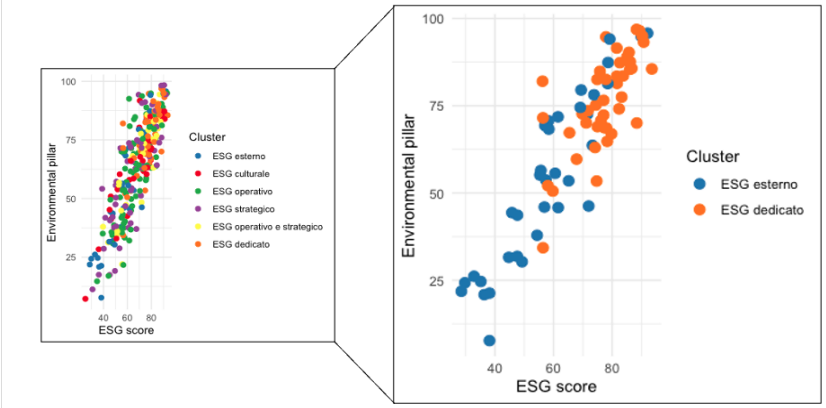
Tab. 4: Valori delle performance ESG per cluster

		ESG esterno	ESG cultura	ESG operativo	ESG strategico	ESG operativo e strategico	ESG dedicato
ESG Performance	Min	28,53	24,87	34,61	30,84	39,52	56,25
	Media	57,83	68,79	65,64	64,02	70,64	77,61
	Max	92,09	91,43	93,12	92,07	92,08	93,58
	St. Dev.	16,63	16,88	12,51	15,62	14,16	9,68
Environmental Pillar	Min	7,71	7,24	14,71	11,25	21,97	34,32
	Media	53,74	65,05	61	59,54	66,66	76,59
	Max	95,78	91,75	94,95	98,37	94,63	96,86
	St. Dev.	24,3	20,01	19,89	22,62	19,76	13,62
Social Pillar	Min	20,16	32,15	25,86	17,06	26,44	51,9
	Media	62,59	74,6	70,42	67,64	75,51	80,51
	Max	94,09	94,16	95,5	92,9	95,9	97,34
	St. Dev.	17,62	16,71	13,29	16,85	16,2	11,64
Governance Pillar	Min	23,88	25,37	16,94	25,91	26,38	20,17
	Media	53,95	63,61	64,46	63,02	67,98	73,21
	Max	89,72	92,28	95,66	96,49	94,67	96,39
	St. Dev.	16,82	22,34	18,58	19,39	17,86	16,89

Fonte: Nostra elaborazione

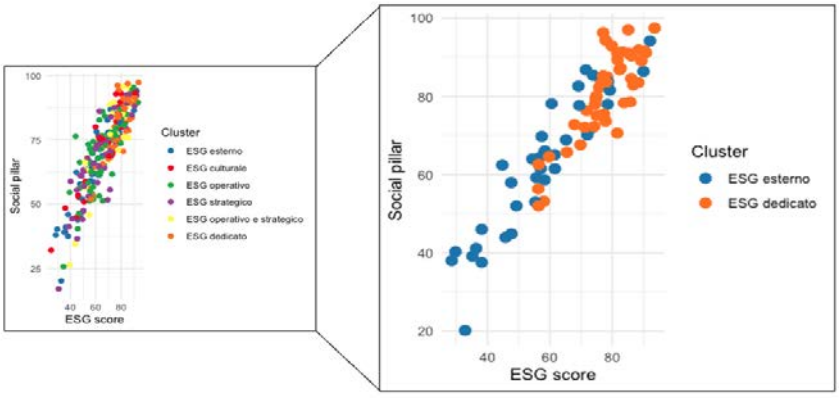
In Fig. 1, Fig. 2 e Fig. 3 è possibile apprezzare come le imprese del cluster ESG dedicato presentino valori di ESG score superiori agli altri cluster. In particolare, confrontando con le imprese appartenenti al cluster ESG esterno emergono una maggioranza significativa dei valori di ESG Score e dei tre pilastri della sostenibilità.

Fig. 1: ESG performance ed Environmental Pillar



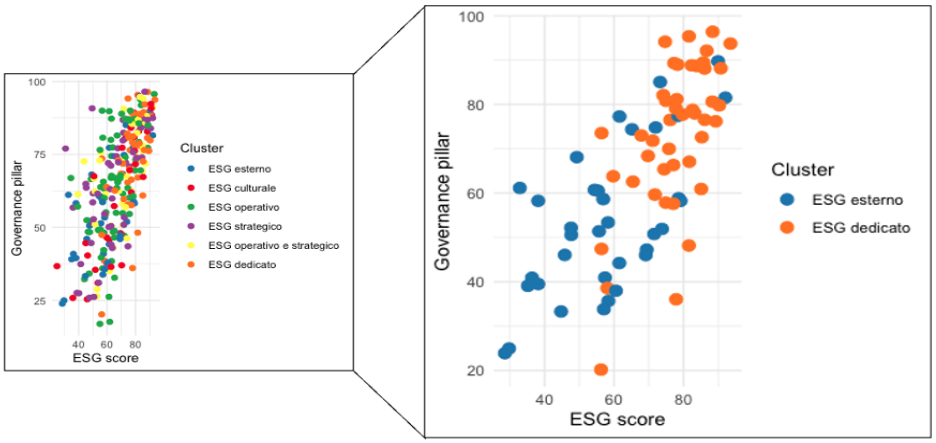
Fonte: Nostra elaborazione

Fig. 2: ESG performance e Social Pillar



Fonte: Nostra elaborazione

Fig. 3: ESG performance e Social Pillar



Fonte: Nostra elaborazione

Dalle analisi emerge quindi che quando un'azienda incorpora i principi ESG nella propria struttura interna di governance, essa dimostra un impegno tangibile verso la gestione sostenibile e il rispetto delle normative sociali ed etiche.

I consulenti esterni possono fornire preziose indicazioni, strutture e migliori pratiche probabilmente nella prima fase di approccio agli ESG. I direttori non esecutivi esterni svolgono un ruolo nel conferire legittimità alle società. Ogni direttore esterno indipendente contribuisce in qualche modo alla legittimità dell'organizzazione, contribuendo alle performance ESG. Man mano che le aziende acquisiscono esperienza e competenze nelle questioni ESG, il ruolo dei consulenti può diventare sempre più residuale, parallelo all'assunzione di risorse dedicate alla costruzione delle loro capacità ESG interne.

L'esistenza di un comitato ESG interno o di un individuo che supervisiona le questioni legate alla sostenibilità a livello del consiglio indica che l'azienda adotta una posizione strategica proattiva nei confronti degli stakeholder. Tipicamente incaricato di revisionare politiche e azioni legate ai principi dell'azienda e all'impegno nelle questioni di sostenibilità, un comitato ESG partecipa attivamente alla rendicontazione delle informazioni sociali e ambientali. Poiché le responsabilità di un comitato ESG comprendono garantire la qualità del processo di coinvolgimento degli stakeholder e le politiche di rendicontazione sulla sostenibilità dell'azienda, l'istituzione di un tale comitato può essere considerata un metodo per affrontare gli stakeholder e affrontare la questione della legittimità. La presenza di un tale comitato, alla luce dei risultati, può essere considerata un approccio efficace per sfruttare le conoscenze.

7. Conclusioni

Lo studio sottolinea il ruolo centrale della CG nel guidare le performance ESG (Naciti *et al.*, 2021). La cluster analysis ha rivelato spunti interessanti su come i diversi approcci di CG influenzino la performance ESG di un'azienda. I risultati suggeriscono che non esiste una soluzione unica per l'integrazione dei principi ESG: le aziende possono adottare diverse strategie a seconda del settore, delle dimensioni e degli obiettivi ESG specifici, ma quando sono in grado di dotarsi di strutture interne complete riescono ad ottenere migliori performance ESG.

In particolare, l'analisi evidenzia il ruolo critico degli approcci strategici e interni di CG nel plasmare la strategia e la cultura della sostenibilità di un'azienda (Antwi-Adjei *et al.*, 2020), per ottenere un'elevata performance ESG (Khan, 2019). I risultati dimostrano che un approccio strutturato e completo, esemplificato dai cluster "ESG dedicato" e "ESG operativo e strategico", ha un impatto sostanzialmente positivo sulla performance ESG (Biswas *et al.*, 2018). Ciò suggerisce che, anche secondo la Stakeholder Theory, quando le imprese danno priorità alle considerazioni ESG all'interno delle loro strutture di governance e le integrano nei processi decisionali operativi e

strategici, ottengono migliori risultati ESG (Ludwig & Sassen, 2022). I risultati possono rappresentare un'indicazione preziosa per le organizzazioni che cercano di migliorare i loro sforzi di sostenibilità attraverso meccanismi efficaci di corporate governance (Michelon & Parbonetti, 2012).

In conclusione, i risultati evidenziano la relazione simbiotica tra approcci di governance e performance ESG. Un solido quadro di governance che dia priorità alla sostenibilità può portare a risultati ESG positivi, che possono produrre diversi benefici per le imprese.

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ESG performance:
Does it pay back in terms of corporate brand value?

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Abstract

Frame of the research: *This study contributes to various research domain of interests, such as branding and corporate branding, corporate governance, ESG and, more in general, sustainability and society well-being.*

Purpose of the paper: *This paper advances hypotheses linking the corporate brand value to the ESG performance.*

Methodology: *The study tests hypothesis by applying linear regressions on cross-sectional 2021 data, built on the corporate brand value of the world's top leading brands, whose ESG score has been retrieved from the Refinitiv™ database. In particular, the corporate brand value has been operationalised by means of the Interbrand listing.*

Results: *Findings show a positive relationship between the corporate brand value and the ESG social dimension, whereas the impact of the other ESG dimensions have been found not significant. Moreover, findings shed light on the positive link between the corporate brand value and ESG controversies, moderated by the social dimension.*

Research limitations: *this paper is based on a sample retrieved from the 2021 Interbrand listing, with the related 2021 Refinitiv™ data, hence further studies are needed to investigate longitudinal effects stemming from the link between corporate brand value and ESG performance.*

Managerial implications: *Corporate managers should be aware of the specific effects of each ESG factor on the overall brand value. However, in parallel with a more focalized view on ESG dimensions, we also suggest a holistic approach to ESG management and branding, for instance by creating an ESG Global Brand Business Unit.*

Originality of the paper: *This is the first study that links the value of leading global corporate brands to their ESG performance using Refinitiv™.*

Keywords: *value; financial value; brand value; environmental; social; governance; Interbrand; ESG; ESG effects; Refinitiv.*

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1. Introduction

In the current BANI (Brittle, Anxiety, Non-Linearity and Incomprehensible) world, corporate brands are playing a major role in creating and delivering value not only for their shareholders, but also for their stakeholders and for the entire planet (Donaldson and Preston, 1995; Iglesias *et al.*, 2023; Roper and Davies, 2007).

The consideration of social and environmental factors, along with the acknowledgment of the need for a multiple stakeholders' view, shed light on the failure of shareholders' primacy (Freeman, 1999; Grossman, 2005; Smith and Rönnegard, 2016). This is in line, in the words of Lantos (2001, p. 601), with the concept of social responsibility that must be conceived as "a balancing act: business must balance economic performance, ethical performance, and the balance must be achieved among various stakeholders". In particular, Hillman and Keim (2001) observed that a careful management of primary stakeholders (e.g., employees, customers, suppliers and communities) can also lead to shareholders' wealth.

Hence, from Milton Friedman calling for a profit- and shareholders-driven approach, both academics and practitioners are embracing the view of the pioneer Edward Freeman who highlighted the importance of integrating the multiple stakeholders' view into the strategy of the company (1984, 1994), which includes a collective responsibility, also shared with competitors, who are willing to transform the whole industry towards a more sustainable one (Lantos, 2001). Thus, the approach has evolved from the shareholders' capitalism, which does not involve stakeholders in the strategy of the firm, towards the corporation that is acting as a corporate citizen, where the societal involvement is extensive (Godfrey, 2005).

In particular, the moral capital enhanced by strategies of corporate philanthropy can increase shareholder wealth by leveraging on intangible resources, such as *corporate brands*, which protect the company from potential risks (Abratt and Sacks, 1988; Godfrey, 2005; Surroca *et al.*, 2010). For instance, when corporate brands are based on a sustainable positioning, companies can achieve both transactional and reputational outcomes, such as consumers' loyalty and advocacy behaviours (Du *et al.*, 2007). In fact, building a strong corporate brand positively impacts on shareholders' value (Guenther and Guenther, 2019) and is linked to re-purchase intentions, indicating its impact on stakeholders' willingness to be loyal to the corporate brand (van Riel *et al.*, 2005). Moreover, when corporate brands embrace sustainability, they can have a positive impact on employees' life satisfaction (Golob and Podnar, 2021), and can increase employees' retention (Meier and Cassar, 2018) and their willingness to co-create value with the company (Bhattacharya *et al.*, 2008). Moreover, when corporate brands act as good corporate citizens (Carroll, 1991; Naidoo and Abratt, 2018), also macro-outcomes can be achieved, such as social welfare and citizens' quality of life (Bhattacharya *et al.*, 2004).

In this scenario, whilst corporate brands are called to be sustainable and more stakeholders-conscious (Iglesias *et al.*, 2023), companies are invited to make responsible investments, defined as "investment practices that integrate a consideration of ESG issues with the primary purpose of delivering higher-risk-adjusted financial returns' (Eccles and Viviers, 2011, p. 389). This implies that companies are called to authentically integrate the ESG framework in their strategy (Ferrell, 2021) and to raise a collective awareness linked the potential relationship between the brand value and the ESG scores.

Based on the above considerations and to answer the recent call for a deeper examination of ESG metrics effectiveness (Atkins *et al.*, 2023; Esposito De Falco *et al.*, 2023), this paper advances hypotheses linking the corporate brand value to the ESG performance and tests them by applying linear regressions. In particular, the present study makes use of cross-sectional data, built on the corporate brand value of the world's top leading brands, as indicated by the Interbrand Best Global Brands Ranking, whose ESG score has been retrieved from the Refinitiv™ database. In acknowledging the need for "granular" research on ESG (Edmans, 2023), this study considers the three ESG dimensions separately, as well as ESG controversies.

2. Literature review and hypothesis development

2.1 Corporate brand value

By acknowledging that ESG performance is only linked to the corporation and not to its products or services, it is important to undertake a corporate brand perspective that - if compared with a product brand perspective - has a wider scope that goes far beyond the selling of brand products (Hatch and Schultz, 2008; Nascimento and Loureiro, 2024). Corporate brands are strong assets uniquely representing the organization (i.e., the corporation) (Aaker, 2004; Balmer, 2012), playing a major role in creating and delivering value for their stakeholders (Iglesias *et al.*, 2023), such as investors, customers, employees, suppliers, governments, trade associations, communities, and political groups, amongst the others (Donaldson and Preston, 1995; Ind, 1997, 1998).

Corporate brands can categorize stakeholders based on their needs and expectations and prioritize them based on their mutual dependence and strategic significance (Jones, 2005). When stakeholders significantly contribute to determining the value base of a corporate brand (Gregory, 2007), they are also involved in the corporation's strategy, thereby leading to corporate brand value co-creation (Ind *et al.*, 2017). In particular, in order to create and maintain value during dyadic (Aarikka-Stenroos and Jaakala, 2012; Mingione *et al.*, 2020) and network-based relationships (Merz *et al.*, 2009, 2018), corporate brand managers are called to involve stakeholders during corporate brand processes (Iglesias *et al.*, 2013; Ind *et al.*, 2013) by sharing information, activating a feedback system, and by constantly dialoguing with them (Edinger-Schons *et al.*, 2020). By taking this perspective, we can affirm that the corporate brand "value resides in the actions, interactions, and projects that acquired resources make possible or support" (Schau *et al.*, 2009, p. 31).

Beyond the value stemming from relations and interactions, a purely positivist view of corporate brands (Mingione and Abratt, 2022) conceives them as objects legally owned by the corporation and that can be turned into liquid assets with financial value (Aaker, 2004; Balmer and Gray, 2003). In particular, building a strong corporate brand positively impacts on shareholders' value (Guenther and Guenther, 2019) and is linked to re-purchase intentions, indicating its impact on stakeholders' willingness to loyalty (van Riel *et al.*, 2005).

Given the relevance of the ranking Best Global Brands of Interbrand, various scholars have operationalised the brand value by means of the Interbrand listing (Harjoto and Salas 2017; Madden *et al.*, 2006; Melo and Galan, 2011). For instance, Melo and Galan's (2011) methodology considered: financial strengths, driving factor for consumer selection and prospect to create brand revenue. Moreover, Madden *et al.* (2006) used the Interbrand ranking to explore how brands can create financial value for shareholders. Specifically, they considered the following dimensions: 1) market segmentation; 2) financial analysis; 3) role of brand analysis; 4) brand strength analysis; and 5) brand value calculations. It is interesting to note the evolution of Interbrand itself in calculating the value of brands, with measurement taking into consideration dimensions that reflect current trends and challenges: 1) human truth (i.e., people/societal side change oriented); 2) economic (financial side); 3) experiences (interactions/co-creation side) (Interbrand, 2021). Hence, in accordance with the above considerations, the novel methodology of Interbrand sheds light on the relational and economic side of brands. However, Interbrand also introduces a new key driver of the brand value, namely the human truth.

In particular, the human truth increases the value of the brand because it authentically integrates sustainability in the core purpose of its positioning, thereby impeding brand controversies, such as woke washing (Mirzaei *et al.*, 2022; Vredenburg *et al.*, 2020) and greenwashing (Vollero *et al.*, 2016). In other words, the human truth on sustainability must be reflected in the brand's strategy and communication (Lai *et al.*, 2010), in the corporate purpose (Iglesias *et al.*, 2023), and in the corporations' ESG compliance (Puriwat and Tripopsakul, 2023). In fact, scholars have found that environmental and social disclosure positively influence the value of the brand (Zampone *et al.*, 2021). The following three sections deepen the above thoughts, by reviewing: i) the value inherent a

corporation's environmental, social, and governance obligations; ii) the role of controversies in the ESG framework; iii) the brand value, CSR considerations, ESG and controversy considerations. In the latter section, the present paper develops hypothesis by linking the brand value to ESG dimensions and to ESG controversies.

2.2 The value inherent a corporation's ESG obligations

The concept of ESG - given the presence of multiple perspectives and the lack of standardized measurement methods - currently lacks a unified definition (Esposito de Falco *et al.*, 2024; Li *et al.*, 2021). However, we can rely on the European Commission (2024a) definition, which conceives ESG as "a framework or criteria to measure the sustainability and ethical impact of an investment or a company focusing on three fields: Environmental, Social and Corporate Governance."

In the last thirty years, there has been a notable growth of global corporations adopting ESG measures, with only twenty companies reporting ESG in the early Nineties, almost 9,000 companies in 2016 (Amel-Zadeh and Serafeim, 2018), to end up - according to Refinitiv (2024) - with 40,000 companies reporting ESG across 90 Countries. Alongside this growth, there has been an increased interest from investors, with approximately 1,400 endorsers of the UN Principles for Responsible Investment by 2016, collectively supervising assets valued at approximately $60 trillion (Amel-Zadeh and Serafeim, 2018).

Since the affirmation of the stakeholder theory (Freeman, 1999), the positive relationship between sustainable efforts and the corporation's financial performance has allowed companies to balance the need of all stakeholders, thereby including also shareholders' interest (Clementino and Perkins, 2021; Cornell and Shapiro, 2021; Fiore *et al.*, 2020; Jensen, 2001; Malik, 2015; Porter and Kramer, 2006). In fact, this is supported non only by academics, but is also backed up by institutional consolidation (Avetisyan and Hockerts, 2017; Erhemjamts and Huang, 2019), in alignment with the European Commission (2024a), which warns that "while the term ESG is often used in the context of investing, stakeholders include also customers, suppliers, and employees, all of whom are increasingly interested in how sustainable an organisation's operations are."

The value inherent a corporation's ESG obligations stems from the nexus between ESG reporting and CSR disclosure (Fahad and Busru, 2021; Khan, 2022) - and the company's financial performance (Bansal *et al.*, 2021; Baran *et al.*, 2022; Feng and Wu, 2021; Huang, 2021). For instance, Koller *et al.* (2019) observe that ESG create value by "facilitating top-line growth, reducing costs, minimizing regulatory and legal interventions, increasing employee productivity, and optimizing investment and capital expenditures...Among other advantages, executing ESG effectively can help combat rising operating expenses (such as raw-material costs and the true cost of water or carbon)". Moreover, Benlemlih and Girerd-Potin (2017) observed that the value is also linked to the company's financial risk reduction. In particular, the positive link between ESG disclosure and the corporation's performance has been studied across diverse sectors, such as the software industry (Kim *et al.*, 2018) and the energy industry (Hurduzeu *et al.*, 2022).

Despite the value inherent a superior ESG performance not all companies approach to ESG in the same manner. For instance, Clementino and Perkins (2021) found that companies show different degrees of ESG compliance and engagement. Hence, whilst the companies enacting a passive resistance to ESG do not believe that ESG can drive the change and bring a real value to the company, those companies who actively conform to ESG, authentically align to ESG principles by integrating them in the corporation's strategy (Clementino and Perkins, 2021).

2.2.1 Digging into ESG: focusing on the value stemming from each ESG dimension

In acknowledging the need for "granular" research on ESG (Edmans, 2023), it has been deemed necessary to observe environmental, social and governance dimensions separately. First, companies are called to deal with environmental concerns, which "might include climate change mitigation and adaptation, as well as the environment more broadly, for instance the preservation of biodiversity,

pollution prevention and the circular economy" (European Commission (2024b). In particular, environmental practices lead not only to reputation as a long-term benefit, but also diminish the financial volatility of companies and increase their chances of surviving in the industrial marketplace (Ortiz-de-Mandojana and Bansal, 2016). Moreover, scholars observed that whilst resource commitment of green initiatives and operational capabilities have a positive impact on financial performance (Richey Jr. *et al.*, 2014; Yu and Ramanathan, 2015), Marsat *et al.* (2022) found that when companies have been consistent in their prior environmental commitments, they can more easily recover from potential emerging controversies. Finally, it is important to highlight those scholars who, in relation to environmental concerns, have claimed that the selection of key indicators (e.g., reduced carbon footprint, energy saving) and the measurement and assessment of the generated value represent core steps to develop value also for the corporation's industrial partners (Patala *et al.*, 2016; Rahman *et al.*, 2014).

Second, companies are called to deal with social concerns, which "refer to issues of inequality, inclusiveness, labour relations, investment in people and their skills and communities, as well as human rights issues" (European Commission, 2024b). In particular, as highlighted by Becchetti *et al.* (2022), this dimension is starting to play an even a more important role than previously recognized (van Rekom *et al.*, 2013) in the ESG framework. This is due to the social complexity highlighted in the above cited BANI world, even more enhanced by the recent pandemic Covid-19 (He and Harris, 2020), by the Russian-Ukraine war (Becchetti *et al.*, 2022), and by the very recent war between Israel and Palestine. Moreover, Millennials and Gen Z are a generational cohort that poses a significant value to the authenticity and transparency of social aspects, being also ready to pay a premium price when companies offer sustainable brands and support social causes (Lyon *et al.*, 2018; Rank and Contreras, 2021). Accordingly, companies are starting to take a stance on socio-political issues, such as gender equality enhanced with femvertising campaigns (Hsu, 2017; Sterbenk *et al.*, 2022), or advancing equality in the fight for equity, for instance with anti-racism campaigns (Dunivin *et al.*, 2022; Eyada, 2020) or with LGBTQ+ campaigns (Lim and Young, 2021). In general, by reviewing existent studies, scholars supported the existence of a positive relationship between a corporation's social efforts and its financial performance (Dam and Scholtens, 2015), thereby companies should be aware of the importance of social auditing, which measures the efficacy of their CSR practices (Maignan *et al.*, 2005). In fact, as Maignan *et al.* (2005, p. 971) highlight in their stakeholder model, "without a reliable measurement of the achievement of social objectives, a company has no concrete way to verify their importance, link to organizational performance, or justify expenditures to stakeholders". To overcome these challenges, external consultancies may measure the CSR performance (Polonsky and Jevons, 2006). Moreover, in line with the stakeholder-based approach of the present study, Becchetti *et al.* (2022, p. 1) suggest that in order to enhance "the value of that pillar, it is necessary to assess both the internal and external relationships of the firm from an impact perspective, improving at the same time the multidimensional well-being of workers and the capacity to create sustainable development in the local community.

Third, and in line with the above, the importance of relationships and engagement strongly emerge in the Governance dimension, which also includes the consideration of environmental and social concerns. In fact, as suggested by the European Commission (2024b), the governance of "public and private institutions - including management structures, employee relations and executive remuneration - plays a fundamental role in ensuring the inclusion of social and environmental considerations in the decision-making process." In particular, the engagement of stakeholders requires a continuous dialogue and foresees the access to the corporation as key to succeed in its strategies (Hatch and Schultz, 2010). This approach entails a high degree of self-disclosure, where the corporate brand acts as a transparent actor who opens up and reveals its managerial strategies and actions to their stakeholders (Hatch and Schultz, 2010). In particular, Maon *et al.* (2021) observed that internal and external stakeholders belonging to the corporate ecosystem influence the corporation's identity (i.e., by including internal stakeholders) and the corporation's reputation (i.e., by including external stakeholders). This approach is at the basis of a new democratic era, which

allows stakeholders to "participate in the process of organizing, decision-making, and governance in corporations" (Edinger-Schons *et al.*, 2020, p. 511).

2.3 Hypothesis development

2.3.1 Linking corporate brand value, CSR, and the corporation's ESG performance

In the marketing domain, CSR (corporate social responsibility) represents a long-term investment, having a positive impact on the corporate brand value (Melo and Galan, 2011; Minor and Morgan, 2011).

By digging into the studies that explored the specific relationship between CSR activities and financial performances, scholars showed that CSR can drive market value, in the forms of Tobin's q, stock returns (Luo and Bhattacharya, 2006) and risk and cost reduction (Knox and Maklan, 2004; Luo and Bhattacharya, 2009). Moreover, Orlitzky *et al.* (2003) found a positive relationship between the CSR and performance, Mc Williams and Siegel (2000) and Surroca *et al.* (2020) found no direct relationships, actually moderated by the operationalization of performance (Orlitzky *et al.*, 2003), which confirms the importance to find standard CSR measurements (Knox and Maklan, 2004; Polonsky and Jevons, 2006).

At present, there have been fragmented attempts to link the brand value to the ESG scores. For instance, Lee *et al.* (2022) revealed that brands tend to signal their ESG performance through direct and collaborative sharing of ESG information. Moreover, whilst Paolone *et al.* (2022) qualitatively found that ESG pillars drive higher levels of marketing performance, other authors offered quantitative studies revealing the positive impact of ESG scores on brand image, customers' purchase intentions (Puriwat and Tripopsakul, 2023) and brand reputation (Yu *et al.*, 2023). Further, some studies discovered that only the social and governance dimensions have a direct effect on brand image, brand attitude (Koh *et al.*, 2022), brand credibility and perceived quality (Lee and Rhee, 2023). Additionally, a very recent article discovered that corporate ethical responsibility impacts on the corporate brand identity, positively influencing environmental and social performances (Bag *et al.*, 2024).

By drawing on the above literature review and in accordance with Eccles (2023) suggesting that each ESG dimension plays a specific role in driving value, this paper develops the following hypothesis:

HP1: The Environmental score is positively related to the corporate brand value
HP2: The Social score is positively related to the corporate brand value
HP3: The Governance score is positively related to the corporate brand value

2.3.2 The key role of authenticity and legitimacy: the impact of ESG controversies on corporate brand value

In this scenario, it is important to underline the key role played by credibility, authenticity (Iglesias *et al.*, 2019; Hur *et al.*, 2014; Neher *et al.*, 2022) and corporate transparency (Heinberg *et al.*, 2020). In fact, the authenticity of CSR strategies and actions is central to increase the corporate brand value (Nirino *et al.*, 2019) and, more specifically, stakeholders' purchase intentions (Afzali and Kim, 2021), customers' WOM and brand loyalty (Markovic *et al.*, 2018). Moreover, Zampone *et al.* (2021), found that environmental and social disclosure positively influence the value of the brand.

Conversely, scholars have found that when corporate brands are not authentic in their purposes - without genuinely supporting what is actually communicated to stakeholders - they are conceived as hypocritical (Klein and Dawar, 2004; Korschun *et al.*, 2016) and can be accused of greenwashing and woke washing, which may have serious negative consequences on the corporate brand value (Harjoto and Salas, 2017; Mirzaei *et al.*, 2022; Vredenburg *et al.*, 2020). Moreover, when CSR and sustainability practices are not supported by a brand conscience throughout the entire value chain, companies could experience a lack of authenticity and credibility, which in turn deteriorate the brand value (Iglesias *et al.*, 2023; Wilson and Morgan, 2011). For instance, the absence of supplier

credibility represents an important barrier to take on environmentally sustainable offerings (Ramirez *et al.*, 2014), which may also trigger a greenwashing effect that could be recovered by adopting specific brand trust repair strategies (Guo *et al.*, 2018).

For the potential backlashes of CSR and the consequential stigmatization of CSR (Warren, 2022), Harjoto and Salas (2017) divided CSR into CSR strengths (proactive strategic CSR activities) and CSR concerns (socially irresponsible activities), revealing - respectively - their positive and negative effects on the brand value. Remarkably, in the ESG context, CSR concerns (e.g., corporate wrongdoing, greenwashing, woke washing) are referred as to ESG controversies (Aouadi and Marsat, 2018; Nirino *et al.*, 2021).

ESG controversies relate "to corporate environmental, social, and governance news stories such as suspicious social behavior and product-harm scandals that place a firm under the media spotlight and, by extension, grab investors' attention" (Aouadi and Marsat, 2018, p. 1027). Consequently, controversies represent a significant barrier to the corporation's ESG performance by negatively affecting the company's value (Nirino *et al.*, 2021), and by posing significant challenges to its organizational legitimacy (Palazzo and Scherer, 2006). In particular, organizational legitimacy is key to avoid stakeholders' skepticism (Skarmeas and Leonidou, 2013) on potential greenwashing on ESG disclosure (Yu *et al.*, 2020) and to trigger isomorphic sustainable practices of all stakeholders, who align to the same value creating system (Taylor *et al.*, 2021). Accordingly, Martín-de Castro (2021) observed that to achieve corporate legitimacy, organizations are called to co-create shared value with stakeholders belonging to their market (e.g., customers, suppliers, competitors) and beyond the market stakeholders (e.g., media, NGOs, citizens). Further, also suppliers play a key role in building and maintaining the corporation's legitimacy. When suppliers are positively perceived in terms of sustainable practices, the industrial brand equity of both suppliers and buyers shows a superior performance (Lai *et al.*, 2010). Conversely, the absence of supplier credibility represents an important barrier to take on environmentally sustainable offerings (Ramirez *et al.*, 2014) and to trigger a greenwashing effect, which could be recovered by adopting specific brand trust repair strategies (Guo *et al.*, 2018).

The above scenario, supported by the negative relationship between ESG controversies and the company's financial value observed by several scholars (La Rosa and Bernini, 2022; Li *et al.*, 2019; Nirino *et al.*, 2021), leads this study to the following hypotheses:

HP4: ESG controversies are negatively related to the corporate brand value

HP5: The relationship between ESG controversies and brand value is moderated by the Environmental Score (a), the Social Score (b), and the Governance Score (c)

HP6: Second-order moderation effects influence the relationship between ESG scores and brand value (a) and the relationship between ESG controversies and brand value (b)

3. Methodology

This paper uses cross-sectional data including the brand values and rankings from Interbrand Global Ranking for the year 2021 and links them to the ESG scores provided by LSE Refinitiv ™ - previously Thomson Reuters Eikon - one of the largest international rating agencies serving as a reference point for investors wishing to allocate their investments in companies that perform well in environmental, social, and governance practices (Duque-Grisales and Aguilera-Caracuel, 2021).The final sample comprised 74 brands, for the twofold reasons. First, we only refer to corporate brands because the ESG ratings are only related to corporations. Hence, for instance, the product brands Sephora and Tiffany have been linked to their corporate brand Louis Vuitton. Second, some brands (Chanel, YouTube, Ikea, Gucci, Zara, Pampers, LEGO, Red Bull, Gillette, Cartier, Ferrari, Corona, DHL, Jack Daniel's, Huawei, Hennesy, KFC, Land Rover) have no ESG-data available.

Thanks to the Refinitiv™ database, we had access to the data presented in table 1. Of note, Refinitiv™ calculates Controversies on the basis of the number of published media news on a brand negative behaviour. It is important to also note that in our analysis, we have converted the Social

Score (SS), Governance Score (GS), and Environmental Score (ES) from their original categorical representations (ranging from "A+" indicating excellent performance to "D-" indicating poor performance) into numerical variables for ease of analysis.

Tab. 1: An exemplification of the employed dataset

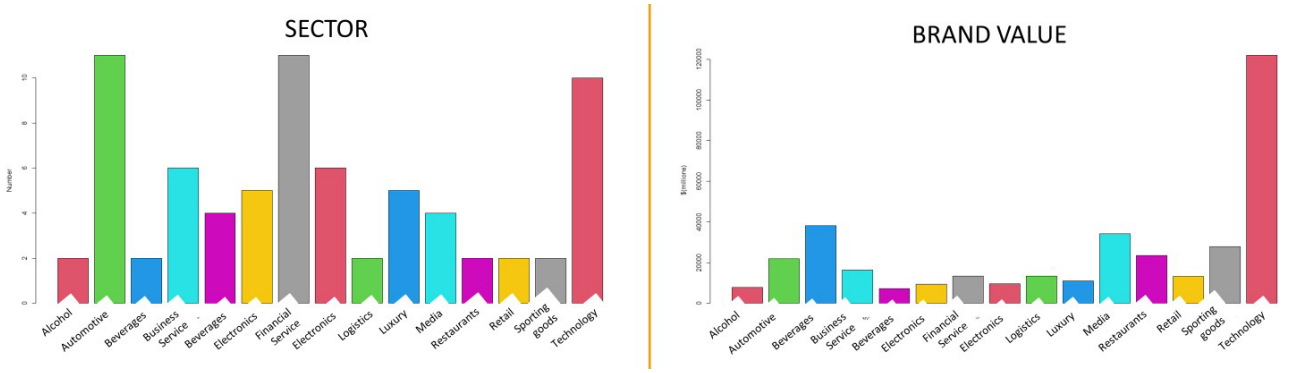
Brand value	ESG Combined score*	Theme	Score*	Weight	Sub-theme	Score*	Weight	Controversies Score	Nr. (E,S,G)
$m	"A+", "A", "A-", "B+", "B", "B-", "C+", "C", "C-", "D+", "D", "D-"	Environmental	"A+", "A", "A-", "B+", "B", "B-", "C+", "C", "C-", "D+", "D", "D-"	%	Resource Use	*	%	"A+", "A", "A-", "B+", "B", "B-", "C+", "C", "C-", "D+", "D", "D-"	nr.
					Emissions	*	%		
					Innovation	*	%		
		Social		%	Workforce	*	%		nr.
					Human rights	*	%		
					Community	*	%		
					Product responsibility	*	%		
		Governance		%	Management	*	%		nr.
					Shareholders	*	%		
					CSR strategy	*	%		
ESG scores always rank from A+ to D-									

Source: our elaboration

The transformation of the scores was necessary for the regression analysis. We assigned a value of 1 to "A+" (excellent) and a value of 12 to "D-" (poor). It's important to note that due to this transformation, the interpretation of the coefficients in the regression results will be inverse. In other words, an increase in SS, GS, or ES implies a deterioration in the respective score, as it indicates a transition from better scores to worse ones. This aspect should be carefully considered when interpreting the results.

Before we describe the methodology adopted for the linear regression model, it's relevant to present the general descriptive statistics of our selected sample (see Figures 1 and 2). By examining Figure 1, we can: i) gain a clear understanding of the sectors analyzed; ii) identify which of the analyzed sectors dominate the Interbrand ranking, specifically automotive, financial service, and technology; iii) observe that the brand value is primarily concentrated in the hands of technology brands.

Fig. 1: Scores by sector distribution and brand mean value



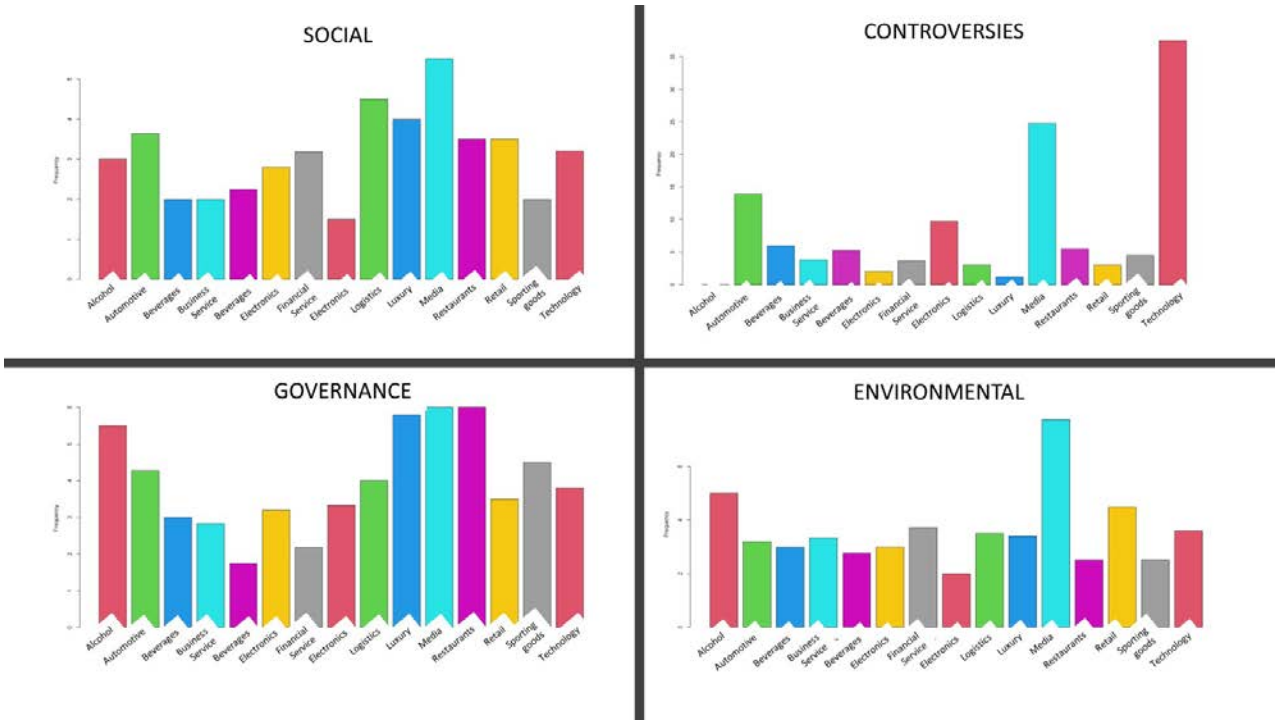
Source: our elaboration

Moreover, it is possible to observe ESG performance, both in terms of single constituents (environmental, social and governance), as well as controversies by sector (fig. 2).

In particular, figure 2 outlines that: i) environmental issues are basically equally distributed, with the three sectors of alcohol, media and retail pursuing the major environmental efforts; ii) environmental

issues are basically equally distributed, with the four sectors of automotive, logistics, luxury and media alcohol, media and retail pursuing the major environmental efforts, and the electronic sector pursuing less efforts; governance issues are basically equally distributed, with the sectors of alcohol, automotive, logistics, luxury, media, restaurants pursuing the major governance efforts, and the beverages sector pursuing less efforts; iv) controversies mainly regard the automotive, the media and the technology sector, with this latter showing the major controversies.

Fig. 2: ESG performance and controversies distributed by sector



Source: our elaboration

Our statistical analysis began with a basic multiple linear regression model, where the dependent variable was ‘Brand value 2021’ and the independent variables were ‘NrC’ (Number of Controversies), ‘ES’, ‘SS’, and ‘GS’. The independent variables were standardized, a process that rescales the variables to have a mean of 0 and a standard deviation of 1.

Standardization is important in regression analysis for several reasons. Firstly, it simplifies the computation of sample covariances and correlations. Secondly, it reduces multicollinearity and the associated problems that are caused by higher-order terms. Thirdly, it allows for a comparison of the effect that different predictor variables have on the response variable. Lastly, it ensures that each variable is measured on the same scale, so the absolute values of the regression coefficients can be compared to understand which variables have the greatest effect on the response variable (Allen, 1997).

After this preliminary step, we tested a model with interaction terms to increase the explanatory power of the model and capture the complex interactions between independent variables. Interaction effects in regression analysis allow the effect of one independent variable on the dependent variable to depend on the value of another independent variable. This can provide a more nuanced understanding of the relationships between the variables and can reveal important insights that might be missed in a model without interaction terms (Andersson *et al.*, 2014; Jaccard *et al.*, 1990; Murphy & Aguinis, 2022).

Finally, we applied the stepwise regression method to the model with interaction terms. Stepwise regression is an automatic method that is particularly useful in exploratory studies with multiple

variables for estimating multivariate linear models. It selects the most useful explanatory variables based on statistical significance (Engelmann, 2023; Lewis, 2007). After applying the stepwise method, we arrived at the final model, which included the main effects of the standardized independent variables and selected interaction terms. This model provides a balance between complexity and interpretability, allowing for a nuanced understanding of the relationships between the variables while avoiding overfitting.

Findings

As table 2 shows, the adjusted R-squared value of 0.7918 implies the model explains about 79.18% of the variability in Brand Value (2021). The F-statistic and its associated p-value (< 2.2e-16) suggest that at least one of the predictors significantly relates to Brand Value (2021). In particular, we can affirm that the model reveals complex relationships between brand value and the predictors, with significant interactions. The estimated linear functions for each predictor are summarized in figure 3.

In our analysis, we scrutinized several hypotheses pertaining to the relationship between various environmental, social, and governance (ESG) factors and brand value. The first hypothesis (HP1) posited a positive relationship between the Environmental Score (ES) and brand value. However, the empirical results did not support this hypothesis. The coefficient for ES was found to be statistically insignificant with a p-value of 0.15604, which is greater than the conventional threshold of 0.05. This suggests that the data does not provide strong evidence to conclude that ES has a significant impact on brand value.

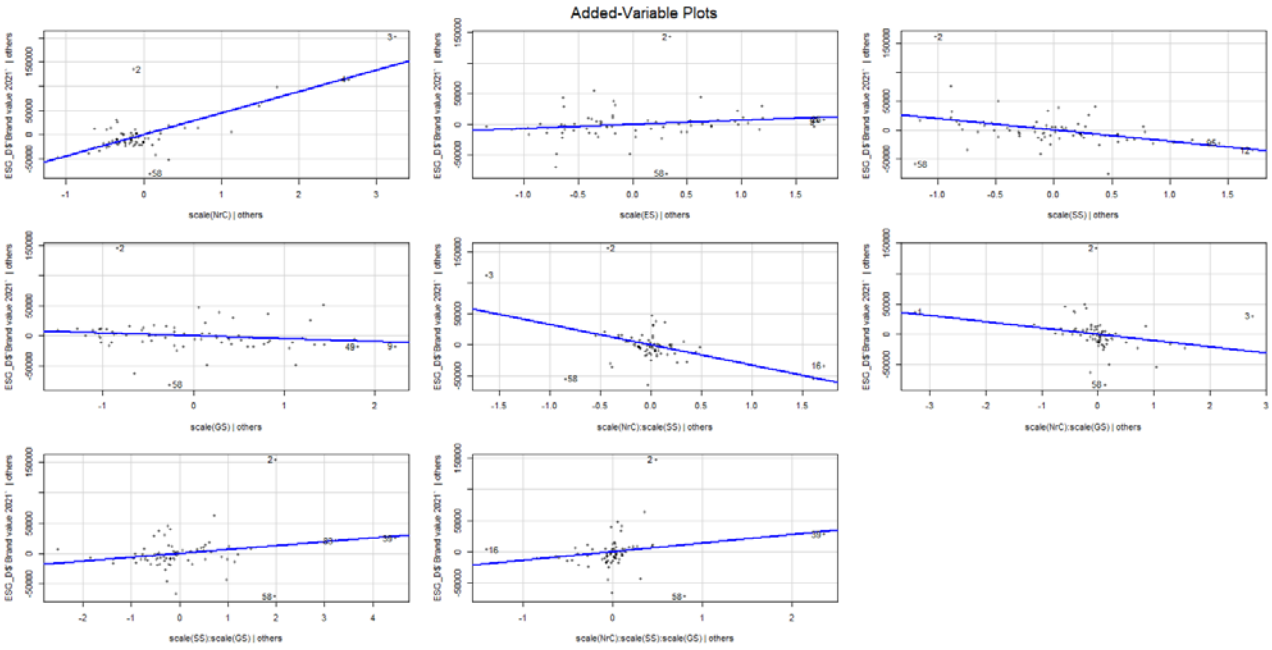
Tab. 2: Summary of the chosen regression model

```
Call:
lm(formula = ESG_D$`Brand value 2021` ~ scale(NrC) + scale(ES) +
    scale(SS) + scale(GS) + scale(NrC):scale(SS) + scale(NrC):scale(GS) +
    scale(SS):scale(GS) + scale(NrC):scale(SS):scale(GS), data = ESG_D)

Residuals:
   Min     1Q Median     3Q    Max
-82414  -8710  -1262   5417 141445

Coefficients:
                              Estimate Std. Error t value Pr(>|t|)
(Intercept)                      28541       3559   8.019 2.70e-11 ***
scale(NrC)                       44411       4837   9.182 2.37e-13 ***
scale(ES)                         6649       4633   1.435  0.15604
scale(SS)                       -19771       5518  -3.583  0.00065 ***
scale(GS)                        -4870       3836  -1.270  0.20870
scale(NrC):scale(SS)            -32760       8279  -3.957  0.00019 ***
scale(NrC):scale(GS)            -10414       5107  -2.039  0.04552 *
scale(SS):scale(GS)               6420       3313   1.938  0.05700 .
scale(NrC):scale(SS):scale(GS)   13783       8120   1.697  0.09440 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 28320 on 65 degrees of freedom
Multiple R-squared:  0.8146, Adjusted R-squared:  0.7918
F-statistic:  35.7 on 8 and 65 DF, p-value: < 2.2e-16
```

*note that the original categorical representations (from “A+” to “D-”) have been transformed into numerical variables. Hence, an increase in SS, GS, or ES implies a deterioration in the respective score as it indicates a transition from better scores to worse ones.

Source: Rstudio

Fig. 3: Regression model linear function estimates



Source: RStudio

Moving on to the second hypothesis (HP2), it proposed a positive relationship between the Social Score (SS) and brand value. The empirical results confirmed this hypothesis. The relationship was found to be negative and statistically significant with a coefficient of -19771 and a p-value of 0.00065, which is less than 0.05. This indicates that as the Social Score improves (as per our scores coding, a higher value in SS indicates a worse rating), the brand value increases. The third hypothesis (HP3) suggested a positive relationship between the Governance Score (GS) and brand value. However, the empirical results did not support this hypothesis. The coefficient for GS was found to be statistically insignificant with a p-value of 0.20870, which is greater than 0.05. This suggests that the data does not provide strong evidence to conclude that GS has a significant impact on brand value.

The fourth hypothesis (HP4) posited that ESG controversies are negatively related to brand value. Contrary to this hypothesis, the empirical results showed that the coefficient for NrC (number of controversies) is positive and statistically significant (coefficient = 44411, p-value < 0.001). This implies that as the number of controversies increases, the brand value also increases. HP5a proposed that the environmental score moderates the relationship between ESG controversies and brand value. However, the interaction model did not support this hypothesis, as the stepwise method screw out the corresponding interaction term. This suggests that the environmental score does not significantly influence the relationship between ESG controversies and brand value. HP5b posited that the social score moderates the relationship between ESG controversies and brand value. The empirical results confirmed this hypothesis. The coefficient for the interaction term scale (NrC): scale (SS) was found to be -32760. This indicates that the effect of NrC on Brand value 2021 decreases by approximately $32760 billion for each standard deviation increase in SS (as per our scores coding, a higher value in SS indicates a worse rating), assuming all other variables are held constant (table 2). The effect of ESG controversies on brand value is not constant, but also depends on the Social Score. Specifically, as the Social Score deteriorates (an increase in SS indicates a worse rating), the standalone positive impact of controversies on the brand value decreases. This means that for companies with a worse Social Score, controversies have less of a positive impact on the brand value.

HP5c posited that the governance score moderates the relationship between ESG controversies and brand value. The empirical results provided some support for this hypothesis. In particular, the coefficient for scale(NrC):scale(GS) is -10414, suggesting that the effect of NrC on Brand value 2021

decreases by approximately $10414 billion for each standard deviation increase in GS, assuming all other variables are held constant. The effect of ESG controversies on brand value is not constant, but also depends on the Governance Score. Specifically, as the Governance Score deteriorates (an increase in GS indicates a worse rating), the standalone positive impact of controversies on the brand value decreases. This means that for companies with a worse Governance Score, controversies have less of a positive impact on the brand value. However, since the main effect of GS is not significant, this interaction should be interpreted with caution. The hypotheses positing second-order moderation effects in the relationships between (H6a) ESG scores and brand value, and (H6b) ESG controversies and brand value, were not supported by the empirical results. For both hypotheses, most interaction terms were eliminated through the stepwise selection method, and the remaining interaction terms did not exhibit significant effects at conventional p-value thresholds.
Table 3 summarizes confirmation and disconfirmation of all the hypotheses considering our results.

Tab. 3: Analysis of hypotheses

Hypothesis	Relationship	Expectation	Result	HP confirmed?
HP1	ES → BV	Positive*	Not Significant	No
HP2	SS → BV	Positive*	Positive*	Yes
HP3	GS → BV	Positive*	Not Significant	No
HP4	NrC → BV	Negative	Positive	No
HP5a	NrC → BV, moderated by ES	Significant	Not Significant	No
HP5b	NrC → BV, moderated by SS	Significant	Significant, negatively moderated by SS	Yes
HP5c	NrC → BV, moderated by GS	Significant	Significant, negatively moderated by GS	Yes
HP6a	ES, SS, GS → BV with second order moderation effects	Significant	Not Significant	No
HP6b	NrC → BV with second order moderation effects	Significant	Not Significant	No

*note that the original categorical representations (from “A+” to “D-”) have been transformed into numerical variables. Hence, an increase in SS, GS, or ES implies a deterioration in the respective score as it indicates a transition from better scores to worse ones. The table summarizes the results following the formulation of the hypotheses, not the reverse coding used for the regression analysis.

Source: Our elaboration

Discussion and conclusion

This is the first study that links the corporate brand value to the ESG performance using cross-sectional data retrieved, respectively, from Interbrand Best Global Ranking and Refinitiv™. Hence, this study contributes to various research domain of interests, such as corporate marketing, corporate branding, corporate governance, ESG, and more in general, sustainability and society well-being.

This study has three main theoretical implications. First, it sheds light on the key role played by the social dimension on the corporate brand value. In particular, this is the only significant factor impacting positively on the value, thereby assigning a major role to the social dimension in comparison with the other dimensions. This insight is in line with Atkins *et al.* (2023) and Becchetti (2022) suggesting that - due to the Pandemic and to the Ukraine-Russia and Israel-Palestine wars - a central role should be assigned to the social dimension within the ESG framework. In fact, the social dimension tries to overcome the limits posed by business concerns (Smith *et al.*, 2010) and highlights the need for establishing strategies and practices that are strategically integrated with the global social well-being (Lindgreen *et al.*, 2012), by placing “stakeholders/customers along with societal concerns at the centre of their strategic deliberations” (Balmer, 2011, p. 1331).

In this scenario, corporations are called to create and manage a social consciousness that emphasizes the "impact of activities of a firm on advantages it receives such as reputation in a competitive marketplace". Gupta *et al.* (2014, p. 3). Hence, corporations and society are called to become intertwined partners with mutual responsibilities aimed at ensuring social issues (Chandy *et al.*, 2021; Lantos, 2001; Porter and Kramer, 2006).

In order to achieve social consciousness, corporations should extend their purpose throughout the whole value chain and search the alignment with those partners who can help them to boost social issues and solve social concerns (Iglesias *et al.*, 2023; Mingione and Leoni, 2020). For instance, Sheth and Sinha (2015) claim that purpose-driven brands acknowledge their role in the society as good citizens and feel intertwined with all the actors of the value chain, who extensively contribute to co-create a shared value committed to increase the wellness of the society. In summary, brands cannot stay in their lane, but are called to be social activist (Smith *et al.*, 2021; Vredenburg *et al.*, 2020).

Second, a counterintuitive role of controversies emerged. In particular, ESG controversies have been associated with higher corporate values. These results are in line with Aouadi and Marsat (2018) who - by considering 3,000 controversies of 4,312 firms in the period 2002-2011 - revealed a positive relationship between ESG controversies and the firm value. However, scholars highlighted that the positive relationship between ESG-firm value is significant for "for high-attention firms", i.e., those brands receiving major media attention (Capelle-Blancard, G., & Petit, 2019; Aouadi and Marsat, 2018). This is in line with the results of our research that highlights that major worldwide leading brands are not affected by controversies, which seem instead to be positively related to the brand value. This implies that the corporate brand value is linked to the brand awareness and brand strength, despite controversies, leading to important considerations on the role played by credibility, authenticity (Iglesias *et al.*, 2019; Hur *et al.*, 2014; Neher *et al.*, 2022) and corporate transparency (Heinberg *et al.*, 2020). In fact, whilst literature supports the importance of these constructs, our result represents food for thoughts for what concerns greenwashing and woke washing (Vredenburg *et al.*, 2020), which have been strongly demonized by the literature, but seem not to have any significant effect on the overall value of the corporate brand. However, the present paper also observes that this relationship is actually moderated (only) by the social dimension, which further emphasizes the key role assigned to this specific ESG dimension (Atkins *et al.*, 2023; Becchetti *et al.*, 2022).

The unexpected result on controversies sheds lights also on consumers attitudes and behaviours. In fact, whilst consumers, especially Millennials and Gen Z (Lyon *et al.*, 2018; Rank and Contreras, 2021) call for sustainable companies, when it comes to brand purchase and attitudes, they are probably more affected by the brand awareness and the brand experience. This implies that not only companies are called to ensure the alignment between promises and practices, but also consumers should close the gap between what they deem as most important in terms of sustainability and how they actually behave (White *et al.*, 2019).

Third, this study confirms bias-related problems when dealing with ESG data. In fact, Drempetic *et al.* (2020) found a positive relationship between the company's size and the ESG scores provided by Thomson Reuters, which has been later explained by Dobrick *et al.*'s (2023) study revealing size bias in the Refinitiv ESG data (ex-Thomson Routers). Remarkably, Barkemeyer *et al.* (2023) found further bias in the selection of ESG controversies media sources, highlighting the limits of these indices (Fiaschi *et al.*, 2020) and the need for complete ESG information (Edmans, 2023). These considerations might also help to understand the positive relationship between controversies and brand value emerged in this paper. In fact, those brands showing more controversies are the same brands that are under the media spotlight for their brand awareness and relevance.

Based on the above, corporate managers should be aware of the specific effects of each ESG factor on the overall brand value. However, in parallel with a more focalized view on ESG dimensions, we also suggest a holistic approach to ESG management and branding, for instance by creating an ESG Global Brand Business Unit.

Lastly, this paper is based on a sample retrieved from the 2021 Interbrand listing, with the related 2021 Refinitiv™ data, hence further studies are needed to investigate longitudinal effects stemming from the link between corporate brand value and ESG performance.

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SUS²A: A framework for assessing Investment Readiness Level in Start-ups. Literature review and model description

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Abstract

Frame of the research. *The research is set within the evolving global economy, emphasizing the increasing importance of technological advancement and sustainability as key factors determining startup success. It frames the necessity for a comprehensive approach to evaluate and improve startup investment readiness by integrating strategic management, innovation, and sustainability principles.*

Purpose of the paper. *The purpose is to introduce the Strategic Unbiased Startup Sustainability Awareness (SUS²A) model as a diagnostic tool to help startups assess their investment attractiveness and identify improvement areas. This aims to facilitate targeted strategies that meet investor expectations and global sustainability goals.*

Methodology. *The methodology involves a comprehensive literature review to expain the reason why for the model, followed by a multi-dimensional approach to evaluate startups across several domains, including strategic business management, innovation management, sustainability, financial viability, market potential, and team competency. It uses specific indicators within these domains to conduct a detailed analysis of a startup's strengths and improvement areas through the SUS²A model's structured assessment framework.*

Results. *Preliminary results demonstrate the SUS²A model's effectiveness in identifying critical gaps in startups' strategies and operations. It offers a nuanced understanding of the Investment Readiness Level (IRL), enabling targeted improvements to increase investor attractiveness by balancing innovation and sustainability.*

Research limitations. *The limitations include the model's dependence on available data for evaluation and the potential necessity for customization across different startup ecosystems and sectors. Additionally, it notes the need for further experimentation to obtain conclusive results.*

Managerial implications. *The research provides significant managerial implications by offering startups a comprehensive framework to evaluate and enhance their IRL. It also presents investors with a structured method to assess startup potential beyond traditional financial metrics, aligning startup strategies with investor expectations and contributing to sustainable economic development.*

Originality of the paper. *The originality of the paper lies in the SUS²A model and its integration of strategic management, technological innovation, and sustainability in evaluating startups. This addresses a gap in existing literature and practice, presenting a scalable and comparable diagnostic tool in line with modern business trends and investor priorities.*

Key words: *Investment Readiness Level, Technological Innovation, Sustainability, Strategic Management, Diagnostic Tool, Innovation Management*

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1. Introduction

In the last twenty years, startups have played a fundamental role in driving technological innovation, economic growth, and sustainable development. The intersection of technology and sustainability has emerged as a critical area of focus, necessitating a nuanced understanding of how startups can leverage these dimensions to attract investment and ensure long-term success. This paper introduces the *Strategic Unbiased Startup Sustainability Awareness* (SUS²A) model, a novel framework designed primarily to evaluate and improve startup attractiveness to investors. The SUS²A model is grounded in the principles of strategic management, technological innovation, and sustainability, offering a comprehensive diagnostic tool that employs a scalable and comparable measurement approach. The following part outlines the context and relevance of integrating technological innovation and sustainability in startup evaluation and investment, reviews relevant literature on startup assessment and the integration of sustainability and technology in business models, and presents research questions aimed at exploring the integration of technological innovation and sustainability in startup evaluation through the SUS²A model and its implications for startup development and investor decision-making.

Technological innovation and sustainability are increasingly recognized as foundational concepts for the success and resilience of startups in the contemporary economy (Aldianto *et al.*, 2021; Salamzadeh *et al.*, 2022; Daraojimba *et al.*, 2023). This recognition is grounded in an evolving understanding of economic success, which now integrates environmental stewardship and technological advancement as critical components (Oláh *et al.*, 2020; Javaid *et al.*, 2022). This integration reflects a paradigm shift in global business practices, where the traditional metrics of financial performance are being supplemented with considerations of environmental impact and innovation capacity (Arabeche *et al.*, 2022; Vasile *et al.*, 2022; Le *et al.*, 2023).

The dynamic nature of the startup ecosystem, characterized by rapid technological advancements and shifting market demands, necessitates a comprehensive approach to innovation that is both forward-thinking and grounded in sustainable practices (Elia *et al.*, 2021; Davis, 2022; Kaggwa *et al.*, 2023). Technological innovation in this context is not merely the introduction of new products, services, or processes but entails a broader conceptualization that includes the disruption of traditional industries through sustainable and environmentally friendly methodologies (De Propris and Bailey, 2020; Kivimaa *et al.*, 2021). Such innovation is increasingly driven by the need to address complex global challenges, including climate change, resource scarcity, and social inequality, thereby aligning economic objectives with broader societal goals (Tödtling, Trippl and Desch, 2022; Segovia-Hernández *et al.*, 2023).

Sustainability, as applied within the startup context, includes a multi-dimensional approach that seeks to balance economic growth with environmental protection and social responsibility (Suriyankietkaew, Krittayaruangroj and Iamsawan, 2022; Adhikari, Shrestha and Adhikari, 2023). This approach is premised on the principle of meeting the current needs without compromising the ability of future generations to meet their own, necessitating a long-term perspective on value creation that transcends immediate financial gains (Doh, Budhwar and Wood, 2021; Grossi, Vakkuri and Sargiacomo, 2022). The broad range of issues covered by sustainability includes, but is not limited to, reducing carbon footprints, enhancing energy efficiency, promoting social equity, and ensuring economic inclusivity (Sovacool *et al.*, 2022; Hariram *et al.*, 2023).

The integration of technological innovation with sustainability strategies poses a unique set of challenges for startups, necessitating a nuanced understanding of the complex interplay between these dimensions. On one hand, this integration demands a commitment to research and development (R&D) aimed at fostering innovation that adheres to principles of sustainability (Chege and Wang, 2020; Chiarini, Belvedere and Grando, 2020). This commitment often requires startups to venture into uncharted territories, exploring new business models and operational strategies that prioritize long-term environmental and social value over immediate profitability.

On the other hand, the successful integration of sustainability and innovation requires startups to manage the complex regulatory, social, and environmental contexts in which they operate (Lüdeke-

Freund, 2020). This is critical for ensuring not only compliance with existing regulations but also the ability to anticipate and adapt to future changes in the socio-economic environment. The capacity to understand and respond to these external pressures is essential for maintaining the startup's relevance, value creation and competitiveness in an increasingly sustainability-conscious market (Ninduwezuor-Ehiobu *et al.*, 2023).

Besides, the intersection of technological innovation and sustainability in startups is not only a response to external pressures but also a strategic approach to investment attraction (Bellucci, Bini and Giunta, 2020; Lüdeke-Freund, 2020). Investors are increasingly prioritizing sustainability and innovation in their decision-making processes (Ikram *et al.*, 2021; Alkaraan *et al.*, 2023), recognizing these factors as indicators of a startup's potential for long-term success and resilience. This shift in investor priorities underlines the importance of startups aligning their strategies with sustainability and innovation principles, not only to attract investment but also to forge a path toward sustainable development.

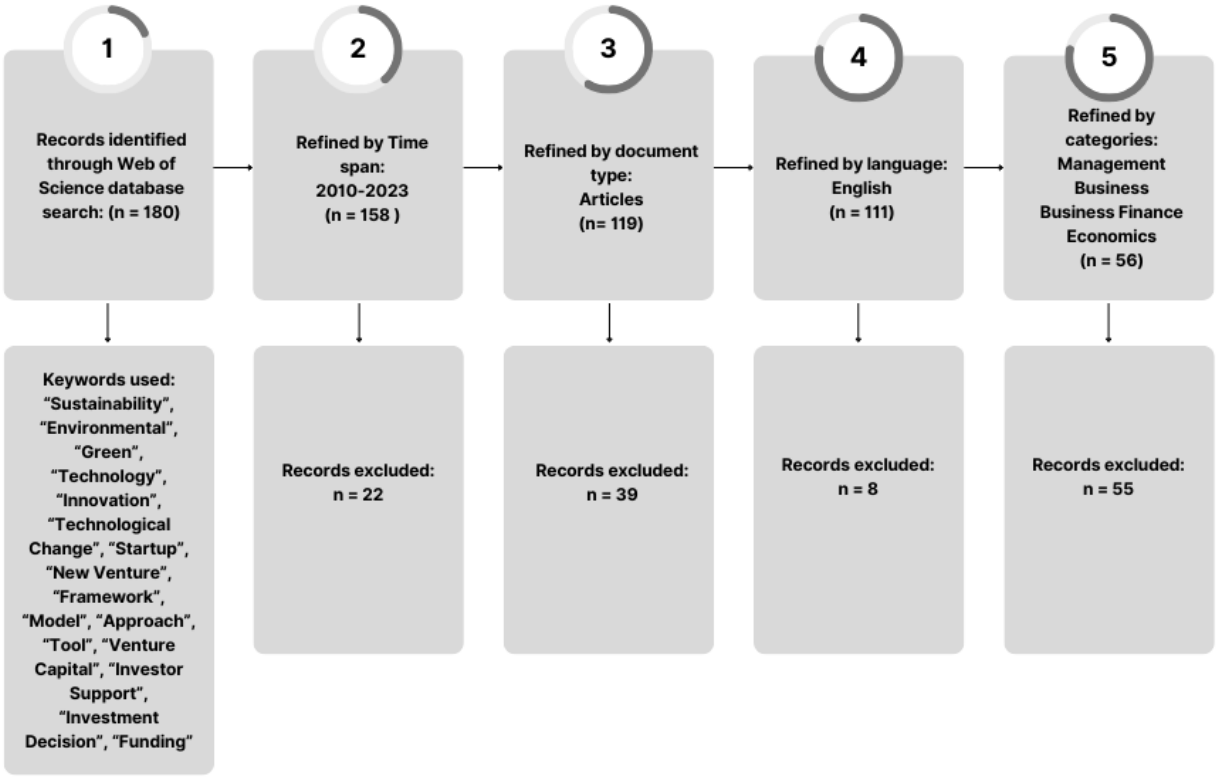
From a managerial viewpoint, the strategic integration of technological innovation and sustainability requires a comprehensive approach that balances immediate operational needs with long-term strategic goals (Tsai *et al.*, 2020), ensuring that startups are not only innovative and competitive but also sustainable and responsive to the broader societal challenges.

2. Literature Review and bibliographic analysis

The literature on startup assessment and investment readiness shows the complexity of evaluating startup potential and investor attractiveness (Granz, Henn and Lutz, 2020; Trautwein, 2021). Traditional evaluation metrics often focus on financial performance (COZGAREA *et al.*, 2023; Guo and Xing, 2023), market potential (Parzen *et al.*, 2022), and the entrepreneurial team's expertise (KRAIEM, MABROUK and Lucas, 2023). However, recent studies suggest that these metrics are increasingly being supplemented with criteria related to technological innovation and sustainability (Alänge, Steiber and Corvello, 2022; Alizada, 2023). This shift reflects a broader understanding of value creation in the startup ecosystem, where sustainable and innovative practices are seen as indicators of a startup's ability to adapt and thrive in the face of global challenges.

In order to fully explore the literature for similar proposed methods, a bibliographic analysis was caried on. In particular, this investigation involves a comprehensive analysis of a wide range of articles and publications from the Web of Science (WoS) database. As depicted in Figure 1, the present study analyzed 180 articles published from 2010 to 2023. The keywords used to retrieve the publications listed in the WoS database are Sustainability, Environmental, Green, Technology, Innovation, Technological Change, Startup, New Venture, Framework, Model, Approach, Tool, Venture Capital, Investor Support, Investment Decision, Funding. Following this step, the initial number of publications was limited to scientific articles published in English and belonging to the categories of Management, Economics, Business, and Business Finance.

Fig. 1: bibliographic search on WoS (keywords and synthetic results)



The query used in WoS reflects a targeted search for scientific literature articles addressing the themes of sustainability, technological innovation, and funding in relation to startups. This query was constructed by combining different keywords to cover a broad range of topics related to sustainability, technology, entrepreneurship, and funding.

The query is as follows:

((TS=("sustainab*" OR "environment*" OR "green")) AND (TS=("technolog*" OR "innovat*" OR "technolog* change*")) AND (TS=("startup*" OR "new venture*" OR "start up*" OR "start-up*")) AND (TS=("framework*" OR "model*"OR "approach*" OR "tool*")) AND (TS=("investor* support*" OR "investment* decision*" OR "funding*" OR "venture* capital*")))

The specific parts of the query reflect: sustainability; technological innovation; startups/new ventures; frameworks, models, approaches, and tools; investor support and investment decisions. More specifically, the query employs a structured approach to identify scholarly articles and research papers at the intersection of environmental sustainability and entrepreneurship within the context of technological innovation. It aims to extract literature that:

- Explores the adoption of sustainable, environmental, or green technologies and innovations by startups and new ventures.
- Examines the frameworks, models, approaches, or tools deployed by these ventures to integrate sustainability into their business operations.
- Investigates the role of investor support, including venture capital and investment decisions, in facilitating or enhancing the growth and development of technology-oriented startups with a focus on sustainability.

Sustainability: specific keywords include "sustainab*" which could cover "sustainability" or "sustainable," "environment*" for environmental topics, and "green" for ecological themes.

Technological Innovation: keywords include "technolog*," "innovat*," and "technolog* change*."

Startups and New Ventures: keywords cover various expressions of "start-up," including "new venture*," "start up*," and "start-up*."

Frameworks, Models, Approaches, and Tools: this section focuses on articles that may present frameworks, models, approaches, or tools. Keywords include "framework*," "model*," "approach*," and "tool*."

Investor Support and Investment Decisions: this part refers to aspects related to investor support and investment decisions. Keywords include "investor* support*," "investment* decision*," "funding*," and "venture* capital*."

As it emerges from this search, several frameworks and models have been proposed in the literature (Pradhan *et al.*, 2017; Di Paola *et al.*, 2018; Wu *et al.*, 2019; Kostin, Fendel and Wild, 2022; van Rijnsoever, 2022) to assess startup readiness for investment, with varying degrees of emphasis on sustainability and technology. For instance, the Lean Startup methodology (Rutitis and Volkova, 2021; Rahmani *et al.*, 2023; Vlies, 2023) emphasizes rapid prototyping and customer feedback loops to drive innovation, but it does not explicitly address sustainability. Conversely, the Triple Bottom Line (TBL) framework (Loviscek, 2020; Ozturkoglu, Sari and Saygili, 2021; Singh and Srivastava, 2022) focuses on evaluating a company's performance in three dimensions: social, environmental, and financial, encouraging businesses to pursue sustainability goals. However, there is a gap in the literature regarding frameworks that holistically integrate technological innovation and sustainability into startup evaluation and investment decision-making processes.

Sustainable business models often require startups to manage complex trade-offs between short-term profitability and long-term environmental and social goals. At the same time, leveraging technological innovation for sustainability presents opportunities for startups to differentiate themselves in crowded markets and address pressing global challenges. The literature highlights several success stories of startups that have successfully integrated sustainability and technology (Nyadu-Addo and Mensah, 2017; Zeng, 2018; Baaziz, 2019; Conway and Hemphill, 2019), but systematic approaches to evaluating and improving such integration remain limited.

SUS²A model addresses these gaps by providing a comprehensive framework for evaluating and improving startup attractiveness to investors through the dimensions of technological innovation and sustainability. As briefly pointed out, SUS²A represents a transformative approach to evaluating the readiness and maturity of innovative startups. Its comprehensive methodology, which incorporates advanced analytics and self-administration, provides a tool for researchers, advisors, investors, and entrepreneurs alike. By offering detailed scoring across various dimensions of enterprise operation and strategic orientation, SUS²A can facilitate informed decision-making, targeted improvements, and enhanced investor readiness, positioning it as a crucial instrument in the landscape of startup development and innovation.

This leads to the formulation of two critical research questions for the core of the present paper:

1) *How does the SUS²A model integrate technological innovation and sustainability in startup evaluation?*

This question seeks to explore the methodological underpinnings of the SUS²A model, examining how it incorporates sustainability and technological innovation into its evaluation criteria. It involves a detailed analysis of the model's evaluation areas and categories, its scalable and comparable measurement approach, and themethod for facilitating effective diagnosis and action planning. This analysis will provide insights into how the model bridges the gap between sustainability and technological innovation, ensuring startups are not only innovative but also sustainable in their operations and business models.

2) *What are the implications of using SUS²A for startup development and investor decision-making?*

This question delves into the practical implications of employing the SUS²A model for startups and investors. It seeks to understand how the model can influence startup strategy, development, and the ability to attract investment. It also explores the implications for investors in terms of identifying startups that not only promise high returns but, at the same time, contribute to sustainable development.

3. The central concept of Investment Readiness Level (IRL)

SUS²A provides a "cognitive map" that serves as an automatic filter for objectively assessing the condition of startups, spin-offs, and innovative SMEs in terms of their readiness for businesses and investors, using the Innovation Readiness Level (IRL) and its variations through detailed scoring. It's important to note that there's no analytical and established description in literature for the underlying nine stages of maturity that the classical IRL indicator expresses for attributing a specific level of IRL, unlike the technology readiness level (TRL) indicator.

IRL acts as a tool that accompanies the lifecycle of a startup, spin-off, or innovative SME, offering a representation of its actual conditions, collateral risks, improvement areas, and enables the association of necessary action plans, effort levels, costs, and tracking of outcomes.

Its methodology consists of:

- Extended and deep analytical basis
- Characterised categories and areas
- Flexible delivery modes
- Scoring based on consistent metrics
- Traceability of results

Its prerequisites make it possible to:

- Use weighting algorithms
- Develop an updatable Analytical Base
- Allow self-administration modes
- Establish a Methodology for advisory
- Issue standardised reports.

In other words, IRL represents a structured approach to gauge a startup's maturity and readiness for investment. Originally conceptualized by Steve Blank (Blank, 2013), the IRL provides a framework analogous to the Technology Readiness Level (TRL) used by NASA (Mankins, 1995), but specifically tailored for startups. It serves as a metric system that evaluates the readiness of a startup to receive and effectively utilize investment based on various criteria, including business model validation, market fit, scalability potential, and the robustness of the management team.

IRL's importance lies in its ability to transform the often subjective and speculative process of startup evaluation into a more objective and structured assessment. It offers both startups and investors a common language to discuss progress and pinpoint specific areas that need improvement before a startup can be considered ready for investment. This framework not only facilitates better decision-making for investors but also provides startups with clear milestones and targets for development, making the journey towards investment readiness more transparent and navigable.

The role of IRL in startup assessment is multifaceted, contributing to a more comprehensive and nuanced evaluation of a startup's potential for success and sustainability. Here's how IRL contributes to the startup assessment process:

1. **Objective Benchmarking:** IRL offers a standardized method for assessing startup maturity across various stages of development. This standardization allows for objective benchmarking, where startups can be compared against established criteria, helping investors identify ventures with the highest potential for success.
2. **Identifying Strengths and Weaknesses:** By breaking down the investment readiness into specific levels, IRL helps startups identify their strengths and weaknesses in critical areas such as product development, market validation, and business strategy. This detailed analysis enables targeted improvements, ensuring that resources are allocated efficiently to areas that will most significantly impact investment readiness.
3. **Facilitating Investor Communication:** The IRL framework provides a common vocabulary for discussions between startups and investors. It shifts the conversation from a binary "yes" or "no" investment decision to a more constructive dialogue about what startups need to do to reach the next level of readiness. This facilitates better mentoring and guidance from investors and other stakeholders.

4. **Enhancing Strategic Planning:** Startups can use their IRL assessment to inform strategic planning and prioritization. Understanding their current level of investment readiness helps startups set realistic goals and timelines for reaching the next level, ensuring that efforts are aligned with enhancing their attractiveness to investors.
5. **Improving Capital Efficiency:** The focus on reaching specific readiness levels before seeking investment ensures that startups are more likely to use the capital they receive efficiently. By addressing key risks and validating their business model before seeking significant funding, startups can reduce waste and increase the likelihood of successful growth.
6. **Encouraging Sustainability:** Although not explicitly focused on environmental sustainability, the IRL framework encourages startups to build solid foundations for long-term success. This includes developing sustainable business models that are resilient to market changes and capable of delivering consistent value over time.

The SUS²A model, which is grounded in the principles of strategic management, technological innovation, and sustainability, incorporates IRL as a key component to offer an evaluation of startups based on various parameters. This integration aims to provide a comprehensive understanding of a startup's position in the investment readiness spectrum, thereby facilitating targeted strategies to elevate their attractiveness to investors. The following elaboration details how SUS²A utilizes IRL, emphasizing a scientific and methodological perspective devoid of an overly promotional tone.

The SUS²A model adopts the IRL framework to systematically evaluate a startup's maturity across several domains critical to investment attractiveness. This evaluation includes an assessment of the startup's business model validation, market fit, scalability, management team robustness, and the integration of technological innovation and sustainability. By incorporating IRL, SUS²A offers a structured path for startups to progress through different levels of investment readiness, focusing on achieving specific milestones that signal their preparedness for external funding, in the following ways.

Objective Benchmarking and Targeted Improvement: SUS²A leverages IRL's objective benchmarking capabilities to compare startups against established criteria, identifying areas of strength and opportunities for improvement. This benchmarking serves as a foundation for SUS²A's diagnostic tool, which evaluates startups across multiple dimensions, including financial viability, market potential, technological innovation, and sustainability practices. By pinpointing precise areas where a startup needs to develop further to become investment-ready, SUS²A facilitates targeted improvements, enabling startups to allocate their resources more efficiently and effectively.

Enhanced Investor Communication and Strategic Planning: the integration of IRL into SUS²A enhances communication between startups and investors by providing a shared framework for discussing a startup's current investment readiness level and the steps required to advance. This improved communication fosters a more collaborative relationship between startups and investors, where feedback and guidance can be more precisely tailored to address specific gaps in readiness. Besides, SUS²A's adoption of IRL aids startups in strategic planning, allowing them to set realistic goals and timelines for achieving higher levels of investment readiness. This strategic focus ensures that startups remain aligned with the critical factors that influence investor decision-making, thereby increasing their chances of securing investment.

Addressing Market Fit, Scalability, and Operational Excellence: SUS²A's use of IRL emphasizes the importance of achieving market fit, scalability, and operational excellence as prerequisites for investment attractiveness. Through its comprehensive evaluation framework, SUS²A guides startups in validating their market fit, demonstrating their potential for scalability, and achieving operational efficiency. These aspects are critical for assuring investors of the startup's capacity to grow and generate returns on investment. By systematically addressing these challenges, startups can enhance their profiles, making them more appealing to a broad spectrum of investors.

Reducing Investment Uncertainty and Risk the structured approach to evaluating startup potential offered by the SUS²A model, through the incorporation of IRL, plays a fundamental role in reducing the uncertainty and risk associated with early-stage investments. By providing clear, objective

assessments of a startup's readiness for investment, SUS²A mitigates the speculative elements of investment decision-making. This reduction in uncertainty is beneficial for both startups and investors, as it leads to more informed, confident investment decisions and fosters a more efficient allocation of capital within the startup ecosystem.

The outcomes of scoring through SUS²A can be represented by the description of the 9 IRL levels.

- IRL 1 Initial business idea
- IRL 2 Existence of a corporate team to develop the business idea
- IRL 3 Corporate team established and initiated
- IRL 4 Corporate team established, initiated, and structured
- IRL 5 Corporate entity active and dedicated to implementing the business idea
- IRL 6 Corporate entity active and capable of market testing
- IRL 7 Active, solid, and sustainable corporate entity
- IRL 8 Corporate entity with proven competitive capabilities in collaborative contexts
- IRL 9 Corporate entity with proven autonomous competitive capabilities

4. Methodology and framework of the SUS²A Model

As briefly pointed out, the SUS²A model offers a comprehensive framework for the evaluation and enhancement of startup investment potential. It is structured to provide a multidimensional assessment, integrating various components that gauge a startup's performance across a spectrum of domains. These domains include strategic management, technological innovation, sustainability, financial viability, market potential, and team competency, among others. This integrative approach ensures that the evaluation of startups transcends mere financial metrics, acknowledging the significance of strategic alignment with contemporary trends in technology and sustainability.

The strategic management component evaluates a startup's ability to define, implement, and adapt strategies that ensure its long-term success and sustainability. This involves assessing the clarity of the startup's vision, the effectiveness of its competitive strategies, and its responsiveness to market dynamics. Indicators within this domain may include the coherence of business planning, the rigor of market analysis, and the agility of strategic decision-making processes.

In the domain of technological innovation, the model scrutinizes a startup's capacity to develop and implement groundbreaking technologies. This evaluation not only considers the novelty and disruptiveness of the technology but also its scalability and the startup's ability to maintain a competitive technological edge. Indicators here could include the level of innovation, the potential for market disruption, intellectual property rights, and the integration of new technologies into existing markets.

Sustainability assessment within the model focuses on a startup's commitment to and implementation of practices that ensure environmental stewardship, social responsibility, and economic growth. This domain evaluates how well a startup's operations and business model are aligned with sustainable development goals. Key indicators might include the reduction of carbon footprint, social impact initiatives, ethical business practices, and sustainable supply chain management.

The financial viability component examines a startup's economic health and its potential for sustainable growth and profitability. This involves an analysis of revenue models, cost structures, funding strategies, and financial projections. Indicators in this area assess the robustness of financial planning, the effectiveness of resource allocation, and the startup's ability to generate revenue and manage expenses.

Assessment of market potential looks at a startup's ability to identify, enter, and grow within its target markets. This includes evaluating the size and accessibility of the market, the startup's market positioning, and its marketing strategies. Indicators might cover market size and growth forecasts, competitive analysis, customer segmentation, and go-to-market strategies.

The team competency domain assesses the skills, experience, and cohesion of the startup's founding and management teams. This area considers the team's ability to execute on the startup's vision, manage challenges, and drive the company towards success. Indicators include the team's background and expertise, leadership and management skills, and the ability to attract and retain talent.

The methodology of the model is characterized by its rigorous and structured assessment framework, made of hierarchical questions and evaluation criteria. Startups are categorized according to multiple evaluation areas, with each area being further dissected into categories and sub-categories. This hierarchical structure ensures a detailed and granular analysis of startup performance. Specific indicators within each sub-category are used to measure performance, enabling a comprehensive and nuanced understanding of a startup's strengths and areas for improvement.

The implementation of this model involves a systematic process where startups are evaluated against the predefined indicators across all domains. This process begins with the collection of qualitative and quantitative data about the startup, followed by analysis and scoring based on the model's criteria. The results of this evaluation provide a wide view of the startup's investment attractiveness, highlighting areas of strength as well as gaps that need to be addressed.

The use of specific indicators allows for the generation of actionable insights, facilitating targeted strategies for improvement. For instance, if a startup scores low in the sustainability domain, it may be prompted to develop a more robust sustainability strategy, incorporating environmental and social considerations into its business model. Similarly, a startup lacking in financial viability may be advised to refine its revenue model or improve its cost management practices.

One of the primary advantages of this model is its ability to provide a complete view of a startup's readiness for investment. By considering a broad range of factors beyond financial performance, the model offers a more comprehensive assessment of a startup's potential for success. This is particularly important in today's business environment, where technological innovation and sustainability are increasingly critical to long-term success.

In addition, the model's structured and nuanced approach allows for the identification of specific areas where startups need to improve, making it a valuable tool for targeted development efforts. This can significantly enhance a startup's attractiveness to investors, who are often looking for ventures that not only promise high returns but also demonstrate alignment with broader societal and environmental objectives.

The application of the SUS²A model to the proposed research questions—how it integrates technological innovation and sustainability in startup evaluation, and its implications for startup development and investor decision-making—illustrates the model's capacity to provide solutions to critical challenges in the startup ecosystem.

1) *Integration of Technological Innovation and Sustainability*

The SUS²A model's methodological approach to integrating technological innovation and sustainability into startup evaluation is distinguished by its comprehensive and multi-faceted framework. This framework is built on the premise that challenges and market opportunities require startups to adopt innovative technologies and sustainable practices not just as a compliance or marketing strategy, but as a core component of their business model. The model delineates specific indicators for assessing the extent to which startups incorporate these dimensions into their operations and strategy.

For technological innovation, indicators are designed to evaluate the originality of the technology, its disruptive potential, and scalability. This includes examining the startup's R&D activities, patent holdings, and the technological readiness level (TRL) of its products or services. The aim is to ascertain not only the current state of the technology but also its future growth trajectory and potential to alter existing market contexts or create new ones.

In the domain of sustainability, the model emphasizes a comprehensive assessment that goes beyond environmental considerations to include social and governance aspects (ESG criteria).

Indicators in this context assess the startup's impact on environmental conservation, including its carbon footprint, resource efficiency, and waste management practices. The model also evaluates the startup's contribution to social well-being, which includes employee welfare, community engagement, and contributions to societal challenges. Ethical business practices and governance, including transparency, accountability, and stakeholder engagement, are also critical components of the sustainability assessment.

The strategic alignment of startups with technological innovation and sustainability is facilitated by the SUS²A model through a detailed evaluation process that identifies not only the current integration of these elements but also opportunities for deeper incorporation. Startups are guided to align their strategies with best practices in technology and sustainability, enhancing their market positioning and investment attractiveness. The model advocates for an iterative process where startups continually assess and refine their approaches to innovation and sustainability, ensuring they remain responsive to evolving market expectations and regulatory environments.

2) *Implications for Startup Development and Investor Decision-Making*

As a diagnostic tool, the SUS²A model offers startups a clear insight into their strengths and areas requiring improvement. This diagnostic capability is crucial for startups to prioritize areas for development, especially in fast-evolving sectors where technological and sustainable advancements are rapidly changing the competitive context, directly connected with the descriptive and prescriptive dimensions of the Viable Systems Approach (Golinelli, 2011).

By providing a detailed analysis across multiple dimensions, the model enables startups to devise targeted strategies that enhance their technological and sustainability profiles, thereby improving their overall investment attractiveness.

For startup development, the implications of this model are potentially important. Strategically, it encourages startups to adopt a forward-looking perspective, where technological innovation and sustainability are integrated into the core of their business models. This not only prepares startups for the increasing demands of consumers and regulatory bodies but also positions them to capitalize on new market opportunities that these dimensions unlock.

From an investor's perspective, the SUS²A model offers a structured framework that demystifies the complexities of evaluating early-stage investments. By dissecting a startup's performance across technological innovation, sustainability, and other critical domains, the model reduces the uncertainty and risks associated with such investments. Investors are provided with a comprehensive profile of each startup, highlighting areas of strength and potential risks, thereby facilitating informed decision-making.

Investors using the SUS²A model can better identify startups that not only promise robust economic returns but also align with broader societal and environmental goals. This alignment is increasingly becoming a determinant of long-term success in the global market, where sustainability and innovation drive competitive advantage. Consequently, the model not only aids in the selection of viable investments but also promotes a more sustainable and innovative startup ecosystem.

5. SUS²A Model Conceptual Development

SUS²A model's conceptual development is deeply rooted in the foundational theories of strategic management. Strategic management provides a framework for organizations to analyze competitive environments, define strategic direction, and make decisions to achieve long-term goals. The SUS²A model adopts these principles to guide startups in managing the complex and dynamic business context, emphasizing the importance of a strategic approach in enhancing investment attractiveness.

The model's connection to strategic management theories is evident in its emphasis on strategic alignment and agility. It encourages startups to align their operations and business models with both current market demands and future trends. This alignment involves a thorough analysis of internal strengths and weaknesses, as well as external opportunities and threats (SWOT analysis), a concept

borrowed directly from strategic management literature (Gurl, 2017). The SUS²A model operationalizes this analysis through its multidimensional assessment framework, evaluating startups on various fronts including market potential, technological innovation, and sustainability.

Additionally, the model underscores the significance of strategic agility (Ferraris *et al.*, 2022), which refers to a startup's ability to rapidly adapt to market changes and emerging opportunities. This is aligned with the dynamic capabilities theory, which posits that the ability of a business to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments is a key source of competitive advantage. By incorporating these strategic management concepts, the SUS²A model equips startups with a roadmap for strategic development, ensuring they are well-positioned to attract investment.

Innovation and technology constitute central concepts in the SUS²A model's framework, reflecting the model's approach to embedding technological advancement within the startup evaluation process. The model recognizes that technological innovation is a critical driver of competitive advantage (Cerrato, 2011; Dagnino, 2014), market differentiation, and long-term sustainability for startups. It examines how startups leverage technology to create value, disrupt existing markets (Sehnem *et al.*, 2022), or establish new ones.

The model's focus on innovation extends beyond mere adoption of new technologies; it includes the capacity for continuous innovation and improvement. This is aligned with the concept of continuous innovation, where organizations persistently transform their business processes, products, and services to meet evolving customer needs and stay ahead of competition. The SUS²A model evaluates the extent to which startups embed innovation in their culture, processes, and strategy, considering factors such as R&D investment, innovation output (e.g., patents, new products), and the adoption of emerging technologies (e.g., AI, blockchain).

This comprehensive approach to assessing technological innovation is informed by theories of innovation management, which emphasize the importance of innovation ecosystems, collaboration with external partners (Yaghmaie and Vanhaverbeke, 2020), and the role of leadership in fostering an innovative culture. By integrating these aspects into its framework, the SUS²A model offers a nuanced understanding of how startups innovate and the implications of their technological strategies for investment attractiveness.

Sustainability integration within the SUS²A model reflects a forward-looking approach to embedding environmental, social, and governance (ESG) criteria into the startup evaluation process. The model conceptualizes sustainability not as an add-on but as an integral component of a startup's strategic management and innovation processes. This integration is premised on the understanding that sustainable practices are crucial for addressing contemporary challenges such as climate change, resource depletion, and social inequality, and for ensuring long-term business viability.

The SUS²A model's sustainability framework is informed by the triple bottom line (TBL) concept (Goh *et al.*, 2020), which encourages businesses to achieve a balance between economic, environmental, and social objectives. It assesses startups based on their environmental impact, including energy efficiency, waste management, and carbon footprint; their social impact, such as community engagement, employee welfare, and diversity and inclusion practices; and their governance structures, including transparency, ethical business practices, and stakeholder engagement.

Last, but not least, the model recognizes the strategic value of sustainability as a source of innovation and competitive advantage. This perspective is supported by theories of sustainable innovation, which argue that sustainability challenges can spur innovation in products, services, and business models. The SUS²A model evaluates how startups leverage sustainability as a driver for innovation, examining their approaches to sustainable product development, circular economy practices, and the creation of shared value for society and the environment (Diaz *et al.*, 2021).

6. Categories for SUS²A and their connection with IRL levels

SUS²A is a comprehensive tool that, in synergy with the IRL categories, offers a detailed and personalized analysis of the status of a startup, facilitating informed decision-making and supporting a sustainable growth path.

This tool is divided into specific categories, that emerge from a series of discourses related to operative practice and literature analysis, which gives them a well-founded foundation. The questions within each category are the result of an in-depth analysis, selecting the main issues to be explored for each area.

SUS²A's seven areas of analysis (Team, Marketing & Strategy, Finance & Economics, Legal & Protection, Product & Industrial, Validation, ESG) are structured to offer a comprehensive view of the factual conditions of a startup. These categories are not mere checkpoints but reflect critical aspects that contribute to the success and maturity of a startup. The use of SUS²A can take place at different levels of depth, allowing a granular detection of the analytical elements relevant to each category. The analysis derived from SUS²A provides the basis for the identification of relevant action plans. The subsequent surveys, representing actual changes in the characteristics assessed, serve as documentation of the results of the actions taken in the process of acceleration and attraction of investors.

By integrating SUS²A with the Investment Readiness Level (IRL) classification model, it is possible to get a complete picture of a startup's condition. Each category of SUS²A finds a direct parallel to key concepts from the IRL, as described in the previous section, thus allowing for a detailed and informed view of the startup's maturity.

Team (A), Marketing & Strategy (B), Finance & Economics (C), Legal & Protection (D), Product & Industrial (E), Validation (F), and ESG (G) reflect critical aspects that contribute to a startup's success and readiness. This correlation with the IRL offers a broad and detailed view of the startup's condition, considering all facets relevant to investors and long-term success. There are several benefits to using SUS²A and IRL together. SUS²A provides a step-by-step guide to explore and improve startup conditions, diagnose deficiencies, and define improvement actions. The IRL, on the other hand, offers an overall rating scale, allowing for a broader view of a startup's maturity. The analysis resulting from SUS²A can be translated into specific actions through acceleration tools, and continuous monitoring allows you to document the progress and effects of the actions taken.

The use of SUS²A therefore potentially allows for the granular detection of the presence/absence of individual analytical elements pertinent to the reference category and to group these results for each area to which they belong, but it is possible to use them of different depths, for subsequent detailed approximations:

- At the level of areas A/B/C/D/E/F/G
- At the level of the categories into which each area is divided
- At the level of the analytical elements underlying each category.

SUS²A's division into seven areas of analysis reflects the complexity and comprehensiveness of the business conditions to be assessed. These categories are closely related to the IRL categories, but with a more detailed and specific approach. Here are the categories, with specific insights.

- Team (A): The "Team" component in SUS²A has a direct parallel to the concept of "Team" within the IRL. A competent and cohesive team is crucial to the success of a startup at every stage of development. This category assesses the team's cohesion, skills, and leadership that are critical to the company's success.
- Marketing & Strategy (B): SUS²A's "Marketing & Strategy" category is closely related to concepts such as "Defining Market Positioning" (IRL 2) and "Defining Marketing Strategies" (IRL 5) in IRL. A well-defined marketing strategy is essential for growth and investment attractiveness. This

category examines marketing strategy, identifying how the company positions itself in the market and reaches its customers.

- Finance & Economics (C): Financial management and understanding economics are crucial considerations in both models. SUS²A's "Finance & Economics" category can be linked to concepts such as "Operating Model Validation" (IRL 8) in the IRL. This category analyses financial management and economic outlook, including future financial needs.
- Legal & Protection (D): Legal security is paramount for a startup, and SUS²A's "Legal & Protection" category aligns with the concept of "Legal Protection" within the IRL, which covers intellectual property protection and other legal aspects. This category evaluates the robustness of the legal structures and protections put in place to safeguard the company.
- Product & Industrial (E): This category reflects the stage of product development and its integration into the industrial environment. In terms of IRL, it could correspond to concepts such as "Product/Service Validation" (IRL 3) and "Market Validation of the Effectiveness of the Minimum Viable Product" (IRL 7). This category examines the quality and innovation of the product or service offered, as well as the positioning in the industrial sector.
- Validation (F): Validation is a crucial aspect for both instruments. SUS²A's "Validation" category links directly to various levels of IRLs, including "Value Proposition Validation" (IRL 6) and "Fundamental Metrics Validation" (IRL 9). This category evaluates the product's validation in the market and the company's value proposition.
- ESG (G): The growing importance of sustainability is reflected in SUS²A's "ESG" category. Even though it is not explicitly covered in the IRL, sustainability can influence the long-term success of a startup and could be considered across many IRL categories. This category examines the company's compliance and environmental, social, and governance impact.

The challenge is to devise an assessment model that is both simple and effective. The preferred approach is the pyramid model due to its simplicity, yet it acknowledges the complexity and variability of reality. Currently, approximate measurements are utilized rather than foregoing measurements altogether. The assessment relies on individual analytical items with affirmative, negative, or "not applicable" responses. These items are categorized and grouped into the above-mentioned areas, forming a pyramid-like structure. The overall score is derived from the interplay between areas, categories, and analytical items.

A careful balance between areas, categories, and analytical elements is maintained to avoid oversimplification. Introducing new criteria must respect this balance, ensuring that additional information remains meaningful and cognitively sound. The summary score enables vertical navigation to attain the desired level. Relevant information is primarily represented through analytical elements, while categories and areas serve a descriptive role and aid in synthesis.

To preserve the information density of analytical elements, repeated tests are conducted to ensure no redundancy exists. This safeguards the impartiality of the model by preventing networks of privileged relationships between analytical elements. The "not applicable" option allows for the exclusion of irrelevant elements without impacting the model, representing the widest possible perimeter based on the adopted methodology. Balancing simplicity with accurate representation underscores the complexity, ensuring the model remains unbiased and informative.

7. Strategic Implications and Application

This model's strategic applications extend to both startups seeking to optimize their strategic positioning and investors aiming to refine their investment selection criteria. By invoking theories from the strategic management literature, such as Porter's Five Forces, the Resource-Based View (RBV), and the Dynamic Capabilities Framework, the SUS²A model offers a mix of analytical tools and strategic insights for stakeholders in the startup ecosystem.

Porter's Five Forces framework provides a method for analyzing the competitive forces within an industry, offering insights into profitability and strategic positioning. Applied within the SUS²A model, this framework aids startups in understanding the competitive context, assessing the intensity of competition, the threat of new entrants, the bargaining power of suppliers and customers, and the threat of substitute products. By evaluating these forces, startups can strategically position themselves to mitigate threats and capitalize on opportunities, enhancing their attractiveness to investors who value a comprehensive competitive analysis.

RBV suggests that a company's competitive advantage is derived from its unique resources and capabilities. The SUS²A model incorporates this perspective by evaluating startups based on their internal strengths, including tangible and intangible assets, organizational capabilities, and human resources. This internal analysis enables startups to identify and leverage their core competencies, aligning them with market opportunities to build a sustainable competitive advantage. Investors, guided by the RBV, can assess the intrinsic value of startups based on their resource endowments and potential for generating long-term returns.

The Dynamic Capabilities Framework emphasizes the importance of a firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments. Within the SUS²A model, this framework underlines the significance of strategic agility and innovation as key determinants of startup success. By fostering an organizational culture that prioritizes learning, adaptation, and innovation, startups can enhance their resilience and flexibility, making them more attractive to investors who are concerned with adaptability and long-term viability in the face of market volatility.

For startups, the strategic application of the SUS²A model, enriched by these strategic management theories, facilitates a comprehensive assessment of their operational, competitive, and strategic contexts. This model encourages startups to conduct a deep introspective analysis that goes beyond surface-level evaluations, fostering a culture of continuous improvement and strategic alignment with broader market trends and investor expectations. The emphasis on leveraging unique resources, understanding competitive dynamics, and maintaining strategic flexibility equips startups with the tools necessary for sustainable growth and market differentiation.

Investors, leveraging the structured approach provided by the SUS²A model, gain wider view of startup potential. This comprehensive methodology allows for a deeper dive into a startup's strategic foundation, evaluating not only financial metrics but also the qualitative aspects of strategic management, innovation capacity, and sustainability integration. By applying strategic management theories through the lens of the SUS²A model, investors can identify startups with robust strategic foundations, high potential for disruption, and alignment with future market trends, thereby mitigating investment risks and enhancing the potential for sustainable growth.

The practical application of the SUS²A model, underpinned by strategic management theories, has profound implications for both startups and investors. Startups are guided to strategically manage the complexities of the business environment, using their unique resources and capabilities to carve out competitive advantages and align with sustainability and innovation trends. This strategic positioning is critical for attracting investment, as it signals to investors a startup's potential for long-term success and resilience.

Investors, equipped with insights from the SUS²A model, are better positioned to make informed decisions, selecting startups that not only promise financial returns but also demonstrate strategic acumen, adaptability, and a commitment to sustainable practices. This alignment of startup potential with investor criteria fosters a more efficient and effective investment process, contributing to the overall health and dynamism of the startup ecosystem.

The main focus of SUS²A is to establish a reference subject to updates and new descriptions of the startup's condition that the tool captures throughout its maturation cycle with regard to the market and investors. Its main characteristic is to meet the cognitive premise of any action plan the startup intends to initiate.

Referring to the Deming wheel model PLAN DO CHECK ACTION, the point of connection between the conclusion of a cycle of initiatives and the start of a new plan is represented by the

depiction of the situation as the outcome of the previous cycle. The cognitive aspect of the factual state is therefore necessary to identify the subsequent steps, and having a comparable measurement unit represents the ability to have measurable feedback with simple and reliable metrics, enabling repetition over time.

The method of obtaining measurable feedback may vary depending on the intensity of measurement efforts, i.e., the relationship between time spent and the quality of data obtained, which often represents the trap of tool hypertrophy that poorly suits the fragile condition of a newly established company, which must strengthen gradually to access the market and investors. In this sense, SUS²A aims to represent a balance between the thoroughness of analysis, data collection cost, and the type of actions connected, as the evidence provided by the unsatisfactory response to certain areas or categories already allows for defining actions to be initiated quickly to achieve improvement based on underlying best practices of the checkpoints to be satisfied. Control and measurement actions can then be repeated at short intervals, following the cycle of actions taken and impacts achieved.

Therefore, this mental map lends itself to the following interconnected uses.

1. Serving as the methodological guide for the advisor's field action, who uses the evaluative elements in whole or in part depending on the relevant conditions for the analyzed startup (economic sector, technology, age since establishment, and other metadata). The reference provided by SUS²A allows for coherent and systematic representation of advisory activities' outcomes, providing feedback metrics and appreciation of actual conditions, identifying risk areas among those less satisfied by quantitative indicators, and enabling controlled, repeatable, and applicable output in various contexts.
2. Acting as a tool that allows and integrates self-assessment of the startup/SME through the usual form of a questionnaire. In this case, the sections of SUS²A applicable to the analyzed startup must also be considered. SUS²A in this case presents itself as a structured checklist, whose answers are weighted according to relevance criteria within the different evaluation areas and categories in which the multiple checkpoints expressed with the questions are grouped.

8. Conclusions, limits and future developments

This study presented the SUS²A model, a comprehensive framework based on the concept of IRL and designed to enhance startups' attractiveness to investors by integrating technological innovation and sustainability. Grounded in strategic management principles, the SUS²A model offers a multidimensional evaluation of startups across domains such as strategic business management, innovation, sustainability, financial viability, market potential, and team competency.

The literature review conducted for the development and scientific fundation of tool, thoroughly examines the existing body of work on startup sustainability, strategic management, and innovation. It identifies a gap in the integration of sustainability within the strategic planning of startups, highlighting the evolving nature of startup ecosystems and the increasing importance of sustainability in business models. The review synthesizes findings from various disciplines, emphasizing the necessity for startups to align innovation with sustainable practices to achieve long-term success and resilience and to be attractive for the investors.

The combined use of SUS²A and IRL offers several benefits, providing a detailed guide to explore and improve the startup's condition, diagnose deficiencies, and define improvement actions. This integration provides a comprehensive and detailed view of startups, allowing for in-depth analysis that considers all facets relevant to investors and the long-term success of emerging businesses.

Integrating SUS²A and IRL provides a comprehensive and detailed view of startups, allowing for in-depth and informed analysis that considers all facets relevant to investors and the long-term success of emerging businesses.

The categories outlined in SUS²A justify and relate to the IRL categories since they aim to examine a wide range of critical aspects that can affect a startup's success and readiness to invest.

SUS²A is configured as a flexible tool, suitable both for internal use by a business analyst and as a direct questionnaire for the startup. The resulting analyses are then used to extract relevant action plans. The subsequent surveys, which reflect actual changes in the presence/absence of the characteristics assessed, serve as documentation of the results of the actions taken in the process of acceleration and attraction of investors.

The use of SUS²A is divided into several aspects:

- SUS²A provides a guide to explore the real conditions of the startup, offering a complete picture of its characteristics and performance in the different analytical areas.
- SUS²A's categories allow you to express the positioning of the startup on the IRL scale through a detailed analytical background. This provides a deeper insight than the traditional IRL model.
- SUS²A identifies shortcomings and areas for improvement, offering a detailed analysis of the challenges and opportunities the startup may face on its growth journey.
- SUS²A's analyses allow you to define specific improvement actions, adaptable to the unique needs of the startup, using various available acceleration tools.
- SUS²A is suitable as a progress control tool, allowing you to monitor the effectiveness of the actions taken over time and evaluate the evolution of the startup with respect to the set objectives.

Despite its innovative approach, the model acknowledges limitations, including reliance on available data and the need for certain customization across diverse startup ecosystems.

A prospective development of the model involves enabling a conversational interface in natural language between the startup self-presented documents and the expertise, experience, and foundational knowledge drawn from scientific literature that underpins the mental map. This will be achieved through leveraging the reading and interpretative capabilities of generative AI. In this scenario, SUS²A will not be explicitly disclosed to the startup/SME. Instead, they will be invited to freely describe themselves, allowing for autonomous interrogation and facilitating explicit outcomes in the form of self-diagnosis and ongoing comparison over time.

The self-description provided will undergo mapping and evaluation using a linguistic model that examines correspondences and delves into the semantic relationship between the text and all identified control points. This analysis aims to trace the positioning and path of closing competitive gaps by implementing improvement actions, learning from best practices, and capitalizing on shared experiences.

This proposed approach aims to leverage the potential of generative AI by enabling it to establish relationships between databases at varying levels of structure. It harnesses the capability of the linguistic model to conduct reasoned comparisons between defined perimeters, one being the pre-established mental map and the other representing the evolving starting point under evaluation, enriched by accumulated experiences over time. This approach minimizes interpretive uncertainties inherent in open-ended investigations and emphasizes the AI's capacity for interpretation and comparison within a predefined context.

The primary challenge in this approach lies in ensuring that the mental map effectively represents a model applicable to the specific case (startup/spin-off/SME) being compared with relevant best practices. The mental map serves as the actual generator of know-how for this comparison, while AI functions as the tool facilitating this process with minimal resource expenditure and rapid turnaround times. Through multiple rounds of evaluation, the AI will highlight prominent gaps and provide evidence of changes and improvements made over time.

This development is aimed at endowing an AI solution with genuine unsupervised potential, meaning it operates without requiring corrective human interventions or interpretive filtering of outcomes, except those predefined within the adopted process.

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Beyond the boardroom: the role of women directors in driving eco-innovation considering situational contingencies

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Abstract

Frame of the research. *Promoting or hindering eco-innovation depends on different aspects, such as the institutional environment, resource availability, stakeholder value, board of directors and its gender composition.*

Purpose of the paper. *This study examines how women directors affect eco-innovation considering the moderating role of three situational contingencies: the presence of a CSR committee (firm level), the industry's environmental insensitivity (industry level), and the level of country's gender inequality in which firms are located (country level). Moreover, the effect on each type of eco-innovation (i.e., environmental products, noise reduction, product impact minimization, and renewable/clean energy products) is analyzed.*

Methodology. *We run a random-effect regression analysis on an unbalanced panel database regarding 6,677 firms operating in OECD countries (for a total of 37,346 firm-year observations). Data refer to the 2012-2020 period.*

Results. *We found that women directors positively affect eco-innovation. The presence of a CSR committee amplifies the effect of women directors, whereas the opposite occurs when women directors operate in an environmentally insensitive industry and in a country with high gender inequality. In addition, some differences emerge when investigating the effect of women directors on each type of eco-innovation.*

Research limitations. *This study is not devoid of limitations. We did not consider the effect of a critical mass of women and their characteristics. Moreover, other situational contingencies at the firm and industry level should be taken into account. Finally, we focused only on firms located in OECD countries.*

Managerial implications. *The inclusion of women directors may strongly promote eco-innovation and firms can benefit from their presence on boards. Moreover, some situational contingencies may influence women directors's effect and should therefore be addressed.*

Originality of the paper. *We tried to solve the conflicting results of previous studies by considering the influence of three situational contingencies.*

Key words: *Eco-innovation, women directors, contingency theory, CSR committee, environmentally insensitive industry, gender inequality*

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1. Introduction

Climate change and environmental degradation have become two of the great challenges of our time (e.g., Bazel-Shoham *et al.*, 2023). In this scenario, eco-innovation, also known as environmental innovation or green innovation (He and Jiang 2019; García-Meca *et al.*, 2023), is a strategy that can mitigate the current ecological crisis (Loarne-Lemaire *et al.*, 2021; Farza *et al.*, 2022).

No definition has so far set the standard for eco-innovation (Farza *et al.*, 2022). In this paper, we adopt the definition provided by Kemp and Pearson (2007, p. 7) whereby eco-innovation is: *"the production, assimilation or exploitation of a product, production process, service or management or business method that is novel to the organization (developing or adopting it) and which results, throughout its life cycle, in a reduction of environmental risk, pollution and other negative impacts of resources use (including energy use) compared to relevant alternatives"*.

Eco-innovation is a high-risk and extremely costly strategic activity (Farza *et al.*, 2022; Ma *et al.*, 2022). Nevertheless, it allows firms to increase their competitive capacity (García-Sánchez *et al.*, 2021; Issa and Bensalem 2023) and to respond to stakeholders' interests concerning the environment (Javed *et al.*, 2023).

Examining which factors affect eco-innovation is a crucial matter (Farza *et al.*, 2022). The board of directors and its gender composition is of paramount importance. Among other things, the board is responsible for strategic choices regarding the environment, including eco-innovation (García-Sánchez *et al.*, 2021; Lin *et al.*, 2022).

The Upper echelons theory (Hambrick and Mason 1984) suggests that directors' characteristics (e.g., backgrounds, principles and values) influence how the board makes decisions and implements strategies (García-Sánchez *et al.*, 2023). Gender diversity is the most evident diversity that may influence board operations (García-Meca *et al.*, 2023).

Previous literature has analyzed the relationship between the presence of women directors eco-innovation (e.g., Bannò *et al.*, 2023; Gangi *et al.*, 2023). As proposed by the social role theory (Eagly and Wood 2012), during their lives, women tend to develop a concern about the environment (Lin *et al.*, 2022) and a sensibility about climate change (Horbach and Jacob 2018). However, existing studies disagree about the effect of women directors on eco-innovation (Issa and Bensalem 2023), despite the majority of studies showing a positive relationship (e.g., Liao *et al.*, 2019; Naveed *et al.*, 2022). Moreover, previous literature (e.g., Nadeem *et al.*, 2020; Lin *et al.*, 2022; Moreno-Ureba *et al.*, 2022; Gangi *et al.*, 2023) assessed how some contingencies at the firm (e.g., firm dimension and type), industry (e.g., environmentally sensitive industry), and country level (e.g., government support, gender inequality) moderate how women directors affect eco-innovation. However, no study investigated the influence of these contingencies simultaneously[4].

This study examines how women directors affect eco-innovation considering the influence of situational contingencies referring to the firm (i.e., the presence of a CSR committee), industry (i.e., the industry's environmental insensitivity), and country level (i.e., the level of gender inequality). Moreover, the effect on each type of eco-innovation (i.e., environmental products, noise reduction, product impact minimization, and renewable/clean energy products) is investigated. Theoretically, this study relies on the social role theory and the contingency theory. Empirically, a random-effect regression analysis is performed on an unbalanced panel database regarding 6,677 firms operating in OECD countries (for a total of 37,346 firm-year observations) and referring to the 2012-2020 period.

Our results show that women directors promote eco-innovation. Moreover, the effect of women directors is amplified if a CSR committee exists, whereas it is reduced if the firm operates in an environmentally insensitive industry and in a country with high gender inequality. Lastly, we found that women directors favor eco-innovation activities related to environmental products and renewable/clean energy products and that situational contingencies influence the types of eco-innovation in a different way.

[4] To the best of our knowledge, Javed *et al.*, (2023) is the only study examining the moderating influence of regional development, state-owned firms, and firm dimension with regard to the effect of women CEOs on eco-innovation.

The paper is structured as follows. Section 2 reviews previous literature on the effect of women directors on eco-innovation and the moderating role exercised by the presence of a CSR committee, the industry's environmental insensitivity, and the level of country's gender inequality. Section 3 describes the methodology, specifically, the data, models and variables. Section 4 presents the descriptive statistics and the empirical results. Finally, Section 5 discusses the results and concludes.

2. Literature review

2.1 Women directors and eco-innovation

According to the social-role theory (Eagly and Wood 2012), gender is a social construct that sets expectations for the behaviors deemed appropriate for men and women (Ruble and Martin 1998; Nelson 2022). Social construction shapes world interpretation and the resulting behavioral patterns (Berger and Luckmann 1966). This, in turn, induces individuals to sharpen certain personality traits in accordance with the social expectations about their gender (Ridgeway and Erickson 2000; Nelson and Constantinidis 2017).

This concept is incorporated also in management studies with the social construction of gender used as a framing mechanism (Nelson 2022). Women are linked to empathy, helpfulness, caution, lack of confidence (Johnson and Powell 1994), while men are associated with agentic traits such as self-determination and courage (Pounder and Coleman 2002; Powell and Graves 2019).

Studies have also shown that women are more concerned about environmental protection and climate change (McCright 2010; Lin *et al.*, 2022) and that women directors promote renewable energy consumption (Atif *et al.*, 2021) and the reduction of emissions (Haque 2017). Women also pay particular attention to stakeholders and their requests (Liao *et al.*, 2019; Nadeem *et al.*, 2020; García-Meca *et al.*, 2023). Nowadays, stakeholders expect a more attentive approach towards the environment (Ma *et al.*, 2022) and the environment itself can be considered a stakeholder (Liao *et al.*, 2019).

At the same time, existing studies highlight the risk-aversion and lower confidence of women when making complex and financially high-risk decisions (Ma *et al.*, 2022; Moreno-Ureba *et al.*, 2022; Bazel-Shoham *et al.*, 2023; García-Meca *et al.*, 2023). Eco-innovation is characterized by high investment costs, long cycles and high risks (Farza *et al.*, 2022; Ma *et al.*, 2022). Therefore, women directors may have a negative impact on eco-innovation (García-Sánchez *et al.*, 2021; Ma *et al.*, 2022).

Previous literature examining the effect of women directors on eco-innovation generally find a positive relationship (e.g., Galia *et al.*, 2015; Farza *et al.*, 2022), even when eco-innovation is measured using patents (e.g., Naveed *et al.*, 2022; Wang *et al.*, 2022). The positive effect is generally confirmed for both product and process eco-innovation (Nadeem *et al.*,, 2020)[5]. On the contrary, few studies find a negative relationship between women directors and eco-innovation (García-Sánchez *et al.*, 2021; Ma *et al.*, 2022): women directors hinder eco-innovation in small firms, firms with financial constraints and firms operating in non-polluting industries (Ma *et al.*, 2022).

In summary, during their lives, women directors have developed several characteristics that induce them to promote eco-innovation (Liao *et al.*, 2019; Nadeem *et al.*, 2020; García-Meca *et al.*, 2023) or hinder it (e.g., risk-aversion and lower confidence) (García-Sánchez *et al.*, 2021; Ma *et al.*, 2022). We are however convinced that the positive effect on eco-innovation may prevail. Therefore, the following hypothesis is advanced:

Hypothesis 1: Women directors promote eco-innovation.

[5] However, according to He and Jiang (2019), the positive effect only regards product eco-innovation.

2.3 Women directors and eco-innovation: Situational contingencies

We believe that the conflicting results found in previous studies regarding the effect of women directors on eco-innovation may be due to different situational contingencies playing a moderating role. We are therefore convinced that it is necessary to go beyond the mere presence of women directors on board (Farza *et al.,* 2022; Issa and Bensalem 2023) and consider the effect of firms' internal and external factors. We refer to the contingency theory to analyze the influence of these factors (Horbach and Jacob 2018). According to the contingency theory of organization, the effect of one factor on a second one may depend upon a third one, which is called *contingency factor* and could be internal or external to the firm (Donaldson 2001).

Several situational contingencies at various levels (i.e., firm, industry, and country-level) moderate how women directors affect eco-innovation. Previous studies have considered many firm-level contingencies such as board characteristics (e.g., board size, tenure, and independence; Moreno-Ureba *et al.,* 2022), CSR strategy (Kuzey *et al.,* 2022), CSR committee (e.g., Moreno-Ureba *et al.,* 2022; Issa and Bensalem 2023), stakeholder orientation (Wang *et al.,* 2022), firm dimension (Nadeem *et al.,* 2020; Lin *et al.,* 2022). Moreover, the industry's environmental sensitivity (Nadeem *et al.,* 2020; Ma *et al.,* 2022), and the cultural system in the country in which women directors operate (e.g., Ma *et al.,* 2022; Bazel-Shoham *et al.,* 2023; Gangi *et al.,* 2023) have been examined.

Previous studies generally focus on one situational contingency (e.g., Naveed *et al.,* 2022; Bazel-Shoham *et al.,* 2023). However, we believe that to offer a complete overview, more contingencies at the firm, industry, and country levels should be considered simultaneously. Specifically, we investigated the moderating role of the presence of the CSR committee, the industry's environmental sensitivity, and the level of country's gender inequality.

CSR committee

The main purpose of a CSR committee is to handle risks and exploit opportunities related to CSR (García-Sánchez *et al.,* 2021; Moreno-Ureba *et al.,* 2022). Its presence suggests the firm's commitment towards sustainability (García-Sánchez *et al.,* 2021) and eco-innovation (García-Sánchez *et al.,* 2021). The presence of the CSR committee also allows a greater control and better management of eco-innovation (Moreno-Ureba *et al.,* 2022).

Previous studies (i.e., Moreno-Ureba *et al.,* 2022; Agnese *et al.,* 2023; Issa and Bensalem 2023) find that a CSR committee can amplify the effect of women directors on eco-innovation. The reason is that the collaboration between women directors and other board divisions enables the support of women directors' ideas (Moreno-Ureba *et al.,* 2022). We therefore hypothesize that:

> *Hypothesis 2a: A CSR committee amplifies the positive effect of women directors on eco-innovation.*

Environmentally insensitive industry

Industry type influences both the firm's sustainability-oriented attitude (Javed *et al.,* 2023) and the role of the firm's eco-innovation (Ma *et al.,* 2022).

Firms operating in more environmentally sensitive industries are subjected to stricter rules in terms of environmental sustainability (Boiral and Heras-Saizarbitoria 2017; Javed *et al.,* 2023). Eco-innovation can help reduce pollution (Javed *et al.,* 2023) and develop the firm in a sustainable way (Ma *et al.,* 2022). Moreover, the necessity to protect the environment induces a greater effort of women directors to promote eco-innovation (Javed *et al.,* 2023). However, Ma *et al.,* (2022) find that in environmentally sensitive industries, women directors do not affect eco-innovation (Ma *et al.,* 2022).

Instead, firms belonging to environmentally insensitive industries face lower pressures to adopt environmentally friendly activities: these industries may even hinder women director's ability to promote eco-innovations (Ma *et al.,* 2022).

We therefore hypothesize that:

Hypothesis 2b: Environmentally insensitive industries reduce the positive effect of women directors on eco-innovation.

Country's gender inequality

The institutional context and, specifically, the cultural dimension, strongly affects firm actions and results (Chen *et al.*, 2016; Wulani and Junaedi 2021; Bazel-Shoham *et al.*, 2023). When analyzing the influence of women directors, the degree of gender equality should be taken into consideration since it affects women's ability to promote their ideas (Bannò *et al.*, 2023). Women's ability to reach upper echelon positions and promote environmental preservation and eco-innovation depends indeed on the level of masculinity and femininity in society (Hofstede *et al.*, 2010; Bazel-Shoham *et al.*, 2023).

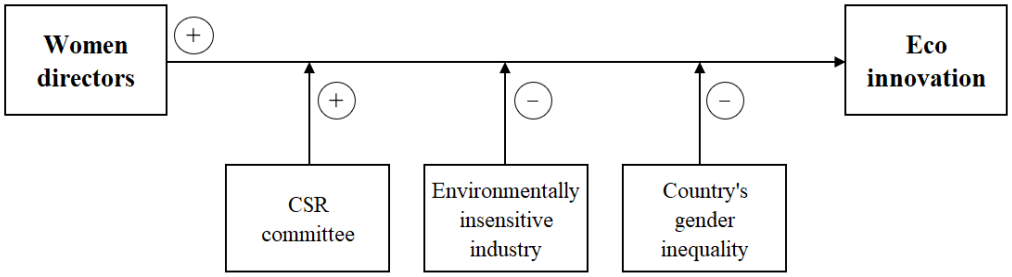
In masculine societies, the effects of women directors on eco-innovation is stronger (Bazel-Shoham *et al.*, 2023), while in feminine societies their effect is limited since firms operating in these societies are already environmentally friendly (Bazel-Shoham *et al.*, 2023). Other studies (i.e., Ma *et al.*, 2022; Gangi *et al.*, 2023) find opposite results: gender inequality negatively moderates the positive effect of women directors on eco-innovation.

We believe that country's gender inequality negatively moderates the effect of women directors on eco-innovation and hypothesize that:

Hypothesis 2c: Country's gender inequality reduces the positive effect of women directors on eco-innovation.

Figure 1 shows the theoretical framework.

Fig. 1: Theoretical framework



Source: Our elaboration

3. Methodology

3.1 Data

Data derives from two sources. The Refinitiv database was used to collect data regarding eco-innovation, the presence of women directors, the presence of CSR committee, firm age, firm size, number of directors, percentage of independent directors, financial and economic data. The Gender Inequality Index provided by the United Nations Development Programme (UNDP) was used to measure the level of a country's gender inequality.

In the sample, we included all firms operating in OECD countries for which Refinitiv provided information regarding our variables of interest. As a result, we obtained an unbalanced panel database of 37,346 firm-year observations regarding 6,677 firms.
Data refer to the 2012-2020 period.

3.2 Method

We adopted a random effect approach to investigate the effect of women directors on eco-innovation and the moderating role of situational contingencies. The random effect approach was preferred to the fixed effect one because some independent variables remain constant during the period considered.

We tested Hypothesis 1 by investigated the effects of *Women directors* on *Eco-innovation* and estimating this equation:

$$Eco\text{-}innovation_{i,t} = \alpha + \beta_1 Women\ directors_{i,t-1} + \beta_2 CSR\ committee_{i,t-1} + \beta_3 Environmentally\ insensitive\ industry_{i,t-1} + \beta_4 Gender\ inequality_{i,t-1} + \beta_5 Control\ variables$$

where *i* and *t* denote the firm and year, respectively. Control variables include *Firm age*, *Total assets*, *ROE*, *Leverage*, *Board size*, *Board independence*, *Industry*, and *Country*. To avoid the potential reverse causality, we lagged the independent variables by one year (Liu, 2018).

We tested Hypotheses 2a, 2b and 2c by assessing the moderating effect of *CSR committee*, *Environmentally insensitive industry*, and *Gender inequality* and estimating these equations:

For Hypothesis 2a:

$$Eco\text{-}innovation_{i,t} = \alpha + \beta_1 Women\ directors_{i,t-1} + \beta_2 CSR\ committee_{i,t-1} + \beta_3 Women\ directors_{i,t-1} \times CSR\ committee_{i,t-1} + \beta_4 Environmentally\ insensitive\ industry_{i,t-1} + \beta_5 Gender\ inequality_{i,t-1} + \beta_6 Control\ variables$$

For Hypothesis 2b:

$$Eco\text{-}innovation_{i,t} = \alpha + \beta_1 Women\ directors_{i,t-1} + \beta_2 Environmentally\ insensitive\ industry_{i,t-1} + \beta_3 Women\ directors_{i,t-1} \times Environmentally\ insensitive\ industry_{i,t-1} + \beta_4\ _{i,t-1} CSR\ committee + \beta_5 Gender\ inequality_{i,t-1} + \beta_6 Control\ variables$$

For Hypothesis 2c:

$$Eco\text{-}innovation_{i,t} = \alpha + \beta_1 Women\ directors_{i,t-1} + \beta_2 Gender\ inequality_{i,t-1} + \beta_3 Women\ directors_{i,t-1} \times Gender\ inequality_{i,t-1} + \beta_4\ _{i,t-1} CSR\ committee + \beta_5 Environmentally\ insensitive\ industry_{i,t-1} + \beta_6 Control\ variables$$

We performed robustness checks by repeating the previous analysis with a focus on the effect of women directors on each type of eco-innovation: environmental products, noise reduction, product impact minimization, and renewable/clean energy products. The equations estimated were similar to the previous ones with *Eco-innovation* being replaced by *Environmental products*, *Noise reduction*, *Product impact minimization*, and *Renewable/clean energy products*.

3.3 Variable definition

Tab. 1 reports the sources and definitions of variables used in the analysis.

Tab. 1: Variables definitions and sources

Variable	Definition	Source
Dependent variables		
Environmental innovation	Score reflecting the firm's capacity to reduce the environmental costs and burdens for its customers, and thereby creating new market opportunities through new environmental technologies and processes or eco-designed products. Score ranging from 1 to 100, where higher values indicate better results	Refinitiv
Environmental products	Score reflecting if the firm reports on at least one product line or service that is designed to have positive effects on the environment or which is environmentally labeled and marketed. Score ranging from 1 to 100, where higher values indicate better reporting	Refinitiv
Noise reduction	Score reflecting if the firm develops new products that are marketed as reducing noise emissions. Score ranging from 1 to 100, where higher values indicate better results	Refinitiv
Product impact minimization	Score reflecting if the firm reports about take-back procedures and recycling programs to reduce the potential risks of products entering the environment or if the company reports about product features or services that will promote responsible and environmentally preferable use. Score ranging from 1 to 100, where higher values indicate better results	Refinitiv
Renewable/clean energy products	Score reflecting if the firm develops products or technologies for use in the clean, renewable energy (such as wind, solar, hydro and geo-thermal and biomass power). Score ranging from 1 to 100, where higher values indicate better results	Refinitiv
Independent variables		
Women directors	Percentage of women directors	Refinitiv
CSR committee	Dummy variable equal to 1 if the firm has a CSR committee, 0 otherwise	Refinitiv
Environmentally insensitive industry	Dummy variable equal to 1 if the firm operates in an environmentally insensitive industry, i.e., in one of the following industries: Manufacturing; Electricity, gas, steam and air conditioning supply; sewerage, waste management and remediation activities; Wholesale and retail trade; repair of motor vehicles and motorcycles; Transportation and storage; Accommodation and food service activities; Information and communication; Financial and insurance activities; Real estate activities; Professional, scientific and technical activities; Administrative and support service activities; Public administration and defense; compulsory social security; Education; Human health and social work activities; Arts, entertainment and recreation; Other service activities	Our elaboration
Gender inequality	Variable ranging from 0 to 1, where 0 indicates an equal contribution of women and men to human development and 1 indicates the domination of one gender over the other across three dimensions (i.e., health, empowerment and labor)	United Nations Development Programme
Control variables		
Firm age	Logarithm of years since firm foundation	Refinitiv
Total assets	Total assets (in billions)	Refinitiv
ROE	Return on equity, given by net income on equity	Refinitiv
Leverage	Debt on equity	Refinitiv
Risk	Standard deviation of return on assets in the last 5 years	Refinitiv
Board size	Number of directors (both men and women)	Refinitiv
Board independence	Percentage of independent directors	Refinitiv
Industry	Dummy variable equal to 1 if the firm belongs to a specific sector, and 0 otherwise. Industries: Agriculture, forestry and fishing; Mining and quarrying; Manufacturing; Electricity, gas, steam and air conditioning supply; Water supply; sewerage, waste management and remediation activities; Construction; Wholesale and retail trade; repair of motor vehicles and motorcycles; Transportation and storage; Accommodation and food service activities; Information and communication; Financial and insurance activities; Real estate activities; Professional, scientific and technical activities; Administrative and support service activities; Public administration and defense; compulsory social security; Education; Human health and social work activities; Arts, entertainment and recreation; Other service activities	Refinitiv
Country	Dummy variable equal to 1 if the firm is located in a specific country, and 0 otherwise. Countries: Australia, Austria, Belgium, Canada, Chile, Colombia, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland; Republic of, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, South Korea, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States of America	Refinitiv

Source: Our elaboration

4. Results

4.1 Descriptive statistics

Tab. 2 shows the descriptive statistics.

Tab. 2: Descriptive statistics

Variable	Mean/%	Standard deviation	Min	Max
Eco-innovation	26.64	31.97	0	99.89
Environmental products	32.74	37.66	0	99.41
Noise reduction	23.26	38.61	0	97.39
Product impact minimization	40.15	35.35	0	95.03
Renewable/clean energy products	23.46	38.01	0	98.00
Women directors	20.93%	0.14	0%	85.71%
CSR committee	54.34%	0.50	0	1
Environmentally insensitive industry	89.84%	0.30	0	1
Gender inequality	0.13	0.07	0.01	0.46
Firm age	1.48	0.35	0.30	2.48
Total assets	30.11	142.03	0.00	3.43
ROE	17.82%	3.46	-50942%	5577%
Leverage	1.38	17.22	-0.01	2131.51
Board size	9.66	3.39	1	119
Board independence	65.07	25.37	0	100
Agriculture, forestry and fishing	0.35%	0.06	0	1
Mining and quarrying	6.37%	0.24	0	1
Manufacturing	33.79%	0.47	0	1
Electricity, gas, steam and air conditioning supply	3.40%	0.18	0	1
Water supply; sewerage, waste management and remediation activities	0.62%	0.08	0	1
Construction	2.89%	0.17	0	1
Wholesale and retail trade; repair of motor vehicles and motorcycles	7.67%	0.27	0	1
Transportation and storage	3.69%	0.19	0	1
Accommodation and food service activities	11.49%	0.10	0	1
Information and communication	8.75%	0.28	0	1
Financial and insurance activities	16.82%	0.37	0	1
Real estate activities	5.78%	0.23	0	1
Professional, scientific and technical activities	4.28%	0.20	0	1
Administrative and support service activities	2.05%	0.14	0	1
Public administration and defense; compulsory social security	0.01%	0.01	0	1
Education	0.28%	0.05	0	1
Human health and social work activities	1.20%	0.11	0	1
Arts, entertainment and recreation	0.62%	0.07	0	1
Other service activities	0.28%	0.05	0	1
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	0	0	0	0
Australia	5.97%	0.23	0	1
Austria	0.56%	0.07	0	1
Belgium	0.83%	0.09	0	1
Canada	6.03%	0.23	0	1
Chile	0.84%	0.09	0	1
Colombia	0.41%	0.06	0	1
Costa Rica	0.01%	0.01	0	1
Czech Republic	0.07%	0.03	0	1
Denmark	0.96%	0.10	0	1
Estonia	0	0	0	0
Finland	0.96%	0.10	0	1
France	2.73%	0.16	0	1
Germany	3.19%	0.18	0	1
Greece	0.52%	0.07	0	1
Hungary	0.12%	0.04	0	1
Iceland	0.04%	0.02	0	1
Ireland; Republic of	0.87%	0.09	0	1
Israel	0.48%	0.07	0	1
Italy	1.57%	0.12	0	1
Japan	9.41%	0.29	0	1
Latvia	0	0	0	0
Lithuania	0	0	0	0
Luxembourg	0.41%	0.06	0	1
Mexico	1.00%	0.10	0	1
Netherlands	1.17%	0.11	0	1
New Zealand	0.95%	0.10	0	1
Norway	0.94%	0.10	0	1
Poland	0.78%	0.09	0	1
Portugal	0.27%	0.05	0	1
Slovak Republic	0.01%	0.01	0	1
Slovenia	0.02%	0.01	0	1
South Korea	2.93%	0.17	0	1
Spain	1.20%	0.11	0	1
Sweden	3.03%	0.17	0	1
Switzerland	2.50%	0.16	0	1
Turkey	1.01%	0.10	0	1
United Kingdom	7.72%	0.27	0	1
United States of America	40.49%	0.49	0	1

Source: Our elaboration

The average performance achieved by firms in eco-innovation and its components (i.e., environmental products, noise reduction, product impact minimization, and renewable/clean energy products) is generally low. Firms perform better in *Noise reduction* and *Renewable/clean energy products*. Moreover, some firms do not engage in eco-innovation, while other firms perform this activity and register excellent results.

In the sample, 20.93% of directors on the board are women, but a great variance is registered.

54.34% of firms in the sample have a CSR committee.

The sample is largely composed by firms operating in an environmentally insensitive industry (89.84%).

Finally, the level of country's gender inequality is generally low (0.1344).

4.2 Empirical results

Tab. 3 reports the results of the regressions analyzing the effect of women directors on eco-innovation. Model 0 does not include interaction terms, while Models 1, 2, and 3 evaluate the moderating effect of the presence of a CSR committee, the industry's environmental insensitivity, and the level of the country's gender inequality.

Tab. 3: Regression results: Women directors and eco-innovation

	Model 0	**Model 1**	**Model 2**	**Model 3**
Variables	**Eco-innovation**	**Eco-innovation**	**Eco-innovation**	**Eco-innovation**
Women directors	7.749*** (1.094)	9.897*** (1.344)	-3.493 (2.813)	12.766*** (1.982)
CSR committee	7.747*** (0.279)	8.611*** (0.420)	7.750*** (0.279)	7.769*** (0.279)
Women directors × CSR committee		-4.350*** (1.581)		
Environmentally insensitive industry	-7.390 (5.390)	-7.334 (5.390)	-9.697* (5.417)	-7.459 (5.390)
Women directors × Environmentally insensitive industry			12.624*** (2.911)	
Gender inequality index	-136.221*** (5.553)	-136.798*** (5.556)	-136.856*** (5.553)	-131.574*** (5.761)
Women directors × Gender inequality index				-40.717*** (13.437)
Firm age	8.127*** (0.731)	8.121*** (0.731)	8.179*** (0.731)	8.064*** (0.731)
Total assets	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
ROE	0.072** (0.030)	0.072** (0.030)	0.072** (0.030)	0.072** (0.030)
Leverage	-0.005 (0.005)	-0.005 (0.005)	-0.005 (0.005)	-0.005 (0.005)
Board size	0.368*** (0.047)	0.365*** (0.047)	0.367*** (0.0467)	0.371*** (0.047)
Board independence	0.048*** (0.008)	0.048*** (0.009)	0.048*** (0.008)	0.048*** (0.008)
Constant	33.351*** (2.482)	33.158*** (2.483)	35.489*** (2.530)	33.054*** (2.484)
Industry FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
R^2	0.302	0.302	0.302	0.302
Observations	37,346	37,346	37,346	37,346
Number of firms	6,677	6,677	6,677	6,677

Source: Our elaboration

Model 0 shows that *Women directors* has a positive and statistically significant effect on eco-innovation ($b = 7.749$, $p < 0.01$), confirming Hypothesis 1 according to which women directors have a positive effect on eco-innovation. The model also shows that *CSR committee* has a positive and statistically significant coefficient ($b = 7.747$, $p < 0.01$), so that the presence of a CSR committee promotes eco-innovation. *Environmentally insensitive industry* has a negative but not statistically significant coefficient, underlining that the industry's environmental insensitivity does not affect eco-innovation. *Gender inequality* has a negative and statistically significant coefficient ($b = -136.221$, $p < 0.01$), suggesting that operating in gender unequal countries has a negative effect on eco-innovation.

In Model 1, which examines the moderating effect of the presence of a CRS committee, *Women directors* and *CSR committee* have a positive and statistically significant coefficient (b = 9.897, p < 0.01; b = 8.611, p < 0.01, respectively). On the contrary, the interaction term *Women directors* × *CSR committee* has a negative and statistically significant coefficient (b = -4.350, p < 0.01). On the complex, Hypothesis 2a is confirmed: the presence of a CSR committee amplifies the positive effect of women directors on eco-innovation. Figure 2 Panel A reports the effect. In Model 1, *Environmental insensitive industry* has negative but not statistically significant coefficient, while *Gender inequality* has a negative and statistically significant coefficient (b = -136.798, p < 0.01).

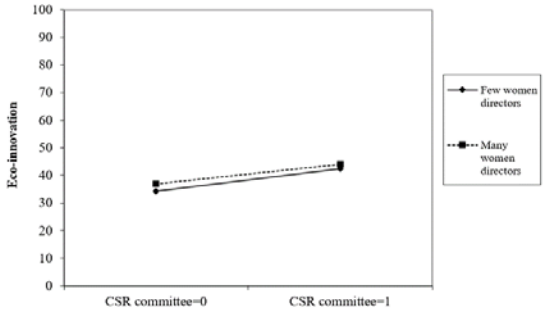
In Model 2, which examines the moderating effect of the industry's environmental insensitivity, *Women directors* has a negative but not statistically significant coefficient. *Environmentally insensitive industry* has a negative and statistically significant coefficient (b = -9.697, p < 0.10). The interaction term *Women directors* × *Environmentally insensitive industry* has a positive and statistically significant coefficient (b = 12.624, p < 0.1). On the complex, Hypothesis 2b is confirmed: operating in an environmentally insensitive industry reduces the positive effect of women directors on eco-innovation. Figure 2 Panel B reports the effect. In Model 2, *CSR committee* has a positive and statistically significant coefficient (b = 7.750, p < 0.001), while *Gender inequality* has a negative and statistically significant coefficient (b = -136.856, p < 0.01).

In Model 3, which examines the moderating effect of the level of the country's gender inequality, *Women directors* has a positive and statistically significant coefficient (b = 12.766, p < 0.01). *Gender inequality* has a negative and statistically significant coefficient (b = -131.574, p < 0.01). The interaction term *Women directors* × *Gender Inequality* has a negative and statistically significant coefficient (b = -40.717, p < 0.01). On the complex, Hypothesis 2c is confirmed: operating in a country with high gender inequality reduces the positive effect of women directors on eco-innovation. Figure 2 Panel C reports the effect. In Model 3, *CSR committee* has a positive and statistically significant coefficient (b = 7.769, p < 0.01), while *Environmental insensitive industry* has a negative but not statistically significant coefficient.

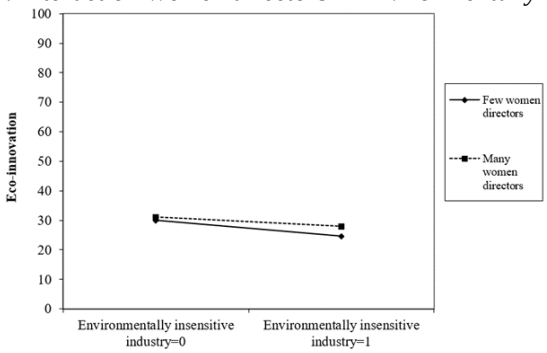
In Models 0, 1, 2, 3, and 4, *Firm age*, *ROE*, *Board size* and *Board independence* have a positive and statistically significant coefficient. Instead, *Total assets* has a null and statistically significant coefficient, while *Leverage* has a negative but not statistically significant coefficient.

Fig. 2: The moderating effect of the presence of a CSR committee, the industry's environmental insensitivity, and the level of country's gender inequality

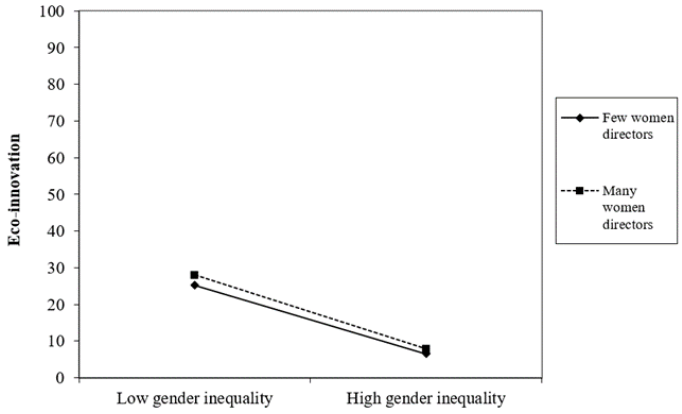
Panel A: Interaction Women directors × CSR committee



Panel B: Interaction Women directors × Environmentally insensitive industry



Panel C: Interaction Women Directors × Gender Inequality



4.3 Robustness checks

We performed robustness checks by running the previous analysis with a focus on the effect of women directors on each type of eco-innovation: environmental products (Models 4, 5, 6, and 7; see Tab. 4), noise reduction (Models 8, 9, 10, and 11; see Tab. 4), product impact minimization (Models 12, 13, 14, and 15; see Tab. 5), and renewable/clean energy products (Models 16, 17, 18, and 19; see Tab. 5). Results obtained in baseline models (Model 0, 1, 2, and 3) are generally confirmed when investigating the effect on each type of eco-innovation.

Tab. 4: Robustness check: Women directors, environmental products and noise reduction

Variables	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**	**Model 9**	**Model 10**	**Model 11**
	Environ-mental products	**Environ-mental products**	**Environ-mental products**	**Environ-mental products**	**Noise reduction**	**Noise reduction**	**Noise reduction**	**Noise reduction**
Women directors	8.766***	12.245***	-2.270	12.787***	3.222	-1.606	-12.554	-9.684
	(1.432)	(1.756)	(3.692)	(2.599)	(3.786)	(4.825)	(8.008)	(6.681)
CSR committee	9.638***	11.048***	9.642***	9.656***	6.010***	4.497***	5.974***	5.873***
	(0.366)	(0.551)	(0.366)	(0.366)	(0.910)	(1.306)	(0.910)	(0.912)
Women directors × CSR committee		-7.097***				8.794		
		(2.075)				(5.449)		
Environmentally insensitive industry	-7.245	-7.154	-9.504	-7.300	-11.651	-11.483	-15.028	-11.849
	(6.656)	(6.656)	(6.693)	(6.655)	(28.832)	(28.836)	(28.880)	(28.839)
Women directors × Env. ins. industry			12.383***				18.926**	
			(3.819)				(8.466)	
Gender inequality	-174.908***	-175.900***	-175.545***	-171.143***	-39.984**	-39.409**	-39.171**	-49.165***
	(7.275)	(7.280)	(7.277)	(7.552)	(17.911)	(17.912)	(17.909)	(18.324)
Women directors × Gender inequality				-32.641*				116.167**
				(17.606)				(49.555)
Firm age	10.484***	10.478***	10.532***	10.439***	3.843	3.844	3.849	3.934
	(0.914)	(0.914)	(0.914)	(0.914)	(2.438)	(2.438)	(2.438)	(2.438)
Total assets	0.000***	0.000***	0.000***	0.000***	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROE	0.035	0.034	0.034	0.035	-0.115	-0.115	-0.110	-0.106
	(0.039)	(0.039)	(0.039)	(0.039)	(0.244)	(0.244)	(0.244)	(0.244)
Leverage	-0.004	-0.004	-0.005	-0.004	-0.087	-0.088	-0.087	-0.087
	(0.006)	(0.006)	(0.006)	(0.006)	(0.056)	(0.056)	(0.056)	(0.056)
Board size	0.451***	0.447***	0.450***	0.453***	0.193	0.196	0.192	0.200
	(0.061)	(0.061)	(0.061)	(0.061)	(0.160)	(0.160)	(0.160)	(0.160)
Board independence	0.048***	0.047***	0.047***	0.047***	0.075***	0.075***	0.077***	0.077***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.024)	(0.024)	(0.024)	(0.024)
Constant	43.745***	43.437***	45.845***	45.490***	-6.133	-5.602	-3.607	-6.067
	(3.124)	(3.125)	(3.190)	(3.126)	(6.659)	(6.667)	(6.753)	(6.659)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.262	2.262	0.262	0.262	0.153	0.154	0.151	0.153
Observations	37,346	37,346	37,346	37,346	6,046	6,046	6,046	6,046
Number of firms	6,677	6,677	6,677	6,677	1,055	1,055	1,055	1,055

Source: Our elaboration

Tab. 5: Robustness check: Women directors, product impact minimization and renewable/clean energy products

Variables	Model 12	Model 13	Model 14	Model 15	Model 16	Model 17	Model 18	Model 19
	Product impact minimi-zation	**Product impact minimi-zation**	**Product impact minimi-zation**	**Product impact minimi-zation**	**Renewable/ clean energy products**	**Renewable/ clean energy products**	**Renewable/ clean energy products**	**Renewable/ clean energy products**
Women directors	2.127	9.128***	6.963	-0.782	9.264***	11.885***	-3.826	10.812***
	(2.289)	(2.780)	(9.992)	(4.037)	(2.116)	(2.678)	(5.051)	(3.774)
CSR committee	8.438***	11.264***	8.442***	8.420***	4.487***	5.396***	4.514***	4.497***
	(0.578)	(0.861)	(0.578)	(0.579)	(0.519)	(0.770)	(0.519)	(0.519)
Women directors × CSR committee		-14.514***				-4.883		
		(3.275)				(3.056)		
Environmentally insensitive industry	-23.041*	-22.702*	-22.038*	-23.010*	-3.769	-3.701	-6.658	-3.772
	(11.940)	(11.942)	(12.111)	(11.942)	(11.919)	(11.921)	(11.964)	(11.918)
Women directors × Env. ins. industry			-5.024				15.006***	
			(10.107)				(5.259)	
Gender inequality	-124.393***	-124.283***	-124.326***	-126.795***	-118.282***	-118.856***	-118.610***	-116.919***
	(11.325)	(11.316)	(11.326)	(11.651)	(10.175)	(10.180)	(10.173)	(10.538)
Women directors × Gender inequality				23.848				-12.900
				(27.263)				(26.053)
Firm age	12.473***	12.490***	12.483***	12.528***	5.603***	5.592***	5.718***	5.578***
	(1.668)	(1.668)	(1.668)	(1.669)	(1.353)	(1.353)	(1.354)	(1.354)
Total assets	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROE	-0.007	-0.008	-0.007	-0.006	0.007	0.007	0.007	0.007
	(0.037)	(0.037)	(0.037)	(0.037)	(0.070)	(0.070)	(0.070)	(0.070)
Leverage	-0.024	-0.025	-0.024	-0.024	-0.030	-0.020	-0.020	-0.020
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)
Board size	0.640***	0.633***	0.641***	0.638***	0.210***	0.207***	0.210***	0.211***
	(0.103)	(0.103)	(0.103)	(0.103)	(0.080)	(0.080)	(0.080)	(0.080)
Board independence	0.086***	0.085***	0.085***	0.086***	0.027*	0.027*	0.026*	0.027*
	(0.016)	(0.016)	(0.016)	(0.016)	(0.015)	(0.015)	(0.015)	(0.015)
Constant	39.108***	37.914***	38.119***	39.204***	22.933***	22.686***	25.242***	22.876***
	(5.902)	(5.908)	(6.229)	(5.904)	(4.211)	(4.214)	(4.287)	(4.212)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.188	0.188	0.188	0.188	0.175	0.175	0.175	0.175
Observations	12,195	12,195	12,195	12,195	18,466	18,466	18,466	18,466
Number of firms	2,246	2,246	2,246	2,246	3,060	3,060	3,060	3,060

Source: Our elaboration

5. Discussion and conclusion

The impact of women directors on climate change management and eco-innovation solutions has received great attention in the last decade (e.g., Bazel-Shoham *et al.*, 2023). Previous studies investigating the effect of women directors on eco-innovation yielded contradictory results (Issa and Bensalem 2023), despite the majority of studies finding a positive effect (e.g., Liao *et al.*, 2019; Naveed *et al.*, 2022).

In this study, we advanced the idea that the mere presence of women directors is not enough to favor or hinder eco-innovation as some situational contingencies at the firm, industry, and country level can influence the effect of women directors. To the best of our knowledge, so far no study has assessed how contingencies at these three levels moderate the relationship between women directors and eco-innovation.

This study investigates how three different situation contingencies affect the impact of women directors on eco-innovation development. We considered the presence of a CSR committee (firm level), the industry's environmental insensitivity (industry level), and the country's level of gender inequality (country level). From the theoretical point of view, we relied on the social role theory (Eagly and Wood 2012) and the contingency theory (Donaldson 2001).

Results show that women directors promote eco-innovation and two types of eco-innovation (i.e., environmental products and renewable/clean energy products) (Farza *et al.*, 2022). The presence of a CSR committee amplifies the positive effects of women directors, supporting the idea that the

presence of a CSR committee enables a better management of eco-innovation projects (Moreno-Ureba *et al.,* 2022). At the industry level, operating in an environmentally insensitive industry hinders the positive effect of women directors on eco-innovation. In these industries women directors may not be able to promote eco-innovation given the lower attention given to environmental issues. Finally, country's gender inequality generally hinders the positive effect of women directors; however, in the case of noise reduction, the effect is opposite.

This study contributes to previous literature by advancing the social role theory in the context of eco-innovation. What this theory states is indeed particularly relevant in the case of eco-innovation as the social construction of gender stereotypes emerges when women directors face strategic decisions regarding this activity (e.g, Horbach and Jacob 2018).

We also tried to advance existing research focusing on women directors and their effect on eco-innovation by analyzing the impact on eco-innovation and each type of eco-innovation and by relying, for the first time, on the contingency theory to assess the influence of moderators at the firm, industry, and country level.

This study has several managerial and policy implications. Our study highlights the role of women directors in promoting eco-innovation and how firms can benefit from the diverse perspectives and competencies of women and men when facing decisions regarding the environment. Moreover, we demonstrated how situational contingencies strongly influence the realization of women's potential in eco-innovation strategies. Our results suggest that a CSR committee should be established as it enhances women's ability to promote eco-innovation. Instead, firms operating in an environmentally insensitive industry and/or in a gender-inequal country should avoid that these situations prevent women from promoting eco-innovation, for example by increasing environmental awareness and gender equality on board.

In addition, our analysis shows the importance of a policy intervention to enable women effecting eco-innovation by creating a more gender-equal context and a higher environmental awareness even in industries that are not, by nature, environmentally sensitive.

This study is not devoid of limitations. First, we measured the presence of women directors with the percentage of board members. Future studies could focus on the effect of a critical mass of women as, according to previous literature, when this threshold is reached, the effect of women directors is stronger (Konrad *et al.,* 2008). Second, we did not consider women's characteristics such as background, sustainability skills, tenure, and age. Future studies could also take into account their effect (García-Sánchez *et al.,* 2023). Third, eco-innovation is influenced by several situational contingencies. Future studies may focus on situational contingencies that have not been considered in this study such as firm dimension and stringency of environmental policies. Finally, we used a sample of firms operating in OECD countries. Future research should focus on other geographical areas with different characteristics.

In conclusion, we can state that women are a pillar to reach environmental sustainability, whose importance should not be disregarded as demonstrated by the 2030 Agenda. Enabling them to realize their potential is therefore necessary and strongly advisable.

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Beyond sustainability: a systematic literature review on climate change through the lens of stakeholder orientation

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Abstract

Frame of the research. *The escalating interest in addressing the challenges presented by climate change has led to a significant increase in research within this domain, necessitating a systematic organization. This study provides a comprehensive summary of the expanding realm of climate change research, emphasizing the progression of scholarly exploration over the past 28 years. Additionally, it underscores the importance of examining this evolution from the perspective of stakeholder orientation. This focus is crucial given that stakeholders represent one of the primary forces compelling companies to undertake climate change initiatives.*

Purpose of the paper. *The purpose of this study is twofold. Firstly, it seeks to delineate the intellectual structure of recent climate change management literature. This involves identifying the core themes and dynamic trends that characterize the current state of research in this field. Secondly, the study aims to ascertain the primary stakeholders targeted by climate change strategies. By measuring the breadth and depth of firms' sustainability efforts, it endeavors to pinpoint and understand the key stakeholder groups that are integral to the deployment of climate change strategies.*

Methodology. *This comprehensive analysis scrutinizes 495 scholarly articles published in leading business management journals from 1995 to 2023. The study aims to dissect the intellectual framework underpinning contemporary climate change management research, utilizing the Bibliometrix tool for this purpose. To assess the breadth and depth of firms' sustainability initiatives, a detailed content analysis was performed on the amassed documents, employing the MAXQDA software for rigorous examination.*

Results. *The findings indicate that the United States, Great Britain, and Australia are leading the charge in climate change research. Key milestones in the field were reached in 2012, 2018, and 2023, marking significant progress in understanding and addressing climate change. Currently, the focal points of research are shifting towards sustainable finance and the assessment of carbon risk, reflecting the evolving priorities in addressing climate change challenges. Finally, depth and breadth metrics reveal a nuanced understanding of stakeholder orientation with climate change strategies.*

Research limitations. *The limitations of this study deserve careful consideration for future research. First, the complex nature of climate change as a global challenge transcends disciplinary boundaries, making a purely management-focused approach potentially narrow. Second, the lexicon used to outline climate change strategies is in a state of continuous evolution, and the terminology and concepts that define these strategies are likely to expand and change. Finally, while the study uses metrics to assess the breadth and depth of companies' sustainability efforts, there is an opportunity to improve this analysis through the development of a standardized index.*

Managerial implications. *Bridging the gap between climate change challenges and managerial strategies, this review equips organizations with a strategic framework to enhance their sustainability efforts in alignment with stakeholder expectations.*

Originality of the paper. *This systematic literature review is pioneering in its comprehensive examination of climate change within the management literature, offering a unique lens through which to evaluate the integration of sustainability into business strategies. By mapping thematic evolution and identifying emerging trends, the document provides new insights into aligning business practices with stakeholder expectations. Moreover, this study represents the first effort to investigate the intricate intersection between climate change and firm's stakeholder orientation, by measuring the breadth and depth of firms' sustainability efforts.*

Key words: *climate change, systematic literature review, stakeholder orientation, sustainability*

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1. Introduction

The climate change is certainly the greatest (Rainard, Smith, & Pachauri, 2023) and the most urgent (Falk *et al.*, 2024) challenge facing all of humanity. The term "climate change" was delineated from former article 1 of the United Nations Framework Convention on Climate Change as "*any change in climate attributed directly or indirectly to human activities, which alters the composition of the atmosphere worldwide and adds to the natural climate variability observed over comparable time periods*" (Bodansky, 1993). The distinction between 'climate variability' and 'climate change' becomes apparent through this definition (Ghil & Lucarini, 2020). Climate variability is defined as the result of natural fluctuations, unaffected by human activities. In this sense, it is contingent upon temporary and localized natural factors, such as shifts in oceanic conditions and solar activity.

On the other hand, climate change is primarily driven by anthropogenic factors. For instance, one contributing factor is the emission of greenhouse gases by companies. Consequently, it can be characterized as a complex phenomenon due to the intricate interplay of numerous interconnected variables, each contributing to the overall impact of change.

The global debate on climate change, characterized by increasing droughts, accelerating biodiversity loss, land degradation and the imminent collapse of food systems, has gained ever more pressing relevance, becoming a central topic in the daily conversations of leaders all over the world.

In response to the growing need to address the climate issue, significant interest has developed over time from the research community (Moss *et al.*, 2010). This interest has given rise to a series of perspectives through which scholars have explored the topic in depth.

Meyer (1995), for example, explores the economic implications of climate change, providing insights into mitigation benefits, costs, policy choices under uncertainty, and alternate policy response mechanisms, influencing climate change policies at domestic and international levels. Renukappa, Akintoye, Egbu, and Goulding (2013) highlight the importance of integrating climate change and carbon management into business models. Dahlmann, Branicki, and Brammer (2019) explore the role of corporate climate change goals in shaping their emissions trends, distinguishing between symbolic and substantive commitments to reduce environmental impacts. Ponte (2020) discusses how leading companies in global value chains address sustainability issues as a key competitive element and source of value creation, suggesting a process of "*green capital accumulation"*. Ghadge, Wurtmann, and Seuring (2020) identify sources, consequences, and control mechanisms of climate change risks in global supply chains. Using the framework of Drucker's Business Theory, Laszlo, Cooperrider, and Fry (2020) argue that global challenges such as pandemics and climate change offer businesses the opportunity to better align with the needs of society. Littlewood, Decelis, Hillenbrand, and Holt (2018) examine the importance of business drivers, sustainability factors and stakeholder pressure in motivating corporate commitment to climate change action. These papers offer a range of perspectives on how businesses are responding to climate change, from managing carbon emissions and risks in supply chains to leveraging global challenges for transformative business models. They provide valuable insights into the evolving landscape of business and management research in the context of climate change, helping to paint a complex and detailed picture.

Considering that the *Systematic Literature Review* (SLR) is vital in academic research since it helps you to gather current information and analyses the state of the art in that specific issue (Kunisch, Menz, Bartunek, Cardinal, & Denyer, 2018), the primary objective of this paper is to organize the managerial literature on climate change to comprehend its current state, thematic evolution, and suggest directions for future studies.

Secondly, integrating climate change into business practices extends beyond operational aspects of sustainability. Numerous studies (e.g., Vieira, Stewart, Lamberts, and Beal (2020), Shackleton *et al.* (2019), Corfee-Morlot, Cochran, Hallegatte, and Teasdale (2011)) highlight the evolving expectations of businesses to not only address climate change proactively, but also to engage stakeholders in meaningful dialogue and action. Thus, this document aims to explore the various dimensions related to climate change, offering a significant contribution to understanding the phenomenon from a new perspective, the stakeholder one. In fact, given that companies are

committed to addressing environmental challenges also due to pressure from stakeholders (Kölbel, Heeb, Paetzold, & Busch, 2020), we decided to understand which categories of stakeholder's research has focused on in implementing strategies on climate change.

To achieve these ambitious objectives, this research adopts a mixed methods approach, blending qualitative and quantitative methodologies.

To establish a comprehensive framework and offer a panoramic view of how climate change is addressed in managerial literature, we utilized Bibliometrix, an advanced bibliometric analysis tool (Aria & Cuccurullo, 2017). This platform enabled us to perform precise data collection and analysis, reviewing over 400 articles spanning from 1995 to 2023. This extensive temporal analysis provided insights into the evolution of managerial literature concerning climate change.

Subsequently, we explored how this perspective intersects with corporate stakeholder orientation through content analysis. In particular, all of the papers under observation were questioned by the MAXQDA program to better understand the latent feature of each research, namely the relationship between the climate change call to action and the stakeholders. Then, inheriting the breadth and depth measures from the literature (Vurro & Perrini, 2011), we evaluate the direction of the firms sustainability efforts to respond to stakeholder pressure on climate change. In detail, depth measures the average volume of strategies related to climate change and mentioned in the document with reference to the stakeholder categories recognized in the literature, that are: shareholder, human resources, manager, competitor, customer, provider, institutional investor, NGO, local community, and environment. While breadth measures the variety of climate change aspects included in the document, also in this case observed through the lens of stakeholder orientation.

In essence, this research bridges the gap between climate change and management, offering organizations a roadmap to navigate the evolving landscape of environmental management.

It is a call to action to address the urgent challenges of climate change and contribute to a more sustainable future through tailored recommendations for management professionals.

2. Review structure and methodology

The systematic literature review approach is distinguished by its structured, transparent, and replicable procedure (Centobelli, Cerchione, Chiaroni, Del Vecchio, & Urbinati, 2020). This methodology empowers researchers to meticulously investigate specific research questions, ensuring the execution of a robust and methodical research process. The review process is organized into four distinct phases, each contributing to the comprehensive analysis of existing literature (Fink, 2019):

1. selection of research questions and methodological approach: in this initial phase, research questions are meticulously crafted, and suitable bibliographic databases are chosen;
2. definition of inclusion/exclusion criteria: this phase involves the formulation of rigorous criteria for the inclusion or exclusion of pertinent literature, maintaining the integrity of the review;
3. development and implementation of a methodological review protocol: a structured review protocol is created and executed, establishing a standardized methodology for the systematic understanding of phenomenon;
4. summary of results: the results of the systematic review are succinctly summarized, offering a comprehensive and coherent overview of the findings.

To comprehensively understand the multifaceted nature of climate change, and its impact on organizations and stakeholders, were identified the following research questions (RQs) (phase 1).

Firstly, while numerous studies have explored climate change and its risks across various sectors (Ghadge *et al.*, 2020; Ng, Wang, Yang, Li, & Jiang, 2018; Nikolaou, Nikolaidou, & Tsagarakis, 2016) and organizational responses to these changes (e.g.,Nema, Nema, and Roy (2012)), a systematic approach to organizing this knowledge, particularly regarding its intellectual structure, remains absent.

Hence, we state the following research question:

RQ1: What is the intellectual structure of recent climate change management literature?

This research question aims to uncover the foundational elements of climate change management research, emphasizing the identification of predominant themes and the dynamic trends shaping the field. By synthesizing existing literature, this investigation provides a comprehensive understanding of the key issues and evolving trajectories within climate change management.

Secondly, in the evolving landscape, understanding the key stakeholders at whom climate change strategies are directed is crucial. As companies increasingly recognize the critical role of environmental management in their operational and strategic frameworks, identifying and engaging key stakeholders becomes a central concern. Sprengel and Busch (2011) provide a fundamental understanding of how stakeholder pressures influence the formulation of environmental strategies, with a particular focus on climate change. Expanding the dynamics between environmental strategies and stakeholder management, Buysse and Verbeke (2003) demonstrate that more proactive environmental strategies are associated with broader and deeper stakeholder coverage. Their empirical analysis indicates that companies with global environmental strategies tend to engage a broader range of stakeholders, highlighting the importance of inclusiveness in stakeholder management practices. Further complicating the stakeholder landscape, Haigh and Griffiths (2009) argue for the recognition of the natural environment as a primary stakeholder in the context of climate change. Research question 2 (RQ2) seeks to delve deeper into this critical area by investigating the key stakeholders targeted by companies' climate change strategies. Thus,

RQ2: Towards which stakeholders are climate change strategies primarily targeted?

This question investigates the primary stakeholders to whom climate change strategies are directed. By assessing the breadth and depth of sustainability efforts, the research seeks to identify and understand the primary stakeholders who are central to the implementation of climate change strategies within firms' organizational frameworks.

The first research question (RQ1) lends itself to a scientific mapping approach, which enables the visualization of the structure and interrelationships within the scientific literature of a specific field.

On the other hand, RQ2 is better suited for investigation through qualitative content analysis. For the scientific mapping analysis, it was opted for the use of the Biblimetrix tool (Aria & Cuccurullo, 2017; Linnenluecke, Marrone, & Singh, 2020), which offers the capability to create visual representations of the research landscape in the chosen field.

In order to address the qualitative content analysis aspects of RQ2, it was selected the MAXQDA software, known for its proficiency in analysing and interpreting textual data in a qualitative manner. This approach allows to leverage the strengths of both scientific mapping and qualitative content analysis techniques to comprehensively address the research questions and derive valuable insights.

The selection of papers to be investigated for research purposes was based on the following approaches based (phase 2) on databases and journals (phase 3).

In detail, the database-drive approach it was useful to identify:

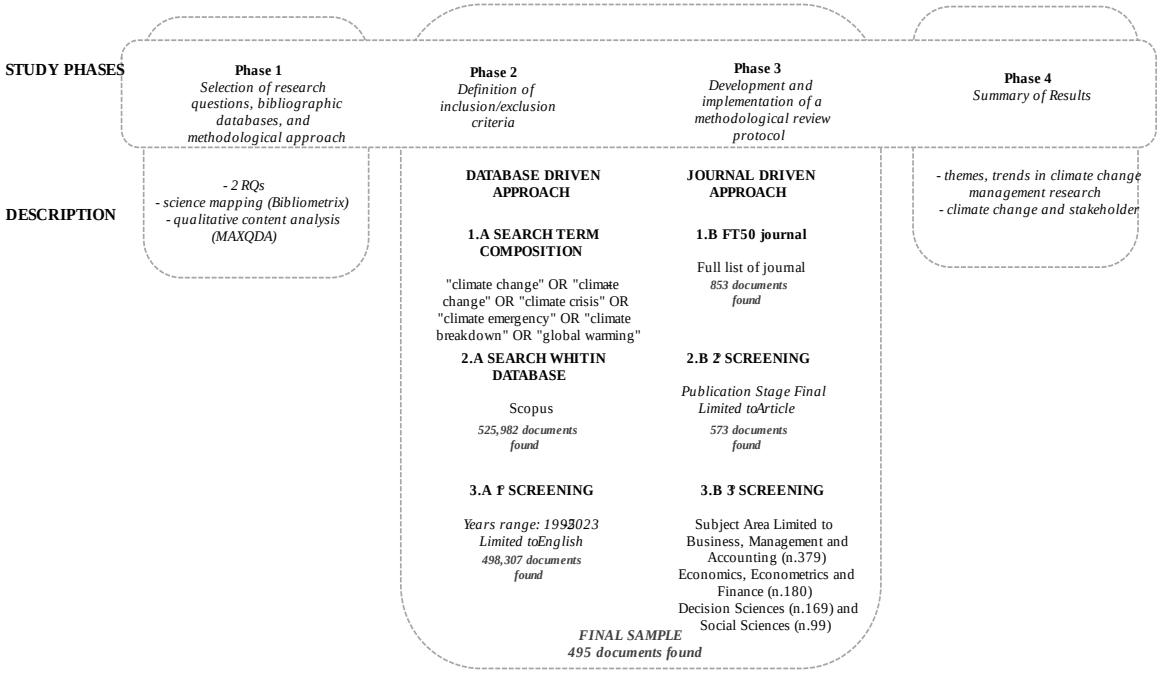
- search terms criteria: "climate change" OR "climate-change" OR "climate crisis" OR "climate emergency" OR "global warming".
- database source: Scopus and Ebsco host (Aguinis, Ramani, & Alabduljader, 2023)
- 1st screening criteria:
  - Timespan: 1995–2023, the authors selected 1995 as the starting point for the analysis because it was the year of the first Conference of the Parties of the UN Framework Convention on Climate Change (UNFCCC), marking the inception of the first international environmental treaty addressing global warming;
  - Languages: only English was considered to prevent language bias (Stechemesser & Guenther, 2012).

- The journal driven approach has perfected the identification of papers with other selection criteria such as:
- source type: limited to FT50 journal,
- 2nd screening criteria:
  - publication stage: only final papers were included, with the exclusion of articles in press;
  - document type: only articles were considered;
- 3dr screening criteria:
  - subject area: limited to Business, Management and Accounting, Economics, Econometrics and Finance, Decision Sciences and Social Sciences.

Ultimately, the synthesis of the results (phase 4) was carried out in alignment with the formulation and development of the research questions.

The procedure to carry out the review was structured as shown in Figure 1.

Fig. 1: The developed method in this study



Source: our elaboration

3. Results

3.1 The key themes and trends in climate change management research

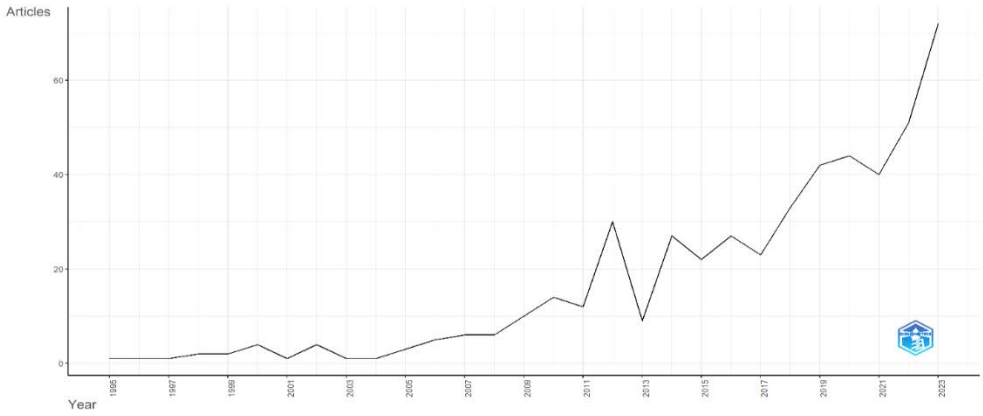
The analysis of bibliometric results commences with a concise description of the main bibliometric statistics. Subsequently, the investigation delves into contextual performance before scrutinizing the primary themes and trends in the field of climate change in management. The literature review was performed on 495 papers published in the period 1995–2023. The articles were written by 1197 authors, of which only 97 papers were single authored. Table 1 summarizes the main information about the collection.

Tab. 1: Main information about the data collection

MAIN INFORMATION	
Timespan	1995:2023
Sources (Journals, Books, etc)	115
Documents	495
Annual Growth Rate %	16.5
Document Average Age	6.01
Average citations per doc	50.09
DOCUMENT CONTENTS	
Keywords Plus (ID)	1103
Author's Keywords (DE)	1648
AUTHORS	
Authors	1197
Authors of single-authored docs	95
AUTHORS COLLABORATION	
Single-authored docs	97
Co-Authors per Doc	2.69
International co-authorships %	30.57

Regarding the contextual performance, in terms of the growth trend related to climate change in management, it is evident that the current relevance of this topic has had a substantial impact on scientific output. There has been exponential growth in scholarly production from 1995 to 2023. The most notable years of increased publication activity are 2012 and 2018, with the highest peak occurring in 2023.

Fig. 2: Annual scientific production



Based on the affiliation information collected from each author in the database, it is possible identify the regions that made contributions to the field from 1995 to 2023. The top 20 countries out of 59 affiliated countries have been listed in Table 2. These countries represent 87% of global scientific production. The top three countries are as follows: the USA, with 254 papers published; UK, with 136 papers; and Australia, with 75 papers.

Tab. 2: Number of documents published by country

#	Region	Freq	#	Region	Freq
1	USA	254	11	ITALY	22
2	UK	136	12	SOUTH AFRICA	22
3	AUSTRALIA	75	13	SPAIN	17
4	CHINA	69	14	SOUTH KOREA	15
5	CANADA	46	15	MALAYSIA	14
6	INDIA	45	16	IRELAND	12
7	GERMANY	40	17	BRAZIL	11
8	SWITZERLAND	33	18	NEW ZEALAND	11
9	FRANCE	26	19	BELGIUM	10
10	NETHERLANDS	23	20	FINLAND	10

As the contribution from the USA, UK and Australia are the most, theoretically, this is expected that collaboration among researchers in these countries would be the highest. This expectation is confirmed with this Figure 3.

Fig. 3: Country collaboration map

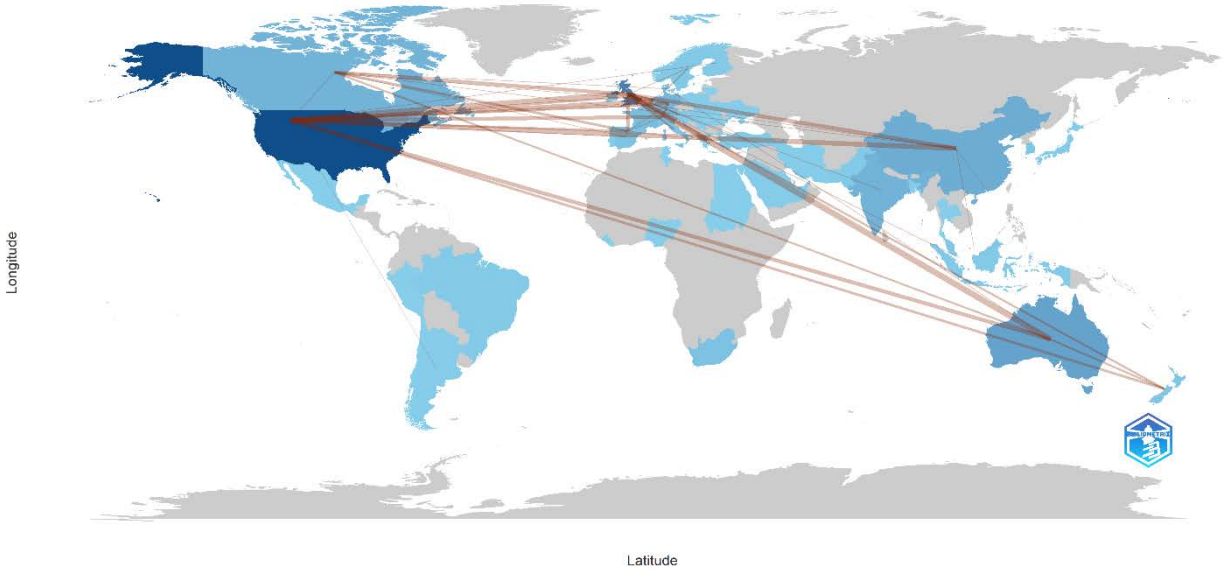


Table 3 presents an overview of the most frequently utilized keywords across four categories, namely keywords plus, authors' keywords, words within titles, and words found in abstracts. Keywords plus refer to words or phrases commonly found in the titles of references cited within an article, but not within the article's own title. This differentiates them from authors' keywords, words within titles, and words within abstracts, which are selected by the authors of the respective papers. In bibliometric analysis, Bibliometrix creators regard keywords plus as significant due to authors' keywords not always being explicit enough in conveying the core content of an article.

Nevertheless, authors' chosen keywords also hold value. As expected in an analysis centered on climate change, words such as "climate change" and "climate" are prominently featured in all four types of words examined. The concepts of "management" and "environmental management" are also recurrent across all dimensions studied.

It is interesting to note that the most frequently recurring words in each of the four categories relate to sustainability management strategies. Keywords plus, for instance, allude to the more societal aspect of sustainability, as evidenced by the frequency and intensity of words associated with this aspect, such as "human,", "humans", "decision making", "fame", "adult", "male" and "workplace". On the other hand, authors' keywords are primarily linked to the environmental facet of sustainability, with terms like "safety climate", "adaptation", "energy efficiency", "environmental management", "LCA" (Life Cycle Assessment), and "circular economy".

Words used in titles appear to be more attention-grabbing, often associated with corporate-level content, thus reflecting the governance of sustainability. Examples include the use of the word "performance" (absent in the other categories), as well as "industry", "corporate", "company" and "firm." Lastly, the most frequently adopted keywords by authors in abstracts seem to strike a balance between all three dimensions of sustainability.

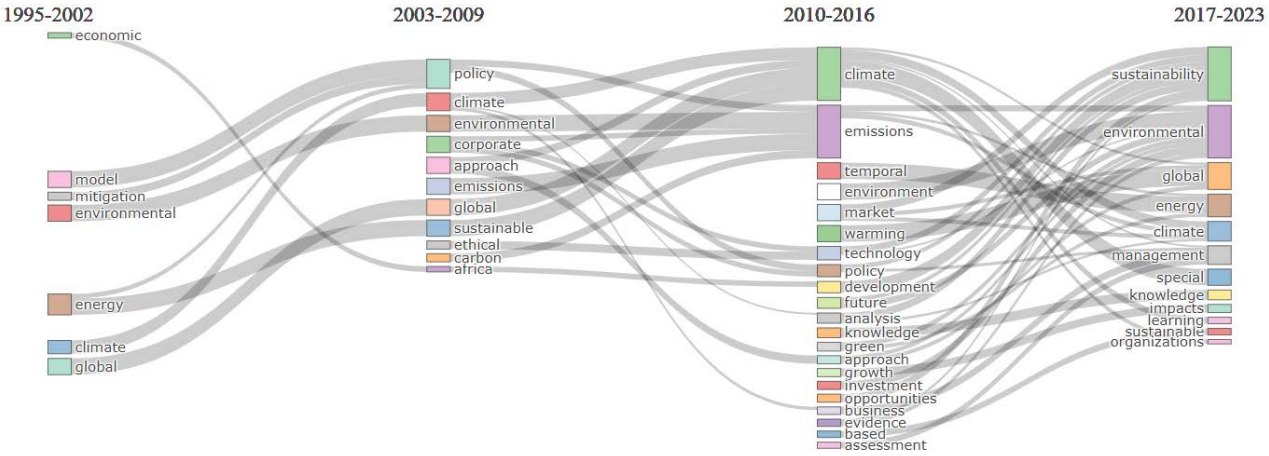
Tab. 3: Most frequently used keywords

Keywords+	Freq.	A.Keywords	Freq.	Titles	Freq.	Abstract	Freq.
climate change	1001	climate change	379	climate	729	climate	5443
article	370	sustainability	139	management	593	management	4171
sustainable development	300	safety climate	94	change	298	study	3240
human	287	sustainable development	84	performance	269	companies	2859
environmental management	286	innovation	73	study	266	change	2548
global warming	223	adaptation	58	carbon	265	environmental	2403
risk assessment	199	corporate social responsibility	58	environmental	258	energy	2002
decision making	198	management	51	safety	249	research	1998
emission control	184	energy efficiency	44	energy	220	results	1915
humans	183	environmental management	44	industry	217	safety	1889
sustainability	179	life cycle assessment	42	corporate	214	firms	1834
environmental impact	175	risk management	40	development	166	performance	1800
carbon dioxide	168	organizational climate	38	analysis	165	carbon	1725
carbon	162	environmental performance	37	sustainable	160	paper	1605
female	152	global warming	37	companies	158	data	1541
China	146	environment	36	green	157	analysis	1352
greenhouse gases	146	carbon footprint	35	risk	156	development	1343
adult	142	knowledge management	35	assessment	153	model	1332
male	142	circular economy	34	organizational	150	emissions	1283
energy efficiency	138	China	32	role	147	water	1273
united states	135	greenhouse gas emissions	32	innovation	144	impact	1215
carbon emission	131	supply chain management	32	supply	144	business	1163
workplace	131	safety culture	31	sustainability	143	company	1161
industry	130	carbon emissions	30	firms	135	organizational	1124
greenhouse gas	126	leadership	29	impact	133	risk	1115

Figure 5 demonstrates evolution of keywords in four different stages: 1995-2002, 2003-2009, 2010-2016 and 2017-2023. It is noteworthy that the connection between themes is uneven throughout these periods. Specifically, the topics pertaining to the initial stage exhibit limited interrelation with those of the second stage. In contrast, the connectivity intensifies between the second and third periods, culminating in a significant expansion of interconnections between the third and fourth stages. This fluctuation demonstrates that the themes associated with climate change, although linked by a common thread, have, in reality, proliferated and enriched themselves with new facets during this progression.

A significant portion of the studies in the first stage (1995-2002) is centered around themes related to “enviromental”, “energy” and “global”. In the second period (2003-2009), the focus shifts towards topics such as “policy”, “climate”, “enviromental” and “corporate”. The third stage (2010-2016) is characterized by research that hones in on subjects like “climate”, “emission”, and “warming”. The final period (2017-2023) is primarily dedicated to the themes of “sustainability”, “enviromental”, and “global”.

Fig. 5: Authors' Keywords thematic evolution

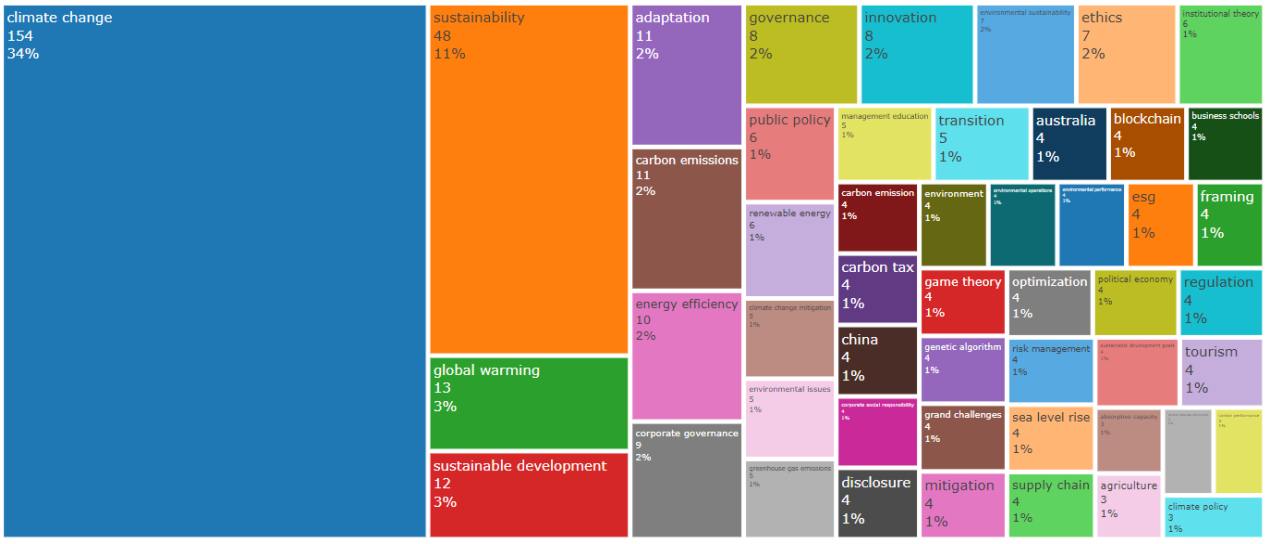


In the Figure 6 is rappresented a TreeMap. By using TreeMap visualizations, researchers and bibliometric analysts can gain insights into the structure and distribution of research topics, keywords, or other bibliometric data within their dataset. It helps in identifying key areas of research focus and can be a valuable tool for exploring and understanding the landscape of scientific literature in a visual and intuitive manner(Almeida-Filho, de Lima Silva, & Ferreira, 2021).

In the context of Bibliometrix, this kind of map is a type of hierarchical diagram that displays information in a nested, tree-like structure. It is often used to depict the hierarchical relationships among different components of bibliometric data, such as research topics, keywords, authors, or publications. The TreeMap in Figure 5 is generated using the plus keywords. In a TreeMap visualization in Bibliometrix, the top-level categories may represent broader concepts or entities, while the lower-level nodes represent more specific subcategories or elements within those broader categories. The size and color of the rectangles are used to indicate the importance or relevance of each category or subcategory within the dataset. Larger and darker-colored cells typically represent more significant components, while smaller and lighter-colored cells represent less significant ones.

The distribution of keywords therefore suggests the key areas of research focus on climate change; it was seen that concepts such as climate change (N=154, 34%), sustainability (N=48, 11%), global warming (N=13, 3%), and sustainable development (N=12, 3%) stood out in the articles included in the analysis.

Fig. 6: Keyword TreeMap and relationship



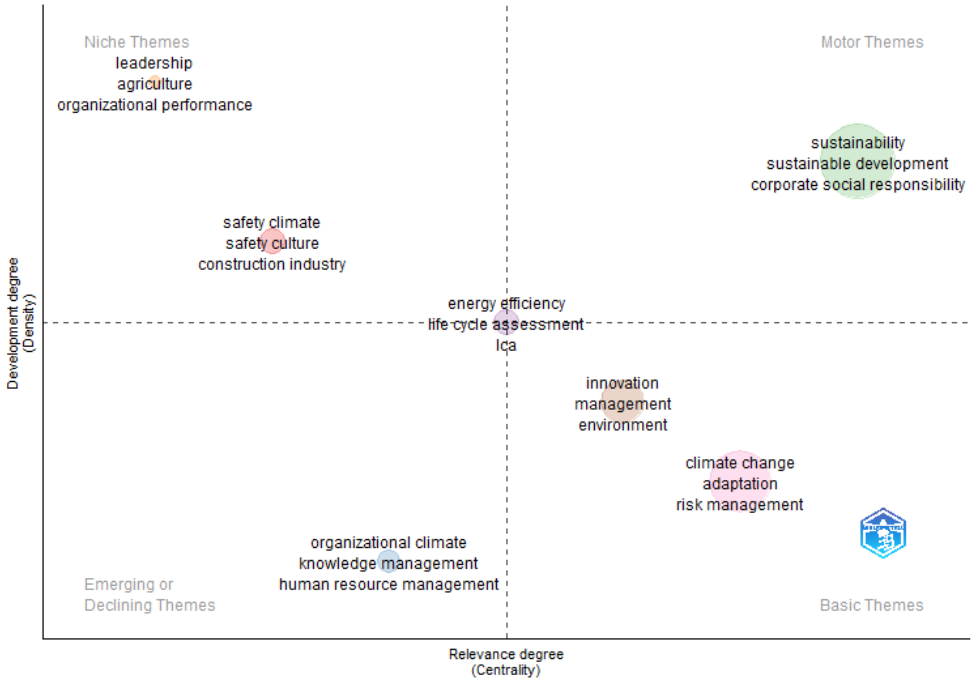
The matrix in the Figure 7 presents a thematic map generated from the keywords plus of the papers. This figure holds significance in the analysis as it visually represents how the concept of climate change aligns with emerging or waning themes in the field of management.

The matrix reveals the presence of seven distinct theme clusters: safety climate, organizational climate, sustainability, energy efficiency, leadership, innovation, and climate change. These themes are subsequently arranged based on two key variables: centrality, which reflects their level of relevance, and density, which signifies their degree of development.

In the upper part of the matrix, on the left side, the highly developed (niches) are presented. Here are listed the keywords link to “leadership”, “agriculture” and “organizational performance”. On the right side, “sustainability”, “sustainable development” and “corporate social responsibility” are the keywords presented as motor themes. Down at the right side, in the basic themes there are the keywords as “climate change”, “adoption” and “risk management”. At the left side, emerging or declining themes are displayed: “organizational climate”, “knowledge management”, and “human resource management”.

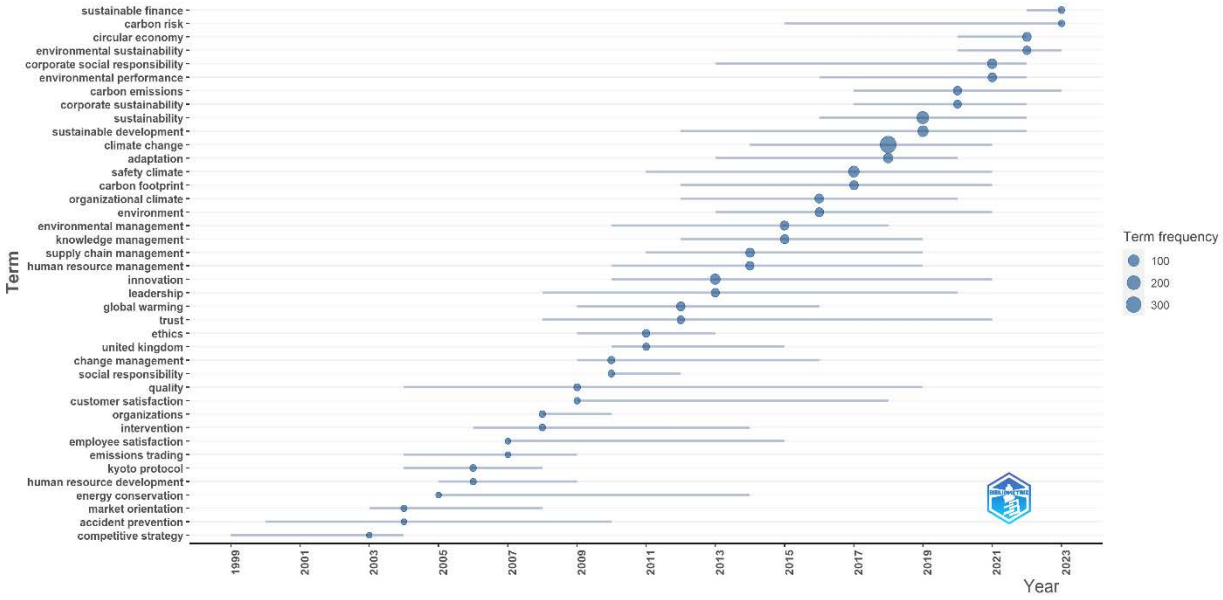
Certain keywords are positioned along the left diagonal of the matrix, particularly those associated with the themes of safety and innovation, albeit with varying degrees of density and centrality. Of particular significance is the theme centered around the terms “energy efficiency” and “LCA”, which stands out as a highly central focus.

Fig. 7: Thematic map of the keywords plus of the papers



In order to delve into the temporal evolution of trends in climate change studies, Figure 8 has been created to precisely illustrate this evolution. From the figure, it is evident that the discourse on climate change has shifted over time. Around the turn of the millennium, terms such as “competitive strategy”, “accident prevention”, and “market orientation” were prevalent. Subsequently, between 2010 and 2015, the terms most frequently used by authors were “social responsibility”, “change management” and “leadership.” Following this, the trend transitioned to themes related to “adaptation”, “sustainable development” and “environmental performance.” Topics of utmost relevance associated with the years 2021-2023, on the other hand, are linked to “carbon risk” and “sustainable finance.”

Fig. 8: Keywords trend topic



3.2 The stakeholders and climate change strategies

To identify primary stakeholders targeted by climate change strategies, the methodological framework has been meticulously crafted. Initial steps involved the identification of overarching categories capable of capturing the spectrum of strategies associated with climate change, culminating in the delineation of four macro classes: *Mitigation Strategies*, *Adaptation Strategies*, *Corporate and Organizational Strategies*, and *Political and Regulatory Strategies*.

Mitigation strategies are characterized by specific criteria directed at elucidating interventions designed to curtail greenhouse gas emissions and alleviate the impacts of climate change (Cadez, Czerny, & Letmathe, 2019). On the other hand, *adaptation strategies* shed light on measures intended to enhance organizational resilience against current and anticipated impacts of climate change (Ortiz-de-Mandojana & Bansal, 2016). The category of *corporate and organizational strategies* was defined through a comprehensive analysis of initiatives and internal policies adopted by firms to integrate sustainability and address climate change concerns. Lastly, *political, and regulatory strategies* involved the identification of pertinent government policies, laws, and regulations pertaining to sustainability and climate change.

Following the identification of these macro-classes, specific keywords were meticulously defined for each strategy category, serving as critical indicators during the subsequent content analysis. As an illustration, keywords associated with mitigation strategies may encompass terms such as “carbon reduction” or “renewable energy”.

The compilation of these keywords forms the basis for the development of the vocabulary presented in Table 4.

Furthermore, to enhance the methodological rigor, a comprehensive examination of widely cited sources pertaining to climate change was undertaken. Noteworthy websites, such as the Paleontological Research Institution[4], the State of the Climate del National Oceanic and Atmospheric Administration[5], the World Bank Group Climate Change Knowledge[6] and the NASA Climate Portal[7] Portal, were meticulously reviewed.

[4] PRI. the Paleontological Research Institution. https://www.priweb.org/.
[5] NOAA. National Oceanic and Atmospheric Administration - State Climate. https://www.ncdc.noaa.gov/sotc/.
[6] https://climateknowledgeportal.worldbank.org/
[7] NASA. Global Climate Portal (NASA). https://climate.nasa.gov/evidence/.

Tab. 4: The vocabulary of climate change strategies

CLIMATE CHANGE STRATEGIES	KEYWORDS
Mitigation Strategies	afforestation, biomass energy, carbon capture, carbon storage, carbon offset, carbon pricing, carbon reduction, clean energy, climate-friendly practices, decarbonization, emission reduction, energy efficiency, energy conservation, geothermal energy, green building practices, green technology, hydropower, land use, low-carbon, nuclear energy, recycling, reforestation, renewable energy, renewable energy adoption, social innovation, solar energy, solid waste, sustainable agriculture, sustainable transportation, transportation, waste management, wind power
Adaptation Strategies	adaptive agriculture, biodiversity preservation, climate management, climate resilience, climate risk management, climate-informed urban planning, climate-proofing, climate-resilient infrastructure, climate-responsive infrastructure, coastal management, coastal protection, conserve natural systems, crop and livestock diversity for agriculture, disaster preparedness, disaster risk, disaster risk preparedness, disaster risk reduction, disease management, diversify, drought management, ecosystem-based adaptation, flood control, health management, heat resilience, make land use changes, modify management, modify operations, policy changes, relocate, renew natural systems, resilient communities, retreat, water resource management
Corporate and Organizational Strategies	carbon footprint reduction, carbon footprint , circular economy, corporate social responsibility, eco-friendly business, environmental management, environmental management systems, environmental responsibility, green procurement policies, green supply chain, iso, stakeholder engagement, supply chain sustainability, sustainability disclosure, sustainability performance, sustainability practices, sustainability reporting, sustainable operations, sustainable procurement, sustainable product design, sustainable product design sustainable product manufacturing
Policy and Regulatory Strategies	cap-and-trade, carbon market regulations, carbon taxation, clean energy incentives, climate action plans, climate adaptation policies, climate regulations, climate resilience policies, emission reduction, emission reduction regulations, emission reduction targets and regulations, emission targets, energy efficiency regulations, environmental legislation, incentives for renewable energy and energy efficiency, international agreements and treaties, international climate agreements, international treaties, paris agreement, renewable energy policies

At this stage, it was used content analysis to examine the language, lexicon, and expressions most often used in the literature to connect stakeholders to climate change strategies. The volume of content analysis data is generally large, and qualitative data analysis software can simplify the analysis process. In this study it was used MAXQDA 2020 software, which offers valuable data management and analysis support to the researcher (Oliveira, Bitencourt, Teixeira, & Santos, 2013).

The software made it possible to query the text content of research papers and explore the data, as well as to analyze the interrelationships between the words in the vocabularies constructed to define the climate change strategies and the stakeholder categories. Thus, all papers were first coded according to the stakeholder categories identified widely in the literature, that are shareolders, human resources, manager, competitor, customer, provider, institutional investors, ONG, local community, and environment. The individual codifications were then interrogated based on the vocabularies for the climate change strategies. This process allowed to understand the researchers orientation in terms of climate change strategies toward all categories of stakeholders.

Thus, the results obtained from this analysis were used to operationalize the depth and breadth variable (Vurro & Perrini, 2011a). In detail, the depth corresponds to the average volume of climate change aspects (the keywords) mentioned in the document. It is given by the sum of the climate change aspects relating to each stakeholder, multiplied by an index that corresponds to the ratio between the total number of aspects cited for the stakeholder in all documents and the total number of climate change aspects cited with respect to all the stakeholders. The weighting index is inserted to reduce subjectivity in the choice of aspects taken into consideration in the content analysis.

While the breadth corresponds to the variety of aspects related to climate change included in the document. This variable is calculated as the ratio between the total of climate change aspects found in the single document and relating to each stakeholder and the total of climate change aspects researched in all the documents collected relating to that specific stakeholder.

The two measures, breadth, and depth were calculated for each strategy identified in Table 4 and for each of the categories of stakeholders previously indicated. Thus, Table 5 shows the result of this analysis.

Tab. 5: Breadth and depth of sustainability efforts

STRATEGIES	*Adaptation*		*Mitigation*		*Corporate and Organizational*		*Policy and Regulatory*	
MEASURES	*Depth*	*Breadth*	*Depth*	*Breadth*	*Depth*	*Breadth*	*Depth*	*Breadth*
STAKEHOLDERS								
Shareholder	0.08	1.00	1.91	6.86	2.70	8.50		
Human resources	0.03	1.00	1.31	3.55	2.02	5.45		
Manager	0.04	1.00	2.78	3.94	2.95	6.09		
Competitor	0.02	2.00	0.13	1.38	0.26	2.75		
Customer	0.49	1.33	26.73	9.86	17.86	13.18		
Provider			1.01	3.83	0.42	4.75		
Institutional investors	0.34	2.00	11.40	9.07	9.14	10.90		
Ong					0.01	2.50		
Local community	1.63	2.33	22.99	9.00	15.44	13.30		
Environment	6.81	1.86	341.69	27.17	459.08	67.38	8.39	16.00

The Table 5 outlines the depth and breadth of climate change strategies across different stakeholder categories, measured through adaptation, mitigation, corporate and organizational, and policy and regulatory strategies.

What clearly emerges is that the environment is the primary focus: the highest depth and breadth scores are consistently observed in the ‘environment’ stakeholder category across all strategies, especially for mitigation and corporate and organizational strategies. This indicates a significant emphasis on environmental impact within climate change strategies, showcasing firms’ focus on reducing their ecological footprint and addressing environmental sustainability directly.

On the other side, there is a notable variability in how different stakeholders are engaged across strategies.

For instance, ‘customers’ and ‘local community’ receive substantial attention in mitigation strategies, reflecting a focus on engaging with external stakeholders who are directly affected by the firm’s operations and climate change policies.

The depth and breadth scores in the Corporate and Organizational category are high for several stakeholders, including shareholders, human resources, and managers. This suggests that internal stakeholders are crucial in the implementation of climate change strategies within firms, emphasizing the role of internal policy and organizational culture in driving sustainability efforts.

Mitigation strategies have the highest depth and breadth scores across most stakeholders, indicating that firms are heavily investing in efforts to reduce their climate impact. This is especially true for the ‘environment’ category, where mitigation strategies are most pronounced, highlighting a direct response to climate change through reducing emissions and other environmental impacts.

The Policy and Regulatory column is notably empty for most stakeholders, except for ‘environment’, which suggests that while firms are focusing on direct action through mitigation and adaptation, there may be less emphasis on engaging with or influencing policy and regulatory frameworks. The high scores for ‘environment’ in this category could imply a recognition of the importance of compliance with environmental regulations or a strategic focus on influencing environmental policy.

Finally, the analysis of depth and breadth measures across various climate change strategies and stakeholders reveals a complex landscape of stakeholder engagement in firms’ sustainability efforts. The emphasis on the environment across strategies underscores the prioritization of direct environmental impacts in climate change initiatives. Meanwhile, the significant scores for internal and external stakeholders in certain strategies highlight the multifaceted approach firms are taking to address climate change, incorporating both internal policy changes and external stakeholder engagement. This analysis suggests that successful climate change strategies require a comprehensive approach that considers a broad spectrum of stakeholders and employs a variety of strategies to address the challenges posed by climate change.

4. Discussion and conclusion

This systematic literature review (SLR) represents a groundbreaking effort to systematically consolidate and analyze how climate change is being integrated within the domain of business and management. By adhering to a rigorous, structured, and transparent methodology, this review has not only delineated the intellectual landscape of recent climate change management literature but has also provided an exhaustive overview of the field's evolution and the intricate ways in which firms engage with climate change through stakeholder orientation.

Our analysis sheds light on a vibrant and expanding corpus of literature that underscores the escalating acknowledgment of climate change as a pivotal concern within the business and management sphere.

The investigation into the intellectual structure of this literature (RQ1) has uncovered a diverse array of themes and trends, highlighting the field's complexity and the multifaceted approaches organizations adopt in response to climate change challenges. The scientific mapping has provided valuable insights into the foundational elements of climate change management research, illuminating the key issues and evolving trajectories that shape this critical area of study. The implications of these findings are manifold. For one, they suggest that the business and management research community is increasingly treating climate change not merely as an environmental or peripheral issue but as a central strategic concern (Ghadge *et al.*, 2020; Moshood, Nawanir, Mahmud, Sorooshian, & Adeleke, 2021). Moreover, the varied themes and trends identified through our SLR signal a growing consensus around the necessity for innovative, multi-stakeholder approaches to climate change strategies. These strategies are not only aimed at minimizing negative impacts but also at leveraging opportunities for sustainable growth and competitive advantage.

Furthermore, this review highlights the importance of an interdisciplinary approach (Schipper, Dubash, & Mulugetta, 2021) to researching climate change within the business and management context. The intricate interplay between climate change challenges and business strategies calls for a collaborative effort spanning various disciplines, including environmental science, sociology, economics, and organizational behavior, to name a few.

In addressing the second research question (RQ2), our analysis has identified the primary stakeholders targeted by climate change strategies, emphasizing the significance of a broad and deep engagement with sustainability efforts. This focus underscores the vital role that stakeholders play in driving firms towards more sustainable practices, reflecting a growing awareness of the need for a collaborative approach to addressing the multifarious challenges posed by climate change.

The use of advanced analytical tools, such as Biblimetrix for scientific mapping and MAXQDA for a content analysis, has enabled a rigorous examination of the literature, facilitating a nuanced understanding of the research landscape. This approach has not only enhanced the robustness of our findings but also contributed to the development of a strategic compass for future research and practice in the field.

The holistic review of 495 papers from top journals between 1995 and 2023 has provided a strategic compass for navigating the evolution of climate change themes within the business and management domain.

As the first of its kind to systematically investigate the intersection between climate change and firm's stakeholder orientation, this SLR serves as a foundational resource for scholars and practitioners alike. It calls for a continued and deepened focus on sustainability efforts, urging firms to adopt a proactive and inclusive approach to stakeholder engagement in the face of climate change. In conclusion, this SLR not only maps the current state of climate change research within the business and management field but also sets the stage for future investigations. It highlights the need for ongoing research to adapt and evolve in response to the changing dynamics of climate change, urging a more nuanced and comprehensive approach to understanding and addressing the implications for firms and their stakeholders. As the field continues to grow and evolve, this study represents a critical step forward in the quest to integrate climate change considerations into the core of business and management practices (Loureiro, Romero, & Bilro, 2020).

4.1 Recommendation

The findings underscore the increasing recognition of climate change as a pivotal issue among the business and management community, with a diverse range of themes and trends emerging from the literature. The analysis has identified key stakeholders in climate change strategies and emphasized the importance of broad and deep engagement with sustainability efforts. However, the results show that there is still space and margin for intervention for researchers in this sense.

The findings of first research question reveals a varied landscape of climate change research in management, highlighting themes like sustainability, energy efficiency, and leadership as central and well-developed. Emerging themes such as knowledge management and human resource management suggest a broadening research focus. This diversity indicates a shift towards integrating climate change into broader management practices, underscoring the importance of multidisciplinary approaches to address sustainability challenges.

Given the temporal evolution of climate change studies, researchers could focus on further exploring sustainable finance and carbon risk management, emphasizing the integration of climate considerations into corporate strategies and financial decision-making.

What is emerging from the second research question is that the use of depth and breadth metrics allows for a nuanced understanding of stakeholder engagement. Depth, reflecting the volume of climate change aspects mentioned, and breadth, indicating the variety of aspects, together suggest that firms are not only covering a wide range of topics related to stakeholders but are also emphasizing these topics to varying degrees. Future research should explore the dynamics between climate change strategies and a broader range of stakeholders, particularly focusing on under-researched groups such as non-governmental organizations and the financial sector, to understand their influence on corporate sustainability efforts.

Moreover, the policy and Regulatory Frameworks is underdevelopment, thus could be impactfully the examine the impact of evolving policy and regulatory landscapes on corporate climate change strategies, especially in different geographical contexts and industries. This examination could shed light in understanding how external pressures shape corporate actions.

The following table represents in briefly summarize the main recommendation of this study.

Tab. 6: Reccomandation

Aspect	Trend	Future RQs	Practitioner Implications
Strategy	Integration of climate considerations	How can sustainable finance and carbon risk management be further integrated into corporate strategies and financial decision-making?	Firms need to embed climate change considerations into their core strategies, utilizing sustainable finance and assessing carbon risks.
Stakeholder	Broad and deep engagement	How can firms enhance engagement with under-researched stakeholders like NGOs and the financial sector to influence corporate sustainability efforts?	Businesses should expand their stakeholder engagement efforts to include a wider array of stakeholders, focusing on deep and meaningful collaborations
Mitigation Strategies	Energy efficiency, sustainability	How can organizations further develop and implement energy-efficient and sustainable practices in their operations?	Companies should prioritize energy efficiency and sustainability in their operations to mitigate their impact on climate change.
Adaptation Strategies	Developing resilience to climate impacts	What strategies can firms adopt to enhance their resilience against the adverse effects of climate change?	Organizations need to adopt and innovate adaptation strategies to safeguard their operations and supply chains against climate-related disruptions.
Corporate and Organizational Strategies	Leadership in climate initiatives	How can leadership and knowledge management be leveraged to foster a culture of sustainability within organizations?	Leadership must actively promote a culture of sustainability and innovation, integrating climate change into organizational practices and decision-making
Policy and Regulatory Strategies	Navigating evolving landscapes	How do changing policy and regulatory landscapes impact corporate climate change strategies, especially across different geographical contexts and industries?	Firms must stay informed about and adapt to evolving policy and regulatory frameworks, ensuring compliance and leveraging these changes for strategic advantage.

In essence, this Systematic Literature Review (SLR) not only charts the current state of climate change research within the business and management field but also catalyses future investigations into this critical area. It advocates for a nuanced and comprehensive approach to understanding and addressing the implications of climate change for firms and their stakeholders. By emphasizing the need for ongoing research and the development of flexible strategies, this review highlights the critical importance of businesses staying agile and responsive to the ever-evolving environmental challenges. Moreover, it calls for an interdisciplinary approach, incorporating insights from finance, policy studies, human resources, and technology to foster a more robust and resilient business model that can withstand and adapt to the uncertainties presented by climate change.
This SLR emphasizes the transformative shift in how businesses view their role in addressing climate change, advocating for a proactive stance that not only mitigates risks but also seizes the opportunities for innovation in sustainability.

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Track 14
Tourism & Culture Management

Cultural Tourism and Climate Change: Italian UNESCO Sites Between Vulnerability and Resilience

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Abstract

Frame of the research. *This paper explores the nexus between climate change, UNESCO World Heritage (WHS) sites, and cultural tourism, focusing on Italy as a case study. Climate change poses significant threats to cultural heritage, impacting the physical preservation of sites and the tourism sector that relies on them. Italy, with its rich cultural heritage and prominence in tourism, offers an ideal context to understand these dynamics.*

Purpose of the paper. *This study aims to examine how current UNESCO management plans address the impacts of climate change on both sites and cultural tourism, filling a gap in the literature on sustainable tourism development in UNESCO sites.*

Methodology. *The study employs a qualitative approach, analyzing existing literature, policy documents, and case studies related to climate change adaptation strategies, UNESCO management plans, and tourism trends.*

Results. *The findings underscore the urgent need for comprehensive climate adaptation strategies in cultural heritage preservation and tourism management. While risk assessment is crucial for site preservation, addressing evolving tourist demands influenced by climate change requires adaptive strategies at the destination level. The study identifies governance recommendations to enhance the effectiveness of management plans in mitigating climate impacts on sites and tourist flows.*

Research limitations. *The study is limited by the availability of data and the scope of existing literature on climate adaptation in UNESCO sites and cultural tourism management plans.*

Managerial implications. *The study highlights the importance of collaborative efforts among policymakers, institutions, destination management organizations (DMOs), and local businesses to adapt effectively to climate change impacts on cultural tourism.*

Originality of the paper. *This study fills a gap in the literature by examining the role of management plans in climate adaptation strategies for UNESCO sites and cultural tourism, providing valuable insights for policymakers and practitioners in the field.*

Keywords: *climate change, cultural tourism, sustainable tourism, UNESCO WH, management plans*

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1. Introduction and Objectives

The concept of "climate change" has become part of our common vocabulary since the early 1990s, when the United Nations began openly discussing it as a phenomenon attributable directly or indirectly to human activity. It is currently known that the conservation and preservation of cultural heritage in tourist destinations largely depend on external environmental conditions determined by climate variations. Rising temperatures, rising sea levels, heat waves, and extreme weather events are some risk factors for maintaining historical buildings, monuments, and artworks. Despite increased attention on the topic, academically and institutionally, since the 1990s, discussions regarding the impact of climate change on cultural heritage have gained more consistency, awareness, and critical sense only in the last decade.

Archaeological sites, monuments, and art collections, which constitute the material cultural heritage of a place, impart a sense of identity and "aesthetic well-being" to local communities (Cassar, 2009; Phillips, 2015). However, these assets are subject to continuous interactions with the surrounding environment and undergo deterioration over time, accelerated and aggravated by climate change (Bertolin, 2019). Climate variations influence materials' physical, chemical, and biological mechanisms, altering their structure and/or composition. Temperature fluctuations, precipitation, atmospheric humidity, wind intensity, sea-level rise, desertification, and the interaction between climate change and air pollution have been identified by UNESCO as threats to cultural heritage. Hence, ICOMOS Climate Change and Heritage Working Group's appeal (2019) for increased attention and further research on these aspects. Sesana *et al.* (2021) also address the impacts of extreme weather events, such as droughts, floods, and landslides, whose frequency and intensity are increasing (Kron *et al.*, 2019; Robinson, 2021). The catastrophic events resulting from these have inevitable repercussions on cultural heritage. Howard *et al.* (2008), ICOMOS Climate Change & Heritage Working Group (2019), and UNESCO World Heritage Centre (2007; 2008) have highlighted how this risk is even more relevant in coastal areas due to changes in storm surges and sea-level rise.

Building upon these previous studies, on December 21, 2023, Italy approved the National Climate Change Adaptation Plan (Pnacc), comprising 361 actions to address the impact of global warming. Although deemed excessively "soft" by some environmental associations, the plan aims to reduce the vulnerability of natural, social, and economic systems and increase the country's resilience.

Within the cultural heritage protection and management framework, the plan identifies the climatic parameters causing degradation, focusing on protection and prevention strategies. Simultaneously, it addresses the direct and indirect impacts of climate change on the tourism industry and implements strategies to manage variations in tourist flows, moderate destination vulnerability, and preserve natural resources (Ministry of Environment and Energy Security, December 2023).

Climate change impacts a place's cultural heritage and generates a series of significant consequences for the tourism sector, influencing supply and demand (Amelung *et al.*, 2007; Kajan and Saarinen, 2013). From existing literature, it emerges, for example, how the tourism sector can actively mitigate climate change (Peeters *et al.*, 2024). Tourism is thus understood not only as an economic catalyst but also as a vehicle to promote environmental sustainability and prudent management of resources related to the tourism sector.

While on the supply side, there is a growing trend towards adapting material assets to climate change, on the demand side, it is essential to consider that such change may sometimes alter the attractiveness and usability of destinations (Markham *et al.*, 2016; Sesana *et al.*, 2021). Increasing temperatures or precipitation, for example, influence travellers' choices, who may avoid some destinations more "at risk," generating negative impacts on local communities for which cultural tourism is the primary source of income (Aygün Oğur & Baycan 2023; Gössling, 2012; Liu, 2016).

Therefore, an in-depth study of the links between climate change and cultural heritage, as well as the different site adaptation strategies, is required. A significant example in this regard is that of UNESCO World Heritage Sites (WHS).

In 2018, 54 WHS found themselves struggling to preserve their "Outstanding Universal Value" (OUV), increasingly threatened by climate change and resulting natural disasters, as well as by the weight of increased visits (Markham *et al.*, 2016; Sesana *et al.*, 2021). For these 54 sites, Sesana *et al.* (2021) thoroughly examined the impending threats and provided management implications based on what emerged. Similar assessments are also carried out by an increasing number of UNESCO sites classified as World Heritage through their Management Plans, which often include a risk analysis and action lines to improve prevention and management of such risks.

In this context, the case of Italy emerges as one of particular interest to be analyzed due, on the one side, to the high number of properties inscribed in the UNESCO WH - the country is ranked first at the international level - on the other due to the prominence of the country in terms of tourism arrivals.

Moreover, according to the report on the regional impact of climate change on European tourism demand by the European Commission (Matei *et al.*, 2023), Italy is one of the countries whose tourism is expected to suffer the most from climate change.

Italy's recent approval of the National Climate Change Adaptation Plan (Pnacc) underscores the imperative to mitigate vulnerabilities within natural, social, and economic systems, with specific provisions addressing the preservation of cultural heritage and the tourism sector (Ministry of Environment and Energy Security, December 2023).

In 2022, Italy recorded, in the field of cultural tourism, over 142 million visits and tourist spending exceeding 12 billion euros. Not surprisingly, the Ministry of Tourism has allocated €75 million for interventions in municipalities included in UNESCO sites and creative cities for 2024/2025. The 59 Italian sites designated as UNESCO heritage sites represent fundamental pillars of Italian cultural tourism. Their context, characterized by the need to adopt measures for risk protection and prevention, together with considerable tourist pressure, thus offers an ideal framework to understand the operational dynamics of a cultural destination in response to climate change.

In this context, our study aims to deepen understanding of the impacts of climate change on both the UNESCO WH sites themselves and cultural tourism, considering both the supply and demand sides. While risk assessment related to climate change will be fundamental for every cultural heritage preservation and conservation strategy, it's equally crucial for the entire cultural tourism sector to adapt to evolving demand needs influenced by changing environmental conditions due to climate change. Addressing this challenge requires a collective effort involving policies, institutions at various scales, destination management organizations (DMOs), and national and local companies operating in the cultural tourism field.

Moreover, despite the increasing recognition of the significance of climate change, academic literature has overlooked the substantial role of management plans in climate adaptation strategies, particularly concerning sustainable tourism development in UNESCO sites. Hence, our study aims to bridge this gap by examining how current UNESCO management plans address climate change impacts on both the site and cultural tourism. Through this analysis and its preliminary results, we aim to identify governance indications to enhance the use and effectiveness of management plans in mitigating the effects of climate change on sites and their tourist flows.

2. Literature review/theoretical framework

The discourse surrounding climate change and its implications for cultural heritage has evolved significantly since the early 1990s when the United Nations first addressed it as a phenomenon with direct or indirect links to human activities. While initial discussions revolved around the broader implications of climate change, recent years have seen a surge in scholarly attention towards understanding its specific effects on cultural heritage preservation and management.

Cultural heritage, encompassing archaeological sites, monuments, and art collections, is a cornerstone of local communities' identity and aesthetic appreciation (Cassar, 2009; Phillips, 2015).

However, the integrity of these assets is increasingly threatened by climate-induced environmental shifts, as highlighted by Bertolin (2019).

Growing interest in the topic can be seen in Fatorić and Seekamp's (2017) comprehensive analysis of literature pertaining to the intersection of the climate crisis and cultural heritage, outlining emerging research trends, methodological approaches, and the diverse array of cultural assets under consideration.

Concerning UNESCO World Heritage, interest in climate change within the World Heritage Centre heightened notably in the mid-2000s, spurred by pressure from environmental NGOs. This led to dedicated publications and working group meetings to formulate official responses. Key outputs included the Strategy to Assist State Parties to Implement Management Responses and the Policy Document on the Impacts of Climate Change on World Heritage Properties, reflecting a proactive approach to addressing climate-related challenges within World Heritage Sites (Samuels and Platts, 2022).

The growing interest in the effects of climate change on UNESCO WH properties can also be seen in the academic world: in 2023 Nguyen conducted a systematic review, analyzing 58 peer-reviewed articles from 2008-2021, focusing on climate change's impact on UNESCO World Heritage-listed cultural properties. The study highlighted a significant rise in publications, mainly from Europe and North America, with varied research methods. He also noted a bias towards natural sites over cultural ones, stressing the need to overcome this binary for effective cultural heritage preservation.

Moreover, many studies (Sesana *et al.*, 2021; Birendra, 2021 et al) have now contributed to a better understanding of the intricate interactions between various climate stressors and the typology of cultural heritage, both externally exposed and internally situated. With specific regard to UNESCO WH properties, a fundamental part of our cultural heritage and primary resource for the cultural tourism economy, UNESCO has identified a spectrum of climate-related hazards, including temperature fluctuations, precipitation patterns, sea-level rise, and desertification, all of which imperil the structural integrity and longevity of cultural heritage sites (ICOMOS Climate Change and Heritage Working Group, 2019).

Extreme weather events, such as droughts, floods, and landslides, are becoming more frequent and severe due to climate change, leading to significant ramifications for cultural heritage preservation efforts (Kron *et al.*, 2019; Robinson, 2021). Coastal areas, in particular, face heightened risks due to alterations in storm surges and sea-level rise, a concern underscored by Howard *et al.* (2008) and reiterated by both the ICOMOS Climate Change & Heritage Working Group (2019) and the UNESCO World Heritage Centre (2007; 2008).

Kapsomenakis (2022) presents a time-dependent analysis of threats posed by man-made climate change to 244 UNESCO cultural and natural heritage sites. The study employs indices based on extremes of heat, fire weather conditions, heavy rainfall days, frost days, changes in mean sea level, and aridity, utilizing regional EUROCORDEX simulations spanning the period 1971-2100, revealing an overall increasing trend in all indices related to man-made climate change.

The pivotal role of tourism in shaping the nexus between climate change and cultural heritage also cannot be overstated. The evolving dynamics of cultural tourism, influenced by shifting environmental conditions, necessitate a nuanced understanding of both supply-side strategies, aimed at adapting material assets to climate change, and demand-side considerations, which encompass tourist preferences and destination attractiveness (Markham *et al.*, 2016; Sesana *et al.*, 2021).

Indeed, while the inscription of a site in the WHS can increase its attractiveness and visibility (Pachrová *et al.*, 2018; Cuccia *et al.*, 2016; Canale *et al.*, 2019), causing a growth in tourism in the area, 60% of WHS are today exposed to geological risks such as earthquakes, landslides, volcanic eruptions, or tsunamis.

Notably, UNESCO World Heritage Sites (WHS), despite their enhanced visibility and economic benefits, face escalating risks from climate-related hazards, prompting concerted efforts to integrate risk assessment and management strategies into their management plans (Pachrová *et al.*, 2018).

However, to date, the academic literature in the field has overlooked the significant role of management plans in climate adaptation strategies concerning sustainable tourism development in

UNESCO sites. In this context, our study aims to contribute to the literature by analyzing how current UNESCO management plans address climate change's impacts on the site and cultural tourism. Through this analysis, our study also aims to identify possible governance indications to strengthen the use and effectiveness of management plans in mitigating the effects of climate change on sites and their tourist flows.

3. Methodology

A systematic cataloguing of the 59 Italian UNESCO sites was first conducted. This cataloguing process aimed to compile essential information for each site, including its geographical region(s), typology (cultural or natural heritage), and additional categorization (e.g., historical centres, monuments, natural landscapes, etc.). This step laid the groundwork for subsequent analyses by providing a comprehensive overview of the sites under investigation.

Building upon the catalogued data, the next phase entailed a targeted analysis of the respective Management Plans (MP) associated with each site, whenever available. These MP analyses were integrated into a structured table format, facilitating a detailed examination of the relationship between the Italian UNESCO sites, climate change, tourism, and sustainable tourism practices. Key elements extracted from the MP included the year of development, the presence or absence of climate change-related issues, and any proposed improvement measures. Additionally, references to tourism, both in terms of supply and demand, as well as sustainable tourism practices, were meticulously documented and categorized.

In synthesis, the following information was used to build the database:

- Region of the UNESCO WH site
- Typology of the UNESCO WH site (Cultural/Natural)
- Category of the UNESCO WH site
- Presence of Management Plan
- Year of release of the Management Plan
- Mention of the "climate change" issue in the Management Plan (Mentioned only/Improvement proposals)
- Mention of the "tourism" issue in the Management Plan (Supply/Demand side perspectives)
- Mention of the "sustainable tourism" issue in the Management Plan (Mentioned only/Improvement proposals)

From the cataloguing of the 59 Sites, it emerged that their geographical distribution was fairly homogeneous across the north, south, and centre, with some Sites spanning multiple regions, such as "I Sacri Monti del Piemonte e della Lombardia" or "Dolomiti", and others even including other countries, such as the "Ferrovia Retica", whose territorial areas encompassed part of Switzerland.

Regarding the typology of the sites, 53 were classified as cultural heritage and 6 as natural heritage (UNESCO World Heritage Centre, n.d.). According to a more specific categorization proposed, it emerged that in some cases, sites belonged to more than one category, as in the case of "Porto Venere - le Cinque Terre e Isole di Palmaria, Tino, Tinetto", which fell between historic centers and cultural landscapes. Among these, the categories most touched upon by the sites were, in order, historic centers, monuments, archaeological areas.

Out of the 59 sites, 47 were found to have a MP. The Plans were then segmented into four distinct temporal clusters (2004-2008, 2009-2013, 2014-2018, 2019-2023), in order to enable a granular examination of evolving attitudes and approaches towards climate change adaptation and sustainable tourism management.

The segmentation resulted as follows (Table 1).

Tab. 1: Years clustering of UNESCO WH sites management plans

Cluster Years	**N of MP per Year**
2004-2008	8
2009-2013	13
2014-2018	11
2019-2023	15
Total	47

Source: Authors on Management Plans.

4. Results

Out of the 59 sites, 47 Management Plans were reviewed to gain insights into the prevailing trends. Notably, climate change featured in 21 plans, accounting for 45% of the total. Of these, 76% proposed specific enhancements to tackle climate-related challenges, constituting 34% of all plans examined. The theme of "tourism" emerged prominently, cited in 94% of cases from the supply side and 72% from the demand side, with 70% of plans referencing tourism from both perspectives. Sustainable tourism was mentioned in 72% of the plans, with 74% of these suggesting practical improvements, contributing to 53% of the total plans analyzed (Table 2).

Tab. 2: Climate change and Sustainable tourism in UNESCO WH sites management plans

	Number of Plans mentioning 'climate change'	N of Plans mentioning "climate change" and include related actions	N of Plans mentioning tourism demand	N of Plans mentioning tourism offer	N of Plans mentioning sustainable tourism and include related actions	N of Plans mentioning sustainable tourism
2004-2008	3	3	7	6	7	5
2009-2013	4	3	13	10	8	6
2014-2018	5	3	11	10	6	6
2019-2023	9	7	13	8	13	8
Total (out of 47)	21	16	44	34	34	25

Source: Authors on Management Plans.

Following the MP analysis, temporal trends were also explored to discern patterns and shifts in the treatment of climate change, tourism, and sustainable tourism practices within the Management Plans over time. This analysis further enriched our understanding of the dynamic interplay between policy frameworks, environmental challenges, and cultural heritage preservation strategies.

Initially, climate change received marginal attention, decreasing in the second phase (mentioned in only 31% of plans) before gaining prominence in the subsequent periods, peaking at 60%. Despite this, the overall level of engagement remains modest considering the prevailing climate crisis. Interestingly, the trend remains consistent over time, irrespective of the depth of treatment in individual plans.

With regard to "tourism", a vast majority of MP address it from the supply side, with a 100% coverage in the middle periods and sustained levels above 87% in other periods. However, concerning demand, while there is a steady growth from the first to the third period (from 75% to 91%), a surprising decline is observed in the final period, indicative of diminishing interest amidst evolving demands influenced by climate change and the pandemic.

Sustainable tourism, initially present in 88% of Plans, experienced a decline until the third phase (55%), before rebounding to 87% in the final phase. However, substantive strategies for sustainable tourism are lacking in the majority of MP, with only 53% of recent Plans proposing significant improvements, down from 63% in the initial phase.

Tab. 3: Climate change and Sustainable tourism in UNESCO WH sites management plans (% per cluster)

	Number of Plans mentioning 'climate change'	N of Plans mentioning "climate change" and include related actions	N of Plans mentioning tourism demand	N of Plans mentioning tourism offer	N of Plans mentioning sustainable tourism	N of Plans mentioning sustainable tourism and include related actions
2004-2008	38%	38%	88%	75%	88%	63%
2009-2013	31%	23%	100%	77%	62%	46%
2014-2018	45%	27%	100%	91%	55%	55%
2019-2023	60%	47%	87%	53%	87%	53%

Source: Authors on Management Plans.

These findings highlight the increasing recognition of climate change as a critical factor in UNESCO World Heritage site management. On the other side, the decrease in attention towards tourism within the final phase of management plans may be attributed to a strategic realignment, possibly influenced by the COVID-19 pandemic, shifting priorities from immediate policies addressing over-tourism or promoting cultural tourism towards longer-term oriented objectives, such as climate change mitigation.

While there's a positive trend in addressing climate-related challenges and integrating tourism perspectives, therefore there's room for improvement in sustaining attention to sustainable tourism practices over time. The analysis also underscores the need for ongoing policy adjustments to effectively navigate evolving environmental and societal dynamics affecting cultural heritage preservation and tourism.

While looking more specifically at the climate change-related and sustainable tourism proposals extracted from UNESCO site management plans, several key themes emerge.

Regarding climate change, various sites acknowledge the imperative of integrating climate change mitigation and adaptation strategies into their management frameworks. For instance, the updated Management Plan for the Historic Centre of Florence (2022) adopts national and international approaches to mitigate climate change impacts, emphasizing coordination among stakeholders in disaster management. Similarly, the Historic Centre of Urbino (2013) outlines a comprehensive Disaster Risk Management Plan, addressing climatic phenomena alongside other hazards.

The Islands of Eolie (2014) recognize the potential devastation wrought by climate change on local populations and habitats, advocating for reduced fossil fuel usage.

"The issue of climate change impacts agricultural land productivity due to the inadequate availability of water, which significantly worsens during the summer months and affects all water-dependent species. In the future, the repercussions on populations and habitats could be devastating, as evidenced by the latest IPCC report. In this regard, a coherent policy to reduce the use of fossil fuels for both mobility and energy production is desirable." (Eolie Islands MP, 2014)

Mantova and Sabbioneta (2020) exemplify proactive adaptation efforts through the development of climate adaptation guidelines, informed by scientific expertise and sites such as the Hills of Prosecco (2019) already developed measures specifically addressed to mitigate the effects of temperature rise and rainfall variability.

"In 2018, guidelines for the climate adaptation of the city of Mantua were also prepared, approved under DGC No. 246/2018. This work was carried out with the technical and scientific support of the IUAV University of Venice, which provided an analysis of the current critical issues and vulnerabilities of the municipal territory. In particular, maps of the territory were developed in terms of the risk of heat island formation, ground irradiation, runoff, and green coverage." (Mantova and Sabbioneta MP, 2020)

"The phenomenon of increasing temperatures and the presence of periods of increased rain shortage is dealt with through the use of drip irrigation systems and the formation of rainwater reservoirs, able to compensate for the widespread but variable local hydraulic network that is subject to prolonged dry periods in the summer." (Prosecco Hills MP, 2019)

With regard to the issue of sustainable tourism, several UNESCO sites underscore the importance of promoting environmentally conscious tourism practices. The Historic Centre of Florence (2022) emphasizes integrated approaches for sustainable tourism management, aiming to alleviate urban congestion while fostering economic growth in peripheral areas.

The multiple site of the Longobards in Italy (2021) prioritize hospitality enhancement and diversified services to promote sustainable tourism, highlighting cultural heritage preservation and environmental respect. Assisi, the Basilica of San Francesco (2014), employs a model for estimating tourist carrying capacity to optimize visitor levels sustainably. Genoa, Le Strade Nuove (2019) advocates for networked collaboration among stakeholders to minimize tourism impacts on the site, while promoting positive visitor experiences. Lastly, the Dolomites (2008) emphasize the establishment of technical guidelines for sustainable tourism, ensuring compatibility with the natural environment and maintaining site integrity.

Overall, these proposals underscore a growing recognition among UNESCO sites of the intertwined challenges posed by climate change and unsustainable tourism practices. Through proactive planning and collaborative action, these sites seek to safeguard their cultural and natural heritage for future generations while fostering sustainable socio-economic development.

5. Conclusions and further research

Our study sheds light on the intricate relationship between climate change, tourism dynamics and management of UNESCO designated sites. It highlights the urgent need for policymakers to adopt proactive and integrated approaches to address the challenges posed by climate change and unsustainable tourism practices, while safeguarding cultural and natural heritage.

In light of the growing threats posed by climate change, policymakers are urged to prioritize the integration of comprehensive adaptation strategies into management frameworks for cultural heritage. This involves not only mitigating the immediate impacts of climate change, but also promoting resilience and adaptive capacity to withstand future environmental disruptions. By adopting national and international best practices in disaster management and environmental preservation, policymakers can ensure the long-term sustainability of these invaluable sites.

Sustainable tourism practices play a critical role in balancing visitor experiences with the preservation of cultural integrity and environmental sustainability. Policymakers should lead initiatives to promote environmentally friendly tourism practices, optimizing visitor levels in a sustainable way and minimizing negative impacts on heritage sites. This involves promoting positive experiences for visitors, preserving cultural authenticity and minimizing the ecological footprint through responsible tourism behaviour. Public-private partnerships can serve as catalysts for innovation in sustainable tourism management, leveraging the expertise and resources of both sectors to achieve shared conservation goals.

Although our study provides some interesting results, these are preliminary results of research that is still ongoing and may benefit from further developments. In particular, the next step of our research will include in-depth interviews and surveys with key stakeholders involved in formulating and implementing management programs. These will provide valuable insights into the contextual nuances that shape policy implementation dynamics. By soliciting expert views, it will be possible to identify barriers to effective policy implementation and devise strategies to overcome them, thus improving cultural heritage sites' capacity to adapt to climate change's impacts.

Regarding the analysis of management plans, there remain avenues for further research to improve our understanding of climate change adaptation and sustainable tourism management in cultural heritage contexts.

Future research efforts could for example leverage advanced analytical techniques, such as probabilistic topic modeling (e.g., latent Dirichlet allocation), to elucidate the underlying topic structures within management plans (MPs). The application of latent discursive models relating to adaptation strategies to climate change would, for example, allow us to obtain more in-depth information on the adaptation measures adopted by UNESCO sites. This nuanced understanding can inform the development of targeted interventions to improve the resilience of cultural heritage sites to environmental stressors.

Finally, although our findings offer valuable insights into Italian UNESCO sites, caution must be exercised when extrapolating the findings to broader geographic and cultural contexts. Variations in environmental, socio-economic and governance contexts may require tailored approaches to climate change adaptation and sustainable tourism management. By embracing context-specific solutions and adapting best practices to local realities, policymakers can promote resilience and sustainability in the conservation of cultural heritage sites worldwide.

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Track 16
Growing resilient Italian SMEs - Special Track

Factors influencing the adoption and implementation of emerging digital technologies. An exploratory analysis of wine SMEs

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Abstract

Frame of the research. *The purpose of this study is to examine the factors influencing the adoption and implementation of Emerging Technologies in the winemaking industry.*

Purpose of the paper. *It is underpinned by the following research question: what are the technological, organizational, and environmental factors that influence the adoption of such Emerging Technologies by family SMEs winemaking? To achieve the aforementioned objective, this research uses the Technology-Organization-Environment framework, which is commonly utilized to explore and explain the adoption of technological innovations by firms.*

Methodology. *The study performs an explorative qualitative analysis focused on two family SME winemaking, located in the Sicilian territory.*

Results. *The findings of this research highlights that the adoption of Emerging Technologies is shaped by a multifaceted interplay of technological, organizational, and environmental factors, thus emphasizing the importance of understanding these intricate relationships and aligning technological advancements with organizational values and strategic priorities.*

Research limitations. *The main limitation of this study lies in the use of a case study approach, which does not allow generalization of the empirical findings, although being appropriate and suitable for its explorative nature.*

Managerial implications. *The findings provide valuable insights for managers of family SME wineries and, in general, for agri-food firms, by highlighting the main factors that effectively influence the adoption and implementation of emerging technologies in their business processes.*

Originality of the paper. *This study represents an attempt to answer the general call for research focusing on Emerging Technologies in specific industry sectors. Indeed, it delves into the winemaking sector that is characterized by an early stage of integrating emerging technologies into its value-creating processes.*

Key words: *emerging technologies; low-tech sectors; technology adoption; family SME; wine sector.*

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1. Introduction

The pervasiveness of Emerging Technologies (ETs) is blurring the traditional architectures of entrepreneurship and business models, bringing new challenges and new dilemmas (Nambisan, 2017; Nambisan *et al.*, 2019), as it encompasses a holistic approach for reevaluating strategies, business models, and activities (Jacobides *et al.*, 2018). ETs are transforming how companies create, innovate, run the business and engage with their stakeholders (Chan *et al.*, 2021).

The label 'ETs' refers to new technologies - such as Big Data, Cloud technology, Artificial Intelligence and Machine Learning (AI/ML), enhanced robotics, Data Analytics, and Blockchain, which demand deep changes in the organizational activities to fully exploit the new related opportunities (Nambisan *et al.*, 2017; Taalbi, 2017). They can disrupt businesses on a vast scale, playing a crucial role in shaping and transforming businesses across various industries (Morkunas *et al.*, 2019). ETs have the potential to impact all functions of the firm, also extending its own boundaries, and influencing product development, business processes, sales channels, supply chains, and even the broader business ecosystems (Matt *et al.*, 2015). Their relevant impact can be clearly seen in a firm's operations, strategy, and overall competitiveness by determining several changes that can contribute to a fast obsolescence of existing competences and capabilities (Day and Schoemaker, 2000).

ETs are concretely changing the 'rules of the game' in terms of where and how to compete, what business model to choose, and how to organize the firm structure and its internal activities (Birkinshaw, 2018). In such new trends, "organizations may rise to prominence or disappear, depending on their ability to strategize in this new competitive landscape" (Volberda *et al.*, 2021, p. 2). Consequently, while some firms actively engage in adding ETs to their resource base, other firms often ignore their potential, focusing on lower-risk innovations closer to the existing knowledge and expertise (Khanagha *et al.*, 2017), committing insufficient resources, engaging too late, or just pursuing the wrong technological path (Day and Schoemaker, 2000).

ETs impact all types of businesses - from established firms to large 'born digitals' - passing through smaller start-ups. Nevertheless, it is the established firms that face greater difficulties in assimilating these new operational methods, as they have developed under a set of structures and norms markedly different from those prevalent in the new digital world (Autio *et al.*, 2021; Verhoef *et al.*, 2021). They are called "to shift to new mental models of competition, to develop the supporting digital routines, and to implement new organizational structures in such a way that these elements support one another" (Volberda *et al.*, 2021, p. 2), while facing continuous and pressing changes in various firms' areas and activities. This could be more complex in family small and medium-sized enterprises (SMEs), which strive to evolve, while maintaining agility and flexibility, to adopt innovative business models and being open to the development and adoption of new digital technologies, infrastructures, and platforms (Riswanto, 2021). Specifically, compared to their counterparts, family SMEs often exhibit a higher ability but lower willingness to innovate (Chrisman *et al.*, 2014), higher long-term orientation, with potential obsolescence in their business models, conservativeness of traditional practices, prioritization of non-economic goals over economic goals, preference of incremental innovations over radical and disruptive ones, and human resources that could lower the openness towards innovative solutions (Bennedsen *et al.*, 2007; De Massis *et al.*, 2013).

Regardless of business type, the adoption and implementation of ETs are significantly affected by a combination of factors (Yadegaridehkordi *et al.*, 2018) originating from both the internal organizational environment and the external environment. Understanding these factors and their interactions can aid firms in achieving a more effective and successful adoption of ETs. The TOE framework (Tornatzky and Fleischer, 1990) has been recognized as a model that provides a more comprehensive assessment of the factors determining firm-level adoption of technologies. These factors consider three different dimensions: technological, organizational, and environmental. Firstly, the technology dimension encompasses both current and emerging technologies that are relevant to the organization, including their benefits, compatibility, and complexity (Lian *et al.*, 2014). Secondly,

the organizational dimension focuses on internal attributes, including the organization's scope, size, managerial support, and resources availability. Lastly, the environmental dimension pertains to the broader context in which the organization operates, including elements such as government regulations and vendors' support. As underlined in the existing literature, the TOE framework has been validly used to explain the adoption of various technological innovations (Baker, 2012) in diverse domains, such as e-business (e.g., Zhu *et al.*, 2006), Electronic Data Interchange (EDI) (e.g., Kuan and Chau, 2001), and general applications (e.g., Thong, 1999).

Despite existing research on ETs (e.g., Atzori *et al.*, 2010; Ardito *et al.*, 2018; Feki *et al.*, 2013; Sheng *et al.*, 2013; Khanagha *et al.*, 2017), there remains a persistent and general call for more focused studies in specific industry sectors or specific organization sizes (Ruggeri *et al.*, 2023). Responding to this need, this research embarks on a qualitative explorative analysis within the winemaking industry, which has seen remarkable growth over the last decade, driven by major advancements in AI, robotics, sensors, and other Industry 4.0 technologies, leading to both economic gains and quality enhancements in products and processes (Dogru and Peyrefitte, 2022). In this respect, the winemaking industry shows concretely the potential to be a dynamic and innovative sector on a global scale, oriented to leverage the opportunities presented by emerging technologies (Silvestri *et al.*, 2023). However, some industry's unique features, including a high concentration of SMEs, prevalent family ownership, terroir-dependent wine production, orientation toward tradition, fragmented business and knowledge networks, and reliance on tacit knowledge, slow down innovation diffusion within the industry (Dogru and Peyrefitte, 2022).

Thus, the purpose of this study is to explore the factors influencing the adoption and implementation of such emerging technologies in the context of the family SME winemaking industry. It seeks to answer the following research question: what are the technological, organizational, and environmental factors that influence the ETs' adoption by family winemaking SMEs?

The explorative analysis focuses on two family wineries operating in the Sicilian region (Italy). The choice of these case studies is based on the combination of theoretical interests and ongoing research activities (Siggelkow, 2007). Winemaking firms have undergone a significant technological shift in recent decades (Giuliani *et al.*, 2015), profoundly impacting competitive dynamics, supply chain relationships, consumer behaviors (Iazzi and Faitwen, 2008) and entrepreneurial processes (Rossi *et al.*, 2012).

The findings of this research underline that the adoption of ETs is shaped by a complex interplay of technological, organizational, and environmental factors, thereby stressing the significance of these intricate relationships and the importance of aligning technological advancements with organizational values and strategic priorities.

The remainder of the paper is organized as follows. The second section defines the TOE framework and explains its main constructs; the third section outlines the research methodology used in analyzing the two case studies. Finally, the fourth section presents conclusions, limitations, and suggestions for future research avenues.

2. Theoretical background

One of the well-established organization-wide technology adoption models is the technology-organization-environment (TOE) framework, that provides a detailed description of all factors affecting a firm's decision to adopt ETs (Oliveira and Martins, 2011). It has also been identified as an effective tool for investigating new innovation-based value creation processes (Huynh *et al.*, 2023; Wen and Chen, 2010), while also providing high quality insights on firms' outer and inner dynamics (Tornatzky and Fleischer, 1990).

The first dimension - the technological ones - can be claimed to have a high impact on ETs adoption. Specifically, factors such as relative advantage, compatibility, complexity, trialability and observability are seen as key technological factors that effectively influence the adoption of ETs.

Relative advantage, which refers to the perceived benefits of adopting new technology compared to existing solutions, has been defined as "the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003, pp. 229), and linked to the paths of technology diffusion (Ramdani *et al.*, 2009). Clearly, a technology that offers distinctive advantages is more likely to be adopted (Chatterjee *et al.*, 2023) than other available alternatives. Compatibility of an innovation with a business is the extent to which the emerging technology aligns with existing systems, processes and organization's past practices and experiences (Géczy *et al.*, 2012). It reflects "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (Rogers, 2003, pp. 240), thus necessitating minimal adjustments accordingly. Compatibility has been recognized as an important driver of technology adoption within various domains, such as ICT systems (Premkumar, 2003), cloud-computing (Mahyar and Bakri, 2016), and supply chain management (Chittipaka *et al.*, 2012). Practically, since the adoption of new technologies can bring significant changes to the business practices (Premkumar and Roberts, 1999), it significantly impacts the organization structure, either accelerating or slowing down the rate at which these new technologies are assimilated and integrated within a firm's existing processes and infrastructures (Géczy *et al.*, 2012). Complexity is defined as "the degree to which an innovation is perceived as relatively difficult to understand and use" (Rogers, 2003, pp. 257). The complexity of a technology, observed through its perceived ease of use (Chau and HU, 2001), creates greater uncertainty for its successful implementation and, consequently, increases the risk in the decision to adopt (Premkumar and Roberts, 1999). The level of complexity associated with the emerging technology can influence its adoption. This means that, if the technology is challenging to understand or implement, it may slow down its adoption process. Trialability is a crucial element in the adoption process of a new technology, as it pertains to the ability to trial an idea, process, or system before making the eventual decision to implement it or not. In the context of innovation, Rogers (2003, pp. 258) defined trialability as "the degree to which an innovation may be experimented with on a limited basis" (Rogers, 2003, pp. 258). This significantly affects adoption rate and speed among businesses. In fact, allowing experimentation of an innovation, trialability could reduce uncertainty of the outcome, potentially leading to a more positive reception of the innovation (Hayes *et al.*, 2015). Observability is defined as "the degree to which the results of an innovation are visible to others" (Rogers, 2003, pp. 258). Rogers' attribute of observability is divided into two constructs: 1) result demonstrability, which pertains to the tangible outcomes of adopting an innovation, and 2) visibility, which is about the extent to which potential adopters can witness the innovation within the context of its adoption. Based on these two dimensions, previous studies asserted that the greater the observability of an innovation, the more likely it is to be adopted by a firm (e.g., Maroufkhani *et al.*, 2023; Nguyen *et al.*, 2022). This is especially true in the context of SMEs that have been found to be more likely to adopt an innovation when they can visualize the potential risks and benefits associated with it (Ramdani *et al.*, 2013; Tan *et al.*, 2009).

The organizational perspective of the TOE framework refers to the resources (tangible and intangible) and internal characteristics of the firm (Gide and Sandu, 2015). The organizational context relates to multiple factors concerning the organization itself, including firm size, scope, level of trust, centralization, financial resource availability, skilled personnel, organizational readiness, and a strong leadership that, by recognizing the potential benefits of emerging technologies and offering a strategic vision for their integration, can facilitate their adoption (Brender and Markov, 2013). Leadership support helps organizations in overcoming internal challenges and reluctance to change, effectively conveying a strong message of confidence and trust in the new technology to all employees of the firm. This support goes beyond mere project approval, representing instead an active enthusiastic commitment to establish and nurture a positive organizational environment (Pan *et al.*, 2013).

The environmental context can be claimed to have a high impact on ETs adoption. It includes the industry structure, market scope, competitive pressure, support infrastructure and the presence of

technology service providers. Industry in which a firm operates, including market trends and innovations, may influence an organization's decision to adopt new technologies, by affecting its business processing requirements (Levenburg *et al.*, 2006). Market scope refers to the market area that a firm chooses to operate, spanning from local to global markets (Zhu *et al.*, 2003). Since SMEs operate not only locally but also nationally and internationally, the availability of new technology may help these firms in achieving their goals, while navigating a level of complexity proportional to their operational scope and further amplified by legal and cultural challenges (Davenport and Prusak, 1998; Prahalad and Hamel, 1994). Competitive pressure has been identified as a key factor influencing the adoption of information technologies by enterprises (Ghobakhloo *et al.*, 2011; Jeyaraj *et al.*, 2006). It is relative to the degree of pressure that firms feel from their competitors within the same industry (Sun *et al.*, 2020), and from their business partners (Alharbi *et al.*, 2016). High level of competition in the market and the need to stay competitive lead to an increasing level of adoption of new technologies: companies start watch narrowly competitive moves of rivals, to enhance their products or services (Soto Acosta *et al.*, 2016), to avoid falling behind, while modifying the competitive structure itself (Zhu *et al.*, 2003). With respect to external infrastructure, it includes every activity by any external organization, whether a vendor, a technology service provider, or an institution, that aids companies in innovating and adopting new technologies (Maroufkhani *et al.*, 2023). Among others, government regulations have been recognized as a key factor encouraging companies to adopt new technologies, by providing policy and technical support, suitable infrastructures, and regulatory directives (Sun *et al.*, 2020), training and funding for innovation. Consequently, government support may stimulate and accelerate companies' intentions to implement several innovative technologies.

It is worth underling that when using the TOE framework to analyze a winemaking company, one must consider the joint impact of the three factors on technology adoption and assimilation within the organization. Thus, exploring the interactions between the three factors is essential. For instance, it is important to explore how technological choices align with the organization's structure and culture, as well as how they are influenced by external environmental factors. Therefore, assessing how the winemaking company manages the dynamics among technology, organization, and environment to stay competitive and foster innovation is crucial.

3. Research Design

3.1 Methodology

To examine how to adapt the TOE framework to family wine SMEs and the impact of the related factors on the adoption and implementation of emerging technologies, this study employed an inductive grounded theory approach (Gioia *et al.*, 2013; Corbin and Strauss, 1990). It enabled a deep investigation of this core phenomenon and a formulation of valuable propositions useful to future developments. We gathered data from multiple sources within two family winemaking SMEs located in Sicily (Italy). The study is "revelatory" (Siggelkow, 2007; Yin, 2014) of the specific difficulties that family winemaking SMEs encounter in relation to the rapid advancement and proliferation of new technologies, as well as increasing competitive pressures.

3.2 Overview of the Two Cases

By assuming the exploratory nature of our study, which investigates how technological, organizational, and environmental factors impact the adoption and implementation of emerging technologies, the case study methodology appears to be the most suitable when an in-depth investigation is needed (Yin, 2011). We selected two family SMEs, namely Cantina Calcagno and Caruso and Minini, in accordance with Siggelkow's (2007) guidelines for choosing compelling cases.

The selection was driven by two main criteria. First, these SMEs are particularly proactive in exploring and experimenting different strategies to dynamically respond to changing markets and enhance quality and efficiency through the adoption of modern technologies, aiming to stay competitive. Second, both case studies are in Sicily, which boasts more than 60 cultivated grape varieties and is recognized as Italy's leading wine-growing region in terms of vineyard area (www.assovinisicilia.it). This region is, in fact, distinguished by its unique characteristics and, in recent years, numerous wineries have embraced modern and innovative processes to improve product quality, packaging and marketing (Giacomarra *et al.*, 2016). Table 1 presents an overview of these wineries.

Tab. 1: Case studies overview

Company	*Website*	*Year of foundation*	*Description of the company*
Cantina Calcagno	www.vinicalcagno.it/en	2006	Founded by the two brothers, Franco and Gianni, and their daughter Giusy, this family company was born out of a shared passion and dedication for the vineyard's cultivation. In 2006, they made the decision to bottle a wine that truly captures the essence of their territory. Gianni is devoted to the vineyards, applying the meticulous care and the experience passed down from his father and grandfather. Franco manages the financial aspects of the company, while Giusy is responsible for welcoming guests in the cellar for tastings. Embracing a winemaking tradition that has been handed down from father to son, together with Giusy, in recent years, they have embarked on a journey of experimentation in the cellar while upholding their traditional practices.
Caruso & Minini	www.carusoeminini.com/en	2004	The establishment of Caruso & Minini resulted from a joint venture between two families, each bringing their unique stories and expertise. Its story started when Stefano Caruso, a third-generation winemaker, meets Mario Minini, the owner of a marketing company in Northern Italy. Together, they created Caruso & Minini, a state-of-the-art winery in Marsala, in the extreme part of western Sicily. The firm represents a formidable challenge, combining the Caruso family's agricultural heritage with the Minini sales expertise. Their wines are sold in more than 30 countries worldwide. The fusion of tradition and competence, with a forward-looking vision, characterizes their activities.

Source: our elaboration

3.3 Data Collection

Data collection took place between January 2023 and January 2024. To address the complexities of a multiple case study approach, the present paper employs triangulation methods (Decrop, 1999; Flick, 2018), integrating the following data sources: i) interviews, ii) archival data, iii) documentary material and videos. Primary data were obtained through different rounds of in-depth online interviews. The authors jointly interviewed two informants from Caruso & Minini and two informants from Cantine Calcagno, aiming to capture a managerial perspective (Eisenhardt and Graebner, 2007). Table 2 presents general information about the interviewees.

The respondents were interviewed for a short period (the average duration was of an hour and half). There were semi-structured interviews, involving key informants to encompass different business areas, thereby linking analytical categories with the respondents' experiences (Gephart, 2004). A common interview protocol, consisting of eleven open-ended questions was followed, maintaining a conversational tone. To begin each interview, the researchers introduced the purpose of the study, without making specific assumptions, thus leaving room for the participants to extend the discussion to unexpected insights (Eriksson and Kovalainen, 2015). When necessary, more detailed questions were posed to deepen the understanding of their thoughts concerning the adoption of emerging technologies. With the informants' consent, the interviews were video recorded, to facilitate transcription for qualitative analysis. In the cases of ambiguity, interviewers followed up via telephone for clarifications. To further investigate factors affecting companies' decision to adopt

new technologies, a comprehensive review of data and documentation available online was also carried out. Specifically, archival records (notably companies' websites, social media, online interviews) were examined to discern the main activities and practices implemented by the firms. This also enabled the verification of existing information from other sources (Layder, 1998), while also tracking their adoption paths of new technologies.

Tab. 2: Interview's profile

Company	*Date*	*Key informants*	*Duration*
Caruso & Minini	19-01-2023	Co-Owner and Social Media Manager	1h23'
	30-01-2024	Co-Owner and Administrative Manger	1h10'
Cantina Calcagno	23-01-2023	1: Co-Owner and Winemaker 2: Co-Owner and Marketing Manager	2h23'
	01-02-2023	1: Co-Owner and Winemaker 2: Co-Owner and Marketing Manager	1h20'

Source: our elaboration

3.4 Data Analysis

The analysis of the results was conducted using a comparative analysis approach (Dyer and Nobeoka, 2000), which is well-suited for examining multifaceted phenomena (Elo and Kyngäs, 2008). After having collected all necessary information in two distinct databases, we started to compare the two cases. This comparative analysis facilitated the extraction of specific insights for each of the three dimensions- technological, organizational, and environmental - in alignment with our theoretical framework. This process was reiterated until theoretical saturation was reached (Saunders *et al.*, 2018).

4. Findings

To support the study findings, illustrative quotes relating to technological, organizational, and environmental factors are provided in Table 3, which presents a total of thirteen highlights. Five refer to the technological cluster, five to the organizational cluster, and three to the environmental cluster. Highlights are defined as the main concepts that emerged from the empirical analysis using the lens of the TOE framework.

a) Technological factors

The analysis of the findings reveals how technologies play a pivotal role in supporting wine companies towards a faster green transition. In fact, both firms highlighted how emerging technologies can play a crucial role in supporting wine companies towards *sustainability* by addressing various aspects of their operations. Examples refers to sensor technologies for monitoring soil moisture, temperature, and nutrient levels, thereby optimizing irrigation and fertilization and reducing water and resource usage.

By leveraging emerging technologies, wine companies can create immersive and personalized experiences, strengthening *customer engagement.* This means that the use of emerging technologies provides innovative ways to connect with consumers, build brand loyalty, and create unique experiences. Issues to underline remain open, such as the case highlighted by Cantina Calcagno's informants that revealed the failure related to the adoption of e-commerce. *Prioritization* is a fundamental theme that emerged in the analysis. It occurs that small family wine businesses recognize the importance of implementing new technologies but are unable to proceed because they are engaged in actions deemed more urgent. Preserving the artistry and authenticity of wine making while

incorporating technological advancements is a delicate balance, so it could happen that new technologies are perceived as components compromising the traditional values and practices that define the family's winemaking *tradition*. Storing data in the *cloud* is seen as a strategic issue since it can offer numerous benefits for wine businesses, especially when it comes to collaboration, accessibility, and overall efficiency.

b) Organizational factors

Organizational factors play a crucial role in the successful integration of emerging technologies within wine companies. Findings reveal five highlights that deserve further investigation. *Familines*s is one of them. In a family wine business, integrating emerging technologies requires balancing technological advancements with the core values of familiness. This balancing act can celebrate both the family's heritage and the innovative spirit while managing the tension between new and old generations.

In small family wine businesses, involving employees in this process can be strategic. In fact, addressing resistance and actively promoting the benefits of emerging technologies are key for wine companies to successfully engage employees and drive positive change within their organizations.

The findings revealed that the two cases are interested in embracing *agile work* practices, recognizing the importance of working more flexibly and collaboratively.

A lack of *managerial expertise* arises as possible weaknesses for small family wine businesses. At the same time, continuous *training* is recognized as fundamental to harness the full potential of these technologies and drive innovation and growth. Encouraging knowledge sharing and collaboration among team members is considered a form of training that facilitates peer learning and skill development.

c) Environmental factors

Partnerships with technology vendors, industry associations, academic institutions, and other experts are recognized by these firms as helpful since they can provide valuable resources, expertise, and opportunities that are unattainable by working alone.

Market dynamics and *public authority* actions are acknowledged as forces that can shape the landscape for the adoption of ETs, either facilitating or hindering the firm's efforts to innovate and remain competitive in the industry.

Tab. 3: Illustrative quotes

Factors	*Highlights*	*Illustrative quotes*	
		Cantina Calcagno	*Caruso & Minini*
Technology	Sustainability	New technologies are absolutely vital for powering the green transition, contributing to sustainability, efficiency, and environmental responsibility. We are thrilled about investing even more in this transformative journey.	We are absolutely convinced that integrating digital technologies will bring benefits, also in terms of environmental sustainability. Take, for example, our use of sensors in vineyards, that allow us to monitor soil health, moisture levels, and weather conditions, enabling us to optimize irrigation and fertilization with precision. This not only slashes resource use but also minimizes our environmental footprint. We deployed sensors and monitoring systems dedicated to tracking energy usage, to achieve efficiency improvements.
	Customer engagement	We are convinced of the crucial role the Internet and social media play within the wine industry, providing us with various opportunities for marketing initiatives and customer engagement. Recently, we ventured into the realm of e-commerce, but we encountered a few hurdles along the way-most notably, the skepticism of our uncle. Economic considerations are also paramount and could lock the full potential of digital technologies.	We leverage digital platforms to broadcast our company's commitment to environmental sustainability, significantly boosting our brand reputation and connecting with eco-conscious consumers. Our digital community is growing, expanding more and more each year. We're convinced this plays a pivotal role in our promotional efforts, as cultivating a loyal customer base not only bolsters our brand but transforms them into passionate advocates for our mission.
	Priorities	Over recent years, our firm has embraced the exciting wave of technological innovation, adopting new technologies to enhance different aspects of wine production. Even though a full-scale digital transformation might not yet be on the	We are aware about the endless possibilities of digital transformation and that there is still a lot to do in terms of digital transition but let me tell you that we are a company that thrives on embracing changes and inclined towards experimentation.

		horizon for us, we're aware of its potential. Sure, we have other priorities at the moment, but we're committed to exploring new opportunities step by step, ensuring we are integrating those new solutions that align with our immediate goals.	Take, for example, the Metaverse and virtual reality viewers. We might not have fully integrated these technologies, but we have launched our own space on Meta, where I am exploring new opportunities. I have also purchased a VR viewer to try to understand some innovative ways to elevate the customer experience we already offer. And about blockchain, I believe in its potential, and I am convinced it will transform our industry very quickly.
	Tradition	We believe in the magic of blending technological advancements with our traditional winemaking practices. It is this delicate balance that ensures the artistry and authenticity of our wine making, which carries the legacy of our family's long-standing tradition	
	Cloud	We have a CRM system, a true powerful tool that not only manages but also optimizes our interactions with customers, distributors, and other stakeholders, ensuring seamless communication and fostering connections at every turn	We are trying to enhance our operational efficiency, by integrating new digital technologies. Imagine a cross-flow filter, a new labeler, an encapsulator, jointly generating a big volume of invaluable data helping us to unlock unprecedented levels of efficiency! And we are talking about reducing production waste, minimizing errors, and increasing speed. But there is more, as we are able to transcend geographical boundaries by uploading all this data onto the cloud, allowing every team member to access it from anywhere in the world, all while ensuring security. And speaking of security, we have developed a dedicated IT security system.
Organization	Familiness	Embarking on the journey of digitalization within a family setting presents unique challenges. This is the vibrant landscape we are navigating within our company, where the integration of new technologies happens gradually, one small step at time.	I believe that our family stands as our greatest asset. It is an example of perfect harmony, bridging the wisdom of the old with the strength of the new. This balance not only preserves the rich heritage of winemaking but also propels us towards digital innovations, ensuring our company could still evolve within the industry.
	Employees' engagement	In our journey towards a more digital environment, we have encountered some resistance rooted in our established organizational cultures and practices. We have adopted a proactive approach, empowering our workers with greater responsibilities. We witness how this strategy not only fosters a sense of ownership and engagement among our employees but also leverages the wealth of insights and expertise within our team. Communication is a key, and we make sure to keep our employees constantly updated. Their satisfaction is also paramount to our company's success. We are more than just colleagues, but we are a family. Sure, we may not have the most sophisticated communication technologies at our disposal, but being so small has its advantages. Face-to- face interactions remain our main way to communicate, and we use WhatsApp as a convenient tool, with both internal and external groups.	We have a team made up mainly of passionate young people who not only believe in our mission but also offer us support every step. Our commitment extends beyond mere belief, we are dedicated to fostering a work environment that is not only flexible but also efficient, empowering our employees to excel in performing their tasks. Understanding and actively shaping the organizational climate is crucial for us. That's why we are proud to announce that our efforts have been recognized and certified by Equalitas, one of the most important certifications promoting sustainability within the wine supply chain.
	Agile work		We are proud to showcase several examples of collaborations extending beyond the confines of a traditional office space . Take, for instance, our Management Controller, who lives in Rome and despite the geographical distance, he has complete access to all the company's data.
	Managerial expertise	We acknowledge that in a small family company, limited managerial expertise can pose several challenges during the transition to digitalization. It's a challenge we embrace, and we are determined to overcome it, recognizing the potential for growth and improvement.	
	Training		We place a significant emphasis on training and fostering open dialogue within our organization. While we may not have formalized occasions for these interactions, we believe in the importance of listening and sharing ideas, that could drive our collective growth.

Environment	Partnerships	Seeking advice and guidance from external consultants or experts is pivotal for the success of our company. One particularly strategic collaboration we value immensely is with our winemaker. His wealth of experience and insights gathered from working with similar businesses in the industry provide us with useful recommendations and strategies. We also have strong partnerships with our machine suppliers that support us into operational practices, ensuring we maximize our efficiency and productivity.	We strongly advocate for collaboration with local stakeholders as an essential pillar for supporting wine companies during their digital transition. In our journey, we have cultivated several partnerships. Take, for instance, our collaboration with the local university for joint research focused on optimizing vineyard management. Additionally, consider our engagement with Industry Associations, Local and National Business Networks, that underscore our commitment to leverage collective expertise. One particularly exciting collaboration is with a local startup that has developed our management software. The synergy between our company and theirs is truly interesting and we are planning to explore further projects together, also in terms of Artificial Intelligence applications.
	Market	Market has a strong influence on our strategic decisions, guiding us towards innovative solutions that resonate with our customers. One such example is our adoption of QR code technology. By harnessing this tool, we are enhancing our customer engagement with appealing information that boosts their overall experience.	
	Public authority	We believe in the strategic importance of government programs and initiatives that provide vital support and resources, especially for small businesses undergoing digital transformations. In our case, we have experienced the impact of such initiatives, as we benefited from European funds that facilitated the acquisition of new machinery for our operations.	We have successfully modernized our machinery, thanks to dedicated EU funds. We strongly believe that public authorities can play a crucial role in driving wine companies towards digital transitions, by implementing supportive policies and regulations to unlock new opportunities.

Source: our elaboration

5. Discussions

Adopting digital technologies within the wine industry - particularly by small winemakers like those analyzed in this study - presents a complex interplay of factors rooted in technology, organization, and the environment in which these wineries operate. In this discussion section, we explore the subtle interplay between these factors, drawing insights from the application of the TOE (Tornatzky and Fleischer, 1990; Baker, 2012) theoretical framework to our investigation.

Our analysis reveals a key insight emphasizing the interconnected nature of technological, organizational, and environmental factors influencing the adoption of ETs in small winemakers. We find that environmental sustainability requirements - a prominent environmental factor - as well as the imperative to maintain and reinforce a strict linkage with the customer base, play a pivotal role in shaping firms' decisions regarding technology adoption. Specifically, winemakers are driven to seek technological solutions that align with their competitive goals without compromising and destroying their traditional internal competencies and capabilities, which form the foundation of their competitive advantage. In turn, small Italian winemakers, deeply rooted in tradition and sustainability practices, prioritize ETs that enhance efficiency while preserving the integrity of their traditional winemaking processes. This highlights the symbiotic relationship between technological advancements and organizational values, where innovative digital solutions are selected not only for their functionality but also for their compatibility with internal operational resources and the ethos of the winemaking enterprise (Géczy *et al.*, 2012). Very likely, a similar pattern can be observed in other low-tech industries where a strict connection with the local context and ancient traditions represents a signal of quality and shapes firms' value offerings.

Secondly, the financial constraints commonly faced by SMEs, including small Italian winemakers, profoundly affect their approach to technology adoption. Our findings indicate that these organizations prioritize investments in digital technologies based on economic imperatives, favoring solutions that offer tangible gains in productivity and efficiency over those that promote strategic differentiation and new strategic positioning. Given the resource limitations inherent in SMEs, particularly in the wine industry, firms allocate their technology budgets judiciously. They prioritize

technologies that yield immediate returns on investment, such as those that enhance the production processes or optimize resource utilization. This approach underscores the pragmatic mindset of SMEs, where technological investments are evaluated through the lens of short-term economic viability. Moreover, technology adoption follows a continuous trial-and-error path rather than a discontinuous process, with innovative solutions that are gradually integrated into the existing organization, their efficiency tested, and positive results achieved before moving to the next step of technology adoption. Thus, a moderate risk aversion drives firms' choices, with representing a relevant technological factor (Rogers, 2003) also in the winemaking industry approaching emerging digital technologies (Hayes *et al.*, 2015).

In this sense, despite the increasing digitization trends across industries, the adoption of advanced ETs within the traditional realm of winemaking must be carefully harmonized with the preservation of core values and practices. Our study identifies a tension between technological advancement and preserving traditional values inherent in winemaking, characterized by a strong connection to vineyards and the local community. Winemakers, deeply rooted in their heritage and craft, approach digital technology adoption with cautious optimism, and contrast the risk of sacrificing their unique identity and heritage in pursuit of innovation. As such, integrating ETs must complement rather than supplant traditional practices, serving as tools to enhance rather than replace the human touch and craftsmanship central to winemaking.

Moreover, our study confirms that the role of leadership in fostering innovation within small winemakers represents a critical determinant of their propensity to embrace ETs (Pan *et al.*, 2013). Our findings indicate that organizations led by visionary and open-minded leaders are more inclined to recognize the value of innovation, as they acknowledge its long-term implications for competitive sustainability, while honoring the essence of their core values (i.e., a deep knowledge of products, long-lasting craftsmanship, and heritage). These forward-thinking leaders cultivate an environment that encourages experimentation and moderate risk-taking, enabling the organization to harness the transformative potential of digital technologies while staying true to its roots. In family firms, this dynamic tension between innovation and tradition often evolves across generations of firm owners, with each successive the generation contributing to the renewal process.

A final insight emerging from our analysis is that a crucial prerequisite for successful technology adoption among small winemakers is developing a minimum level of internal competencies related to ETs, in general, and digital technologies, in particular. In this sense, a baseline level of technological proficiency within the organization represents the due absorptive capacity (Zahra and George, 2002; Pradana *et al.*, 2020) that allows firms to discern the value of digital solutions and make informed adoption decisions. Absent such a minimum internal absorptive capacity, the perceived risks from technology adoption overcome their potential advantages, and adoption is often delayed or impeded. Winemakers with a higher absorptive capacity are better equipped to navigate the complex landscape of ETs, identifying solutions that align with their strategic objectives and organizational capabilities. This highlights the pivotal role of continuous learning and skills development in enabling SMEs to leverage digital technologies effectively to drive innovation and competitiveness.

In conclusion, the adoption of ETs by small winemakers is shaped by a multifaceted interplay of technological, organizational, and environmental factors. Our study highlights the intricate relationships among these factors, emphasizing the importance of aligning technological advancements with organizational values and strategic priorities. Moving forward, it is imperative for winemakers to strike a delicate balance between embracing innovation and preserving tradition, leveraging digital technologies as catalysts for growth and sustainability while safeguarding the essence of their craft. By cultivating a culture of innovation, nurturing visionary leadership, and enhancing absorptive capacity, small winemakers can harness the transformative potential of ETs to succeed in an increasingly competitive landscape while staying anchored to their roots.

6. Conclusions and future research

The main contribution of the present study to the ETs literature lies in its exploration of the principal dimensions influencing the ET adoption and implementation among firms. Grounded in the TOE framework, our research aimed to identify the principal dimensions driving to ET adoption, responding to the call for more comprehensive investigations into drivers and factors of ET adoption. By shedding light and gaining in-depth insights on this theme and, additionally, by extending the application of the TOE framework, our study provides valuable insights into the favorable and restrictive factors encountered by firms when adopting and using ETs in their projects, processes, and activities. The adoption of ETs is an ongoing process, instead of a single point in time, where, at different levels, technological, organizational and environmental dimensions influence their successful implementations and utilization.

Practically, this study provides suitable implications for firms navigating increasingly dynamic environments driven by pressuring technological advancements and competitive markets. Firstly, firms recognize that technology and innovation management decisions are more complex and challenging. Beyond mere adoption and implementation, the value of the ETs lies in their strategic utilization to introduce innovative modes and practices that can enable organizations to differentiate themselves from competitors.

While this current research extends the literature on ETs, future studies should address some limitations. Primarily, the use of a case study approach restricts the generalizability of empirical findings, despite being appropriate for the explorative nature of this research. Future studies could diversify and extend the sample of analysis, by including industries such as manufacturing, construction, or service sectors to provide additional precise results. Additionally, investigating specific organizational sizes, such as large enterprises, would provide insights into how the dimensions applied in this study operate within different organizational contexts. Moreover, future research should broaden its scope beyond Sicilian cases to encompass organizations located in different areas or nations. This would allow for an analysis and comparison of the role and influence of environmental factors (i.e., such as government regulation) which vary across different areas or nations.

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Resilience of enterprises: A systematic literature review in a Dynamic Capabilities (DCs) perspective

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Abstract

Purpose: *This study aims to comprehensively review the field of resilience research in business and management applying a dynamic capabilities (DCs) perspective, with a focus on the antecedents of enterprise resilience. The work aims at providing a detailed understanding of the growing body of literature on resilience, particularly in the face of natural disasters and by comparing the resilience antecedents of large and small and medium-sized enterprises (SMEs).*

Design/Methodology: *This study performs a systematic literature review using the PRISMA framework. A final selection of 27 peer-reviewed papers were identified by filtering articles from Scopus and Web of Science (WoS) databases using keywords related to resilience and DCs.*

Findings: *The review suggests that there has been a significant increase in resilience research, particularly after the beginning of the pandemic. Key antecedents of resilience identified include robustness, agility, integrity, redundancy, strategic decision-making, innovation, learning and collaboration. These elements highlight the multifaceted nature of resilience, emphasizing the importance of both internal capabilities and external collaborations in enhancing resilience.*

Research limitations/implications: *The study acknowledges certain limitations, such as its focus on specific databases and the possibility of publication bias. It suggests that future research could broaden the scope of the review to include diverse sources and methodologies, explore resilience strategies across various organizational contexts and industry sectors.*

Originality: *This research contributes to the theoretical discourse on resilience by mapping the evolution of resilience research, updating it with the studies published during/after the pandemic and identifying key antecedents of enterprise resilience in the light of the DCs view. It provides actionable insights for practitioners on cultivating resilience, highlighting the importance of tailored strategies for SMEs based on. The study offers a foundation for further research and practical advice on improving enterprise resilience in an increasingly volatile and uncertain world.*

Keywords: *resilience, dynamic capabilities, SMEs, enterprise, systematic literature review*

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1. Introduction

In recent times, resilience has received unprecedented attention in the context of global adversities ranging from natural disasters to socio-economic turbulence (Boers *et al.*, 2024; Castro and Zermeno, 2020). Adversities such as earthquakes, floods, terrorism, epidemics (e.g. SARS), financial crises, geopolitical disputes and, in particular, the COVID-19 pandemic, all pose significant threats to business continuity and economic stability (Dubey *et al.*, 2023). The impact of natural disasters on business operations can have significant consequences, potentially leading to global economic and social crises (Scott *et al.*, 2020). Martinelli and Tagliazucchi (2018, 2019) have outlined the tangible effects of these calamities on economic activities. Given these challenges, it can be argued that resilience is an important asset for organisations and their members to possess (Linnenluecke, 2017).

Although there has been growing interest in resilience within the business and management literature, consensus on its definition and core components remains elusive, resulting in conceptual ambiguity (Conz and Magnani, 2020; Duchek, 2020). This lack of clarity emphasizes the need for a more structured approach to understanding resilience.

A considerable amount of research has been dedicated to investigating organisational resilience (Lengnick-Hall *et al.*, 2011; Xiao & Cao, 2017; Martinelli and Tagliazucchi, 2019; Martinelli *et al.*, 2019; Chen *et al.*, 2021; Corrales-Estrada *et al.*, 2021; Sincorá *et al.*, 2023) and supply chains (Forbes and Wilson, 2018; Yu *et al.*, 2019; Polyviou *et al.*, 2019; Gölgeci and Kuivalainen, 2020; Mishra *et al.*, 2021; Polater, 2021; Katsaliaki *et al.*, 2022; Ali *et al.*, 2023a, 2023b, 2023c, 2022, 2021; Dubey *et al.*, 2023; Pu *et al.*, 2023; Stadtfeld and Gruchmann, 2023). Accordingly, a number of systematic literature reviews have been conducted on the topic of organization resilience, as evidenced by the works of Bhamra *et al.* (2011), Linnenluecke (2017), Williams *et al.* (2017), and Duchek (2020), and on firms' resilience, as explored by Conz and Magnani (2020). Notwithstanding, the specific resilience of individual enterprises has yet to be rigorously investigated. Further researches on enterprise resilience are important for a number of reasons, particularly in today's rapidly changing business environment characterised by increasing global challenges including climate change and geopolitical tension (Ortiz-de-Mandojana & Bansal, 2016), technological advancements and unanticipated disruptions such as the COVID-19 pandemic (Fu *et al.*, 2023).

This study aims to address a gap in the literature by conducting a comprehensive review of enterprise resilience through the lens of dynamic capabilities (DCs). The study seeks to clarify and refine the definition of resilience in the business and management domain, specifically for small and medium enterprises (SMEs). The goal is to make a significant contribution to the discourse on resilience in business and management answering the following research questions:

RQ1: *How is enterprise resilience conceptualized in relation to the DCs view*?

RQ2: What are the antecedents of enterprises resilience explored by extant literature?

The paper is structured as follows: The second section outlines the theoretical framework, which is divided into two parts. The first part focuses on enterprise resilience in general, its connection to DCs, and the relative antecedents. The second part gives more emphasis to SMEs. The third section explains the methodology used to conduct the systematic literature review. The fourth section presents the main findings and discusses them. The conclusion provides insights into the implications of the study and suggests future research directions.

2. Literature review

2.1 DCs and Enterprise resilience

The DCs framework, introduced by Teece *et al.* (1997) and developed in order to overcome the limitations related to the resource-based view of the firm (Barney, 1991, 1995, 2001), provides a

robust framework for analyzing how organizations adapt to rapidly changing and dynamic environments. A DC refer to "*a firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments*" (Teece *et al.*, 1997, 516) and emphasizes the importance of strategic agility, resource reconfiguration, and continuous learning in building resilient organizations. The DCs view integrates systematic routines and strategic processes within an organisation, enabling the creation of competitive advantage by regenerating competencies, structures and resources (Teece, 2014). Teece (2007, 2018) emphasises a hierarchy of capabilities, with "*ordinary capabilities*" at the base, "*microfoundations"* at the next level, and "*dynamic capabilities"* at the top. These latter capabilities are: *sensing, seizing and transforming.*

Exploration of the concept of DCs offers profound insights into how organisations can foster resilience and navigate the volatility and complexity of today's business environment. Robustness, agility, integrity, redundancy, learning, and collaboration are crucial for companies looking to maintain their competitive advantage and operational continuity during disruptions. Robustness in organisations refers to the ability to maintain operational performance despite various shocks, relying on strategically designed systems and processes that are resilient to disruptions. This concept is integral to absorptive capacity, enabling firms to effectively respond and adapt to challenges. Sheffi (2005) highlights robustness as a fundamental aspect of resilience, critical to a firm's ability to withstand immediate setbacks and adapt to future challenges. Agility refers to an organization's ability to respond quickly and effectively to changes, including market trends, technological advancements, and competitive changes. According to Sutcliffe and Vogus (2003), agility plays a crucial role in enabling firms to capitalize on opportunities and mitigate threats, which is essential for resilience in the face of rapid disruption. Integrity within DCs requires organisations to align their practices, processes, and strategies with their core values and ethical standards. This ensures that firms adapt to changing environments in a consistent, ethical, and transparent manner. Integrity promotes trust among stakeholders and is fundamental to sustainable competitive advantage (Palanski and Yammarino, 2007). Redundancy refers to the strategic integration of redundant resources, capabilities or information systems to help ensure operational continuity when faced with disruptions. This involves creating buffers that allow organisations to respond to unexpected events without significant degradation in performance. The acquisition and management of knowledge are essential for continuous improvement and innovation within organisations (Behzadi *et al.*, 2017). Helfat and Peteraf (2003) emphasise the importance of assimilating lessons from both successes and failures to facilitate adaptation and growth. Additionally, the development of collaborative networks enhances organisational capabilities through external partnerships, enriching adaptability and innovative capacity (Wilden *et al.*, 2013).

A study by Duchek (2020) defines organizational resilience as the capacity of an organization to anticipate threats, cope with adverse events, and adapt to change. This definition represents a departure from conventional perspectives of resilience. It acknowledges the significance of proactive approaches in predicting and reducing disruptions, rather than viewing resilience as a passive, reactive ability. Studies by Peteraf *et al.* (2013) and Helfat and Peteraf (2015) explore into the intricacies of strategic management practices that facilitate such agility, highlighting the importance of adaptability in achieving and sustaining competitive advantage in a constantly evolving business environment. The dynamic reconfiguration of resources and processes is essential for an organisation to recover from disruption and sustain growth. This facet of DCs involves not only the reallocation of existing resources, but also the development, reconfiguration and integration of new capabilities. Wilden *et al.* (2016) discuss how the strategic management of resources contributes to resilience by enabling organisations to efficiently navigate uncertainty and recover from adversity.

The resilience of an enterprise is greatly improved by a culture that values continuous learning and innovation. In this context, DCs facilitates the cultivation of a work environment that encourages creativity and experimentation. Schilke *et al.* (2018) explore the impact of an innovation-driven culture on organisational performance, highlighting the role of DCs in fostering an environment conducive to innovation and sustainable growth. The ability to continuously re-evaluate and revise

strategies, business models and operational approaches in the light of new information and changing circumstances is a critical aspect of DCs. Recent research by Fainshmidt *et al.* (2016) highlights the importance of strategic renewal for long-term resilience, illustrating how DCs enable firms to proactively adjust their strategic direction to remain relevant and competitive.

It is important to examine DCs to determine their importance in creating a strategic framework for enterprise resilience. This strategic approach involves using agile adaptation, reconfiguring resources, promoting an innovative and learning culture, and ensuring continuous strategic renewal. These elements together strengthen an organization's resilience and competitive advantage over time. Conz and Magnani (2020) provide a detailed analysis of firm resilience, highlighting its dynamic nature through the phases of proactive, absorptive, and reactive responses to disruptions. However, all these studies are mainly addressed to investigate large organisations, while SMEs resilience evidence some peculiarities requiring further exploration.

2.2 SMEs resilience

When discussing enterprises resilience, it is crucial to note the differences between large enterprises and SMEs. While larger organizations may have the ability to distribute resilience-building capabilities across various structures and processes, SMEs often rely on the competencies of key individuals or a small leadership team (Teece, 2012). This dependence puts SMEs at a unique disadvantage, particularly during economic recessions, due to their limited resources and increased vulnerability to external shocks (Pelletier and Martin Cloutier, 2019; Branicki *et al.*, 2018). However, it has been suggested that SMEs have the potential to develop resilience through strategic planning, resourcefulness, and adaptability. This may enable them to overcome constraints and take advantage of opportunities for growth and sustainability, even in challenging circumstances (Etemad, 2020; Juergensen *et al.*, 2020; Tognazzo *et al.*, 2016).

Based on Teece's (2018) research, it can be inferred that strategic agility and flexibility play an important role in enhancing the resilience of SMEs, allowing them to proactively respond to market dynamics and make necessary adjustments to their business models. Helfat and Peteraf (2015) suggest that innovation plays a crucial role in maintaining the relevance of SMEs. By continuously exploring and implementing new ideas, products, and services, SMEs can remain competitive and responsive to market demands. In the current age of digital transformation, it may be beneficial for SMEs to consider the use of digital technologies to enhance their operational efficiency and broaden their market reach (Nambisan, 2017).

The resilience of SMEs can be influenced by various factors, including leadership and human capital. According to Li *et al.*, (2016), the competencies, adaptability, and strategic vision of the leadership team play a crucial role in steering SMEs through challenges and towards recovery and growth. Additionally, access to financial resources can also bolster the resilience of SMEs, providing the necessary liquidity to weather periods of reduced cash flow and invest in strategic initiatives (Ortiz-de-Mandojana & Bansal, 2016). Relationships with customers and suppliers constitute another critical aspect of SME resilience (Asamoah *et al.*, 2020). Moreover, as underline by Ozanne *et al.*, (2022) SMEs can derive significant advantages from the valuable information, resources, and support that are provided by industry associations and local business communities. These networks play a crucial role in helping SMEs to navigate through and recover from disruptions, by offering a broader network and social capital. The organisational culture within SMEs - characterised by values that prioritize learning, adaptability and employee empowerment - creates an environment conducive to innovative solutions and rapid responses to challenges (Hoang *et al.*, 2021; Hanifah *et al.*, 2019).

Recent studies (Erdiaw-Kwasie *et al.*, 2023; Li *et al.*, 2022; Nan & Park, 2022) suggest that SMEs and larger enterprises differ in their resilience, especially during global crises like the COVID-19 pandemic. The studies emphasize the importance of innovation, digital technologies, and adaptive strategies in enhancing the resilience of SMEs. Although SMEs are more vulnerable, they also have unique capacities for adaptation and respond quickly during times of crisis (Battisti and Deakins, 2017).

In conclusion, it can be said that the resilience of SMEs is supported by a combination of strategic agility, innovative capabilities, digital transformation, leadership and human capital, financial resilience, strong customer and supplier relationships, extensive networks and social capital. These elements collectively enable SMEs to withstand, adapt to, and thrive amidst the uncertainties and challenges of the global business environment.

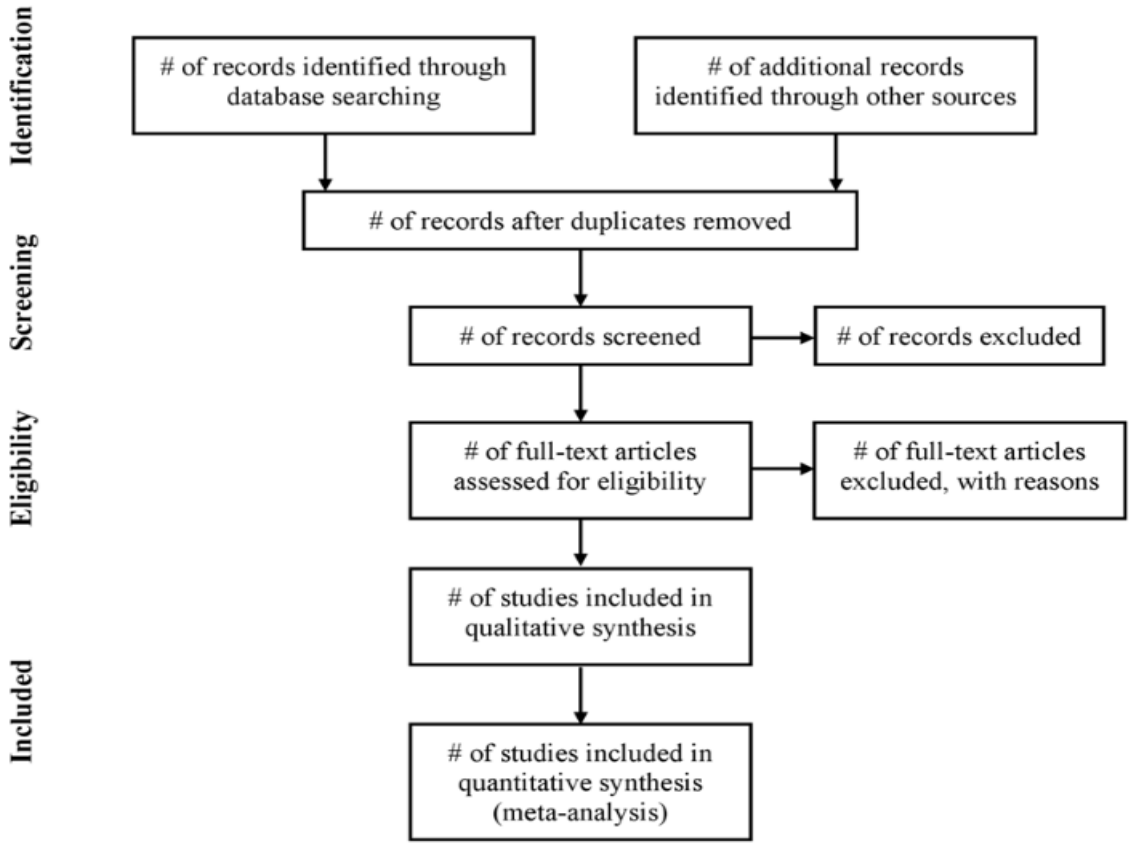
To clarify the relationship between antecedents of resilience and DCs in the field of business and management scholarship, we conducted a systematic review of the existing relevant literature.

3. Methodology

3.1 Data Source and Literature Selection

A comprehensive literature review exploring the relationship between enterprises resilience antecedents and DCs in the field of business and management studies was performed. We utilized two preeminent databases, Scopus and Web of Science (WoS), both of which are renowned for their extensive indexing and citation tracking capabilities in the academic and scientific literature. The methodological approach was based on strict adherence to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The PRISMA framework, which was originally developed for the medical sciences by Liberati *et al.* (2009), was chosen for its comprehensive coverage and methodological rigor. It is characterized by a 27-item checklist and a structured four-phase flow diagram (see Fig. 1). The decision to use PRISMA was made intentionally, with the aim of ensuring a high level of methodological consistency and comprehensiveness in conducting this systematic review.

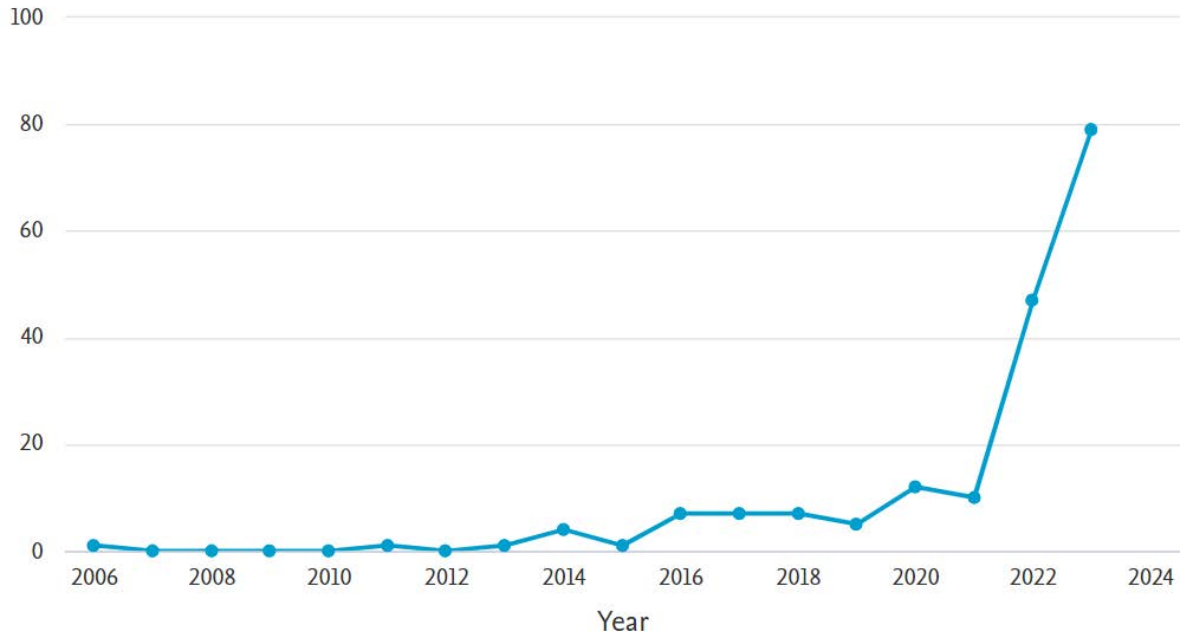
Figure 1. PRISMA flow diagram.



Source: Liberati *et al.*, 2009.

Utilizing specific keywords: (resilience) AND ("dynamic capabilit*") AND (firm* OR sme* OR organization* OR enterprise*), the search was confined to the period from 2006, marking the year the first article appeared in both Scopus and WoS, up until the end of 2023. The search produced a total of 218 documents, which were further refined to focus on the core academic disciplines relevant to our research, namely business, management and accounting (180 documents) and finance (39 documents). Through Scopus's meticulous de-duplication process, the number of documents was reduced to 182, guaranteeing that each contribution is distinct and relevant to the discourse. An analysis of the publication trend reveals a notable increase in published papers on the topic in 2023, with 79 documents, suggesting a growing research interest and scholarly contributions to the field of resilience and DCs in business and management contexts (Fig. 2). This peak represents an upward trend in research output, which began notably in 2022 with 47 documents. It is worth noting that this marks a significant increase from 2020 (when relevant literature reviews were performed, see. Conz and Magnani, 2020), which previously held the record for the most publications in this area with 12 documents.

Fig. 2. Publications trend about resilience and dynamic capabilities of firms from 2006 to 2023 in the Business, Management and Accounting field in Scopus, using the keywords: resilience AND "dynamic capabilit" AND firm* OR sme* OR organization* OR enterprise*.*



Source: Scopus.

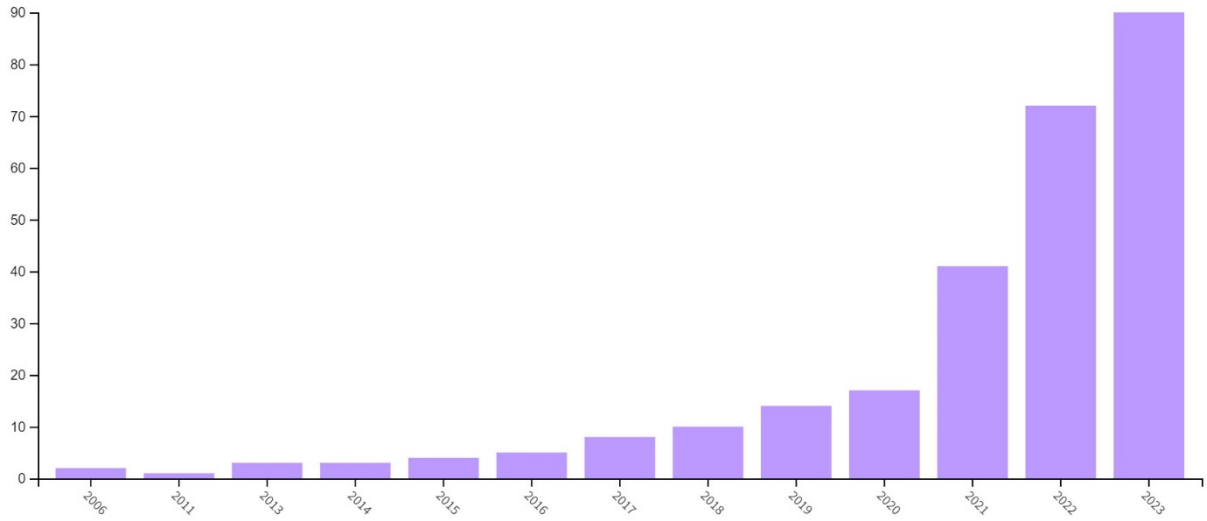
The clear trend in the academic literature, as revealed by Scopus-indexed publications, highlights a significant increase in academic interest and research output focused on resilience and DCs in organisations over the last two years. The accumulation of 126 documents in 2022 and 2023, out of a total of 182 documents identified with the selected keywords, represents an impressive 70% of the total research output in this area during the specified period. This strong increase contrasts with the period from 2006 to 2021, when only 56 documents were published, indicating a relatively modest interest in the topic. This exponential growth in scholarly publications within the business and management discipline, particularly pronounced in the 2022-2023 biennium, signals a profound shift towards prioritizing the study of resilience and DCs of enterprises. Such a shift is not merely numerical, but reflects a deeper, more nuanced understanding and recognition of the critical role that resilience plays in the strategic and operational paradigms of modern enterprises. This trend is particularly notable in the context of recent global challenges, including economic volatility, geopolitical tensions and the ongoing impact of the COVID-19 pandemic. These factors have undoubtedly contributed to an increased focus on resilience as a mechanism through which

organisations can manage uncertainty, adapt to change and sustain competitive advantage. The DCs framework, with its emphasis on the ability of firms to integrate, build and reconfigure internal and external competencies to cope with rapidly changing environments, has become increasingly relevant. The concentration of scholarly effort in recent years underscores the urgency and relevance of understanding how enterprises can effectively cultivate and exploit resilience. This proliferates area of research offers promising avenues for theoretical advancement and practical application, providing insights into how organisations can not only survive but prosper in the face of adversity and change.

Similarly, using the research keywords on WoS: (resilience) AND ("dynamic capabilit*") AND (firm* OR sme* OR organization* OR enterprise*), the search was delimited from 2006 - the first year that marked the presence of articles with these keywords in the database - to the year 2023.

The search yielded a total of 270 documents in the specified fields, highlighting WoS's role in eliminating redundancy by removing duplicate documents appearing in both fields, thus ensuring the uniqueness of each entry. The year 2023 marked a significant milestone, with a record high of 90 documents, followed by 72 documents in 2022 (Fig. 3). This distribution indicates a strong scientific momentum in the last two years, with these periods together accounting for 162 documents. This volume represents 60% of the total output, highlighting a significant escalation in research activities centered on resilience, DCs and their integration in business and organisational contexts. The comparative analysis between the periods 2006-2021 and 2022-2023 reveals a noticeable shift in the academic landscape. While the total number of documents from 2006 to 2021 is 108, with a peak of 41 publications in 2021 alone, the exponential increase in publications in the following two years is indicative of a heightened interest and focused examination of how resilience and DCs can influence and enhance business performance and adaptability.

Fig.3. Publications trend about resilience and dynamic capabilities of firms from 2006 to 2023 in the Business, Management and Accounting field in Scopus, using the keywords: resilience AND "dynamic capabilit" AND firm* OR sme* OR organization* OR enterprise*.*



Source: Web of Science.

The significant increase in the number of academic papers published in the field of business and management, particularly in 2022 and 2023, indicates that the challenges and complexity of the contemporary business environment are being critically reflected upon. The intensification of research on resilience and DCs reflects an academic and practical recognition of the imperative to equip enterprises with the tools and strategies necessary to navigate the uncertainties and disruptions of the modern market landscape.

Moreover, the data from WoS, which parallels the trends observed in Scopus, reinforces the notion that the study of resilience and DCs within enterprises, firms, SMEs, organizations has become a

focal point of academic inquiry. This growing body of literature not only contributes to the theoretical development of the field, but also provides valuable insights for practitioners seeking to foster resilience and adaptability in their organisations.

3.2 Descriptive analysis

To ensure the integrity and comprehensiveness of our systematic literature review, we conducted a meticulous search strategy across the major academic databases, namely Scopus and Web of Science (WoS). This process of iterative keyword searching was designed to uncover a wide range of literature relevant to our investigation of enterprises resilience, with a particular focus on the DCs as framework. The initial search yielded a pool of 452 potentially relevant articles, with Scopus contributing 182 articles and WoS accounting for 270 articles.

To manage and analyze this large volume of literature, we compiled key bibliographic details - such as article title, abstract, keywords, journal name, publication year and citation count - into a CSV Excel spreadsheet. This organisation facilitated a structured approach to the subsequent screening phases.

The first step in refining our dataset was to remove 90 articles due to duplication between databases, reducing the total to 362 articles. A preliminary screening based on titles, keywords and abstracts further narrowed the selection by excluding 201 articles. This initial filtering focused on identifying studies that specifically addressed the resilience of individual enterprises, therefore excluding research on not-for-profit organisations, non-governmental organisations, public institutions and topics other than individual firm resilience, such as supply chain and logistics resilience.

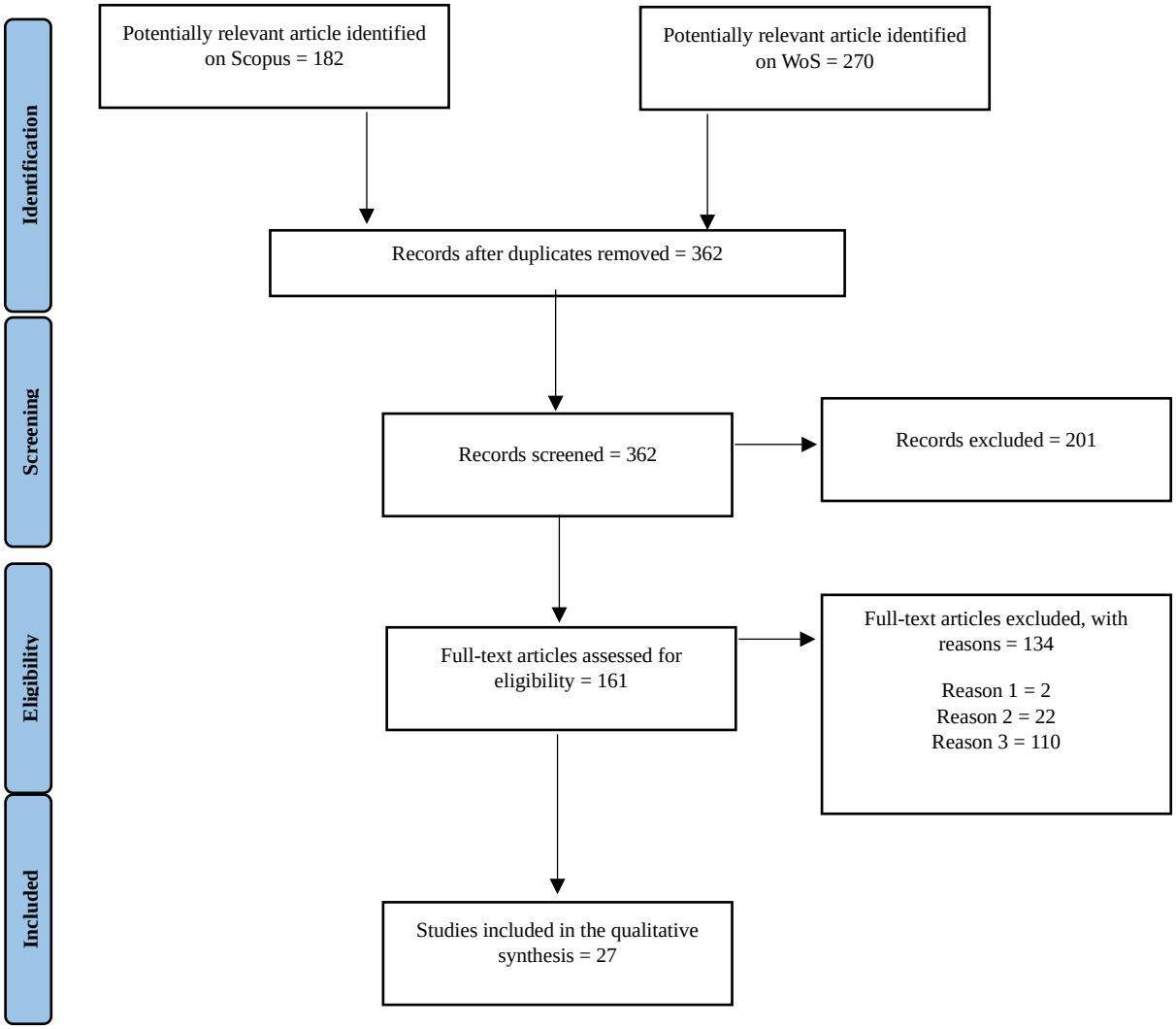
The refined set of 161 articles underwent a more detailed screening process, governed by a set of inclusion and exclusion criteria carefully designed to align with our research objectives:

1. *Language exclusivity*: Only articles published in English were considered, resulting in the exclusion of 2 articles that did not meet this criterion.
2. *Publication type*: The scope was strictly limited to peer-reviewed journal articles, resulting in the exclusion of 22 non-journal publications, including books, book chapters, editorial material and conference proceedings.
3. *Citation threshold*: We prioritized scholarly impact by including only articles that had received at least 10 citations, resulting in the exclusion of 110 articles that did not meet this citation threshold.

After applying these criteria, a further 134 articles were excluded from the analysis, resulting in a concentrated selection of 27 articles considered most relevant for in-depth review. This rigorous and systematic screening process, from the initial discovery of 452 articles to the final selection of 27, underscores our commitment to identifying high quality, impactful research on business resilience through the lens of DCs.

This methodological approach to literature selection and review is graphically summarized in Figure 4, which provides a visual representation of the screening and filtering process used to distill the most relevant articles for our study. This figure illustrates the sequential steps taken to refine the pool of articles to ensure the robustness and relevance of the literature included in our review.

Fig. 4. Flow diagram of study selection process.



Source: our elaboration.

Our systematic review is based on a rigorous examination of peer-reviewed journal articles, a decision based on the belief that such publications are a central and highly representative source of academic research in business and management. Peer-reviewed articles are often regarded as the gold standard in academic research because of their rigorous peer-review process, which ensures the reliability, validity and originality of the research presented. This methodological choice underlines our commitment to sourcing the most credible and impactful evidence on business resilience and DCs.

While our focus remains on peer-reviewed journal articles, we recognise the potential breadth and depth that could be achieved by including a more diverse range of academic outputs. Books, book chapters and conference proceedings often contain valuable contributions to the field, offering theoretical advances, practical insights and innovative research methodologies that could enrich our understanding of business and management. The inclusion of such sources could potentially provide a more comprehensive assessment of the current knowledge base, presenting nuanced perspectives and multiple interpretations that go beyond the scope of journal articles.

As shown in Tab. 1, our collected data highlights the distribution of academic articles across a spectrum of prestigious journals within the business and management disciplines. The *Journal of Business Research* emerges as the most prolific outlet in our dataset, with three publications relevant

to the focus of our study. This is closely followed by the *International Journal of Entrepreneurial Behaviour* and *Business Strategy and the Environment*, each of which contributed two publications to our review. These journals are recognized for their scholarly contributions to the fields of business and management, reflecting the diverse and interdisciplinary nature of research on resilience and DCs within enterprises.

Tab 1. Journal and numbers articles considered in the study.

Name of Journal	Number of publications
Journal of Business Research	3
International Journal of Entrepreneurial Behaviour and Research	2
Business Strategy and the Environment	2
Industrial Marketing Management	1
European Management Journal	1
Management Decision	1
Review of Managerial Science	1
Small Business Economics	1
Benchmarking: An International Journal	1
Journal of Management in Engineering	1
International Business Review	1
Organization Theory	1
Nankai Business Review International	1
Vision	1
Journal of Operations Management	1
International Small Business Journal-Researching Entrepreneurship	1
Journal of Knowledge Management	1
Long Range Planning	1
International Journal of Human Resource Management	1
Entrepreneurship Theory and Practice	1
R & D Management	1
Journal of International Business Studies	1
Industrial and Corporate Change	1
Tot.	27

Source: our elaboration.

This distribution illustrates not only the thematic relevance and scholarly interest across different academic platforms, but also the broad appeal and applicability of the research topics under investigation. The prevalence of articles in these prestigious journals underscores the importance of resilience and DCs as critical areas of inquiry, central to the strategic development and operational sustainability of organisations in the dynamic and often turbulent business environment.

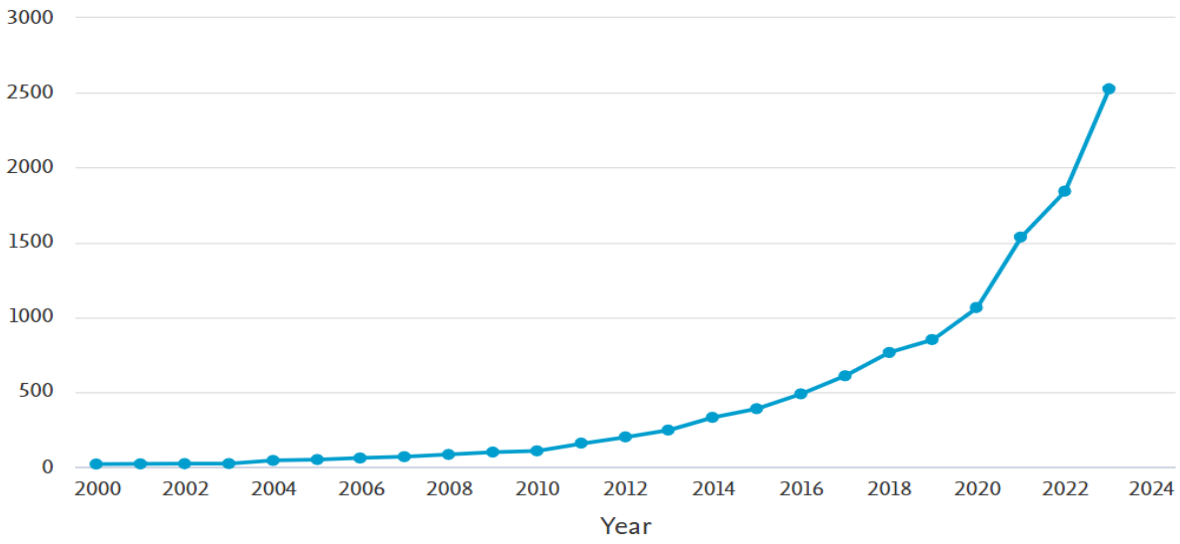
In summary, while our review strategically prioritizes peer-reviewed journal articles to ensure the highest standards of academic rigor and credibility, we acknowledge the potential value of a more inclusive approach to literature review. Expanding the scope of sources could provide a richer, more holistic understanding of the intricate dynamics that define resilience and DCs within business and management discourse.

4. Findings

The review of the Scopus database shows that there has been a notable increase in the interest in and research output on the topic of resilience in the academic field. Conz and Magnani's (2020) study initially identified over 60,000 documents on “resilience” from 2000 to 2017. An extension of this

review up to 2023 demonstrates a substantial increase, with the count exceeding 180,000 documents. This jump underlines the accelerating focus on resilience research. In particular, the proliferation of resilience-related scholarship in the disciplines of economics, management and accounting is remarkable. However, from 2000 to 2023, over 11,000 documents have been documented, with 2,526 documents in 2023 alone. Between 2000 and 2016, a cumulative total of 2,381 documents were recorded. This significant increase illustrates the growing scope and relevance of resilience in these fields (Fig. 5).

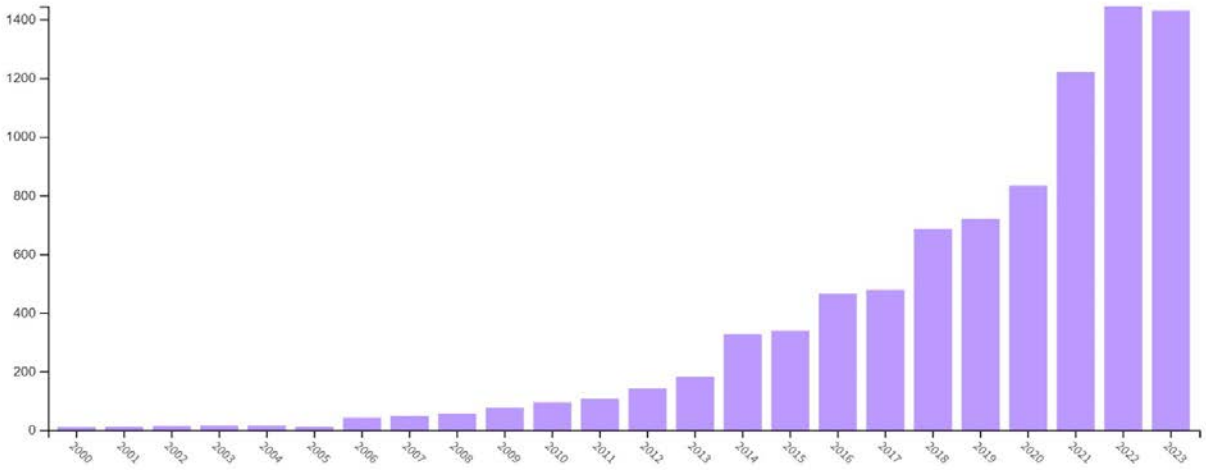
Fig. 5. Publications trend of resilience topic from 2000 to 2023 in the Business, Management and Accounting field in Scopus.



Source: Scopus.

Similarly, an investigation of the WoS database shows over 160,000 documents related to resilience. A focused search under the categories of Management, Business, and Economics reveals 8,768 documents spanning from 2000 to 2023 (Fig. 6). It is worth noting that the years 2022 and 2023 had the highest publication rates, indicating a growing interest in resilience research within these domains. Over the past three years, i.e. from 2021 to 2023, there has been a notable increase in scholarly attention towards resilience, as evidenced by 4,094 documents accounting for nearly 47% of the total resilience-related output in these categories.

Fig 6. Publications trend of resilience topic from 2000 to 2023 in Management and Business categories in WoS.



Source: Web of Science.

The recent increase in literature on resilience, particularly in response to current crises such as the COVID-19 pandemic and the conflict in Ukraine, underscores the significance of resilience as a critical area of study in navigating present challenges. The focus on resilience, especially post-2020, emphasises the need to understand and integrate resilience strategies into business and management practices in order to cope with disruptions, crises and external shocks.

The thematic analysis suggests a notable emphasis on resilience in response to disruptions, crises, and catastrophic events, highlighting the adverse impact of these occurrences on businesses. The concept of resilience has been integrated into COVID-19 research, as demonstrated by the studies listed in Table 2, such as those by Ozanne *et al.* (2022), Mota *et al.* (2022), Elf *et al.* (2022), Chih *et al.* (2022), Bergami *et al.* (2022), Hadjielias *et al.* (2022), and Sreenivasan *et al.* (2023). Moreover, Table 2 references literature that investigates resilience in different adverse circumstances, such as disruptions, crises, disturbances, catastrophic events, external crises, and natural disasters. Contributions to this debate include those by Limnos *et al.* (2014), Su *et al.* (2014), Battisti & Deakins (2017), Ma *et al.* (2018), Martinelli *et al.* (2018), Parker and Ameen (2018), Bustinza *et al.* (2019), Iborra *et al.* (2020), and Audretsch and Belitski (2021). It is worth noting that while the initial research did not specifically focus on these phenomena as keywords, there is a significant association between the construct of resilience and the aforementioned events in extant scholarly literature. This observation suggests a greater scholarly recognition of the importance of resilience strategies in mitigating the impact of external shocks and ensuring organisational sustainability in the face of unprecedented challenges.

Table. 2. Authors, years, type of study included in the literature review.

Authors	**Year**	**Type of study**
Mamouni Limnios E.A.; Mazzarol T.; Ghadouani A.; Schilizzi S.G.M.	2014	Conceptual
Su H.-C.; Linderman K.; Schroeder R.G.; Van De Ven A.H.	2014	Conceptual
Fainshmidt S.; Nair A.; Mallon M.R.	2017	Quantitative
Battisti, M; Deakins, D	2017	Quantitative
Ahn J.M.; Mortara L.; Minshall T.	2018	Quantitative
Ma Z.; Xiao L.; Yin J.	2018	Conceptual
Martinelli E.; Tagliazucchi G.; Marchi G.	2018	Qualitative
Parker, H; Ameen, K	2018	Quantitative
Bustinza, OF; Vendrell-Herrero, F; Perez-Arostegui, MN; Parry, G	2019	Quantitative
Grøgaard B.; Colman H.L.; Stensaker I.G.	2019	Qualitative
Iborra, M; Safón, V; Dolz, C	2020	Quantitative
Audretsch, DB; Belitski, M	2021	Quantitative
Hillmann, J	2021	Conceptual
Ozanne L.K.; Chowdhury M.; Prayag G.; Mollenkopf D.A.	2022	Qualitative
Mota R.O.; Bueno A.; Gonella J.S.L.; Ganga G.M.D.; Godinho Filho M.; Latan H.	2022	Quantitative
Khurana I.; Dutta D.K.; Singh Ghura A.	2022	Qualitative
Elf P.; Werner A.; Black S.	2022	Qualitative
Fares J.; Sadaka S.; El Hokayem J.	2022	Qualitative
Chih Y.-Y.; Hsiao C.Y.-L.; Zolghadr A.; Naderpajouh N.	2022	Qualitative and Quantitative
Hepfer M.; Lawrence T.B.	2022	Conceptual
Do H.; Budhwar P.; Shipton H.; Nguyen H.-D.; Nguyen B.	2022	Quantitative
Akpan E.E.; Johnny E.; Sylva W.	2022	Quantitative
Bergami, M; Corsino, M; Daood, A; Giuri, P	2022	Qualitative
Hadjielias, E; Christofi, M; Tarba, S	2022	Qualitative
Anwar, A; Coviello, N; Rouziou, M	2023	Quantitative
Sreenivasan, A; Suresh, M; Panduro, JAT	2023	Qualitative
Wang, J; Xue, Y; Yang, J	2023	Quantitative

Source: our elaboration.

This exploration revealed intriguing convergences and divergences between different thematic clusters. The analysis emphasises the relationship between DCs (sensing, seizing and learning) and the core aspects of resilience (robustness, agility, integrity, redundancy). It provides an overview of the strategies and factors that contribute to enterprise resilience and highlights the importance of

adaptability, strategic planning and collaboration in managing business uncertainty:

1. *Dynamic Capabilities and Innovation*: Wang *et al.* (2023), Akpan *et al.* (2022), Chih *et al.* (2022), Do *et al.* (2022), Elf *et al.* (2022), Bustinza *et al.* (2019), Grøgaard *et al.* (2019), Martinelli *et al.* (2018), Ma *et al.* (2018), Parker and Ameen (2018), Battisti & Deakins (2017) and Su *et al.* (2014) highlight the significance of adaptability, innovation, and strategic reconfiguration as the foundation of resilience. They propose that internal capabilities and strategic vision form the core of resilience, and argue for an internal focus, a notable change from the dependence on external networks for resilience. The authors claim that internal capabilities and strategic vision are critical. This aligns with the sensing and seizing dimensions of DCs, where organizations must recognize and capitalize on opportunities for innovation. Additionally, the continuous adaptation and development of a strategic vision suggests an emphasis on the learning dimension. Regarding resilience, these efforts contribute to both robustness and agility. Robustness is achieved by fostering a strong internal foundation to withstand disruptions, while agility is achieved by enabling quick adaptation to changes.
2. *Social Capital and External Networks:* Conversely, while some argue that enterprises are more resilient than others, Ozanne *et al.* (2022), Iborra *et al.* (2020) and Martinelli *et al.* (2018) champion the strengths found in social capital, community support and external collaboration, particularly for SMEs and start-ups. According to the authors, it is suggested that resilience can be significantly improved by external networks. These networks can act as a counterbalance to the self-reliant strategies that are emphasized by the first group. Focusing on external collaboration and support indicates a focus on the sensing and seizing dimensions of DCs, where organisations use their social capital to identify and act on external opportunities.
3. *Environmental Sustainability and Green Innovation:* According to Wang *et al.* (2023) and Elf *et al.* (2022) it is suggested that environmental sustainability should be regarded as a crucial aspect of resilience, especially in the context of green innovation. This viewpoint represents a change in resilience strategies, which should not only facilitate the survival of organizations but also enable them to prosper in an environmentally responsible manner. The authors highlight the integrity dimension of resilience, emphasising the importance of maintaining ethical practices and making a positive contribution to the environment. They also emphasise the importance of agility in adapting to more sustainable practices, focusing on the learning dimension of dynamic capabilities, where organisations evolve their strategies to address environmental challenges.
4. *SMEs and Startups - Specific Resilience Strategies:* Anwar *et al.* (2023), Khurana *et al.* (2022), Sreenivasan *et al.* (2022), Fares *et al.* (2022), Hadjielias *et al.* (2022), Mota *et al.* (2022), Audretsch and Belitski (2021) have identified resilience antecedents that are unique to SMEs and startups, with a focus on agility and digital transformation. Their findings suggest that a tailored approach to resilience is necessary, with size-specific mechanisms that differ from those of larger enterprises. This emphasis reflects the agility and redundancy dimensions of resilience, highlighting the need for rapid adaptation and the development of systems to ensure continuity. The focus on identifying unique challenges and adopting digital strategies indicates a strong alignment with the sensing and seizing dimensions of DCs.
5. *Broad/Integrative Frameworks for Organizational Resilience*: Limnios *et al.* (2014), Battisti & Deakins (2017) and Ma *et al.* (2018), Hilmann (2021) Hepfer and Laurence (2022) propose a holistic framework that integrates both internal capabilities and external networks, offering a comprehensive view of resilience. The authors weave together various threads of resilience into a cohesive structure. The authors argue for a combination of sensing, seizing and learning dimensions, implying a comprehensive approach to DCs.

The formation of groups reflects the multifaceted nature of resilience as presented in scholarly works. The discourse among these thematic groups demonstrates a complex landscape where resilience and DCs intersect in various ways. Each theme offers a unique perspective on the dimensions of resilience and dynamic capabilities, highlighting the diverse strategies that enterprises employ to manage disruptions and capitalise on opportunities. It acknowledges the variation in

organizational contexts and perspectives on resilience antecedents. Notably, some studies include several groups due to their broad or cross-cutting themes, illustrating the interconnectedness of concepts such as DCs, innovation and sustainability within the resilience discourse. In the realm of enterprise resilience, which includes SMEs, startups, and large firms, as well as environmental sustainability, there is a clear recognition that the boundaries between topics are permeable, fostering a dynamic exchange of ideas between different research areas.

However, the scale of resources, strategic approaches, and the extent to which they leverage internal versus external factors differ significantly. SMEs frequently encounter distinctive challenges due to their limited resources and size. Nevertheless, important observations and suggestion about to SMEs survival and development, and how these enterprises could cultivate resilience proactively, can emerge from an analysis of this literature:

- *Agility and Digital Transformation*: In order to cope with external threats, SMEs often rely on agility. This is exemplified by the emphasis on digital transformation as a resilience strategy, which enables these SMEs to adapt rapidly to changing market conditions and external shocks. Anwar *et al.* (2023), Khurana *et al.* (2022), and Sreenivasan *et al.* (2022) have suggested that agility and digital transformation could be important for SMEs to mitigate the effects of crises such as the COVID-19 pandemic and maintain competitive sustainability.
- *Utilization of Social Capital and External Networks*: External collaborations and community support can provide SMEs with additional resources and knowledge to tackle external threats. This is highlighted by Ozanne *et al.* (2022), Iborra *et al.* (2020), and Martinelli *et al.* (2018). By engaging with networks, SMEs can access valuable information, gain support, and collaborate on solutions to shared challenges. These networks act as a counterbalance to the limitations often faced by SMEs, including limited access to resources and market influence. Through the use of social capital, SMEs can identify and seize new opportunities created by external disruptions.

In order to improve the ability of SMEs to withstand and recover from disruptions, a number of strategic and operational approaches could be utilized to proactively promote resilience:

- *Tailored Resilience Strategies:* The focus is on identifying unique challenges and adopting tailored digital strategies, indicating a proactive approach to resilience. SMEs recognise that one size fits all strategies do not apply to their unique contexts. By developing resilience strategies that are specifically designed to address their size and sector-specific challenges, SMEs can better prepare for and recover from disruptions.
- *Leveraging Dynamic Capabilities*: DCs are crucial for SMEs to proactively cultivate resilience. SMEs can anticipate potential threats and opportunities by continuously scanning the environment for signals of change (sensing) and swiftly acting on these insights (seizing). Furthermore, the learning dimension, which involves continuous adaptation and strategic vision development, enables SMEs to evolve their strategies over time. This ensures that they remain resilient in the face of changing external conditions.

SMEs can navigate external threats and cultivate resilience through agility, digital transformation, leveraging social capital, and tailored resilience strategies. These approaches are supported by dynamic capabilities that enable SMEs to sense, seize, and learn from their environment, ensuring effective response to disruptions and maintenance of growth trajectories.

5. Conclusion and implications for future research

This research contributes to further our understanding of enterprise resilience, particularly through the framework of dynamic capabilities (DCs) and when SMEs are considered. In an era characterised by escalating global challenges, the need for organisations to promote resilience has become increasingly pronounced. Through a careful review of the extant literature, this study has enriched the theoretical framework of enterprise resilience.

The results accentuate the significance of adaptability, innovation, and strategic foresight, positioning these elements as essential for cultivating resilience within enterprises. The DCs

framework, which emphasizes sensing, seizing, and transforming, reinforces this rich understanding by revealing the dynamic interplay between an enterprise's internal capabilities and its external environment.

The literature review identifies a range of antecedents that are essential for promoting enterprise resilience. These include robustness, agility, integrity, redundancy, strategic decision-making, innovation, learning, and collaboration. This diverse set of antecedents reflects the multifaceted nature of organizational resilience, highlighting a range of strategies and resources that enterprises can use to enhance their resilience. Findings highlight the importance of both internal capabilities, such as innovation and strategic agility, and external factors, such as social capital and environmental sustainability.

This study contributes to the theoretical literature by providing a refined conceptualisation of enterprise resilience within the DCs framework. It expands current knowledge by illustrating that resilience is not only a reactive approach but also a strategic capability that organizations can cultivate. Moreover, the identification of various antecedents of resilience can contribute to a deeper theoretical understanding of the constructs that support resilience in the business domain.

This study highlights the critical role of DCs in building enterprise resilience from a managerial perspective. It suggests that managers should prioritize the development of adaptive, innovative, and strategic capacities to navigate the complexities of the modern business environment. Moreover, the focus on both internal and external factors that contribute to resilience highlights the significance of adopting a comprehensive approach to resilience, which involves strategic planning, ongoing learning, and external partnerships.

Moving into the future, the study articulates several directions for future research. It recommends conducting comparative analyses to examine the resilience strategies used by SMEs compared to larger enterprises. This may highlight the unique challenges and opportunities associated with these different organisational forms. There exists an imperative for empirical investigations to confirm the identified antecedents of resilience and to establish their relevance across different industries and organisational scales, with a particular focus on SMEs.

Acknowledging certain limitations, including the study's dependency on specific databases and the potential for publication bias, there is a call for future research to extend the scope of the investigation. By incorporating a larger range of sources and methodologies, future research efforts can capture a more comprehensive range of resilience-related scholarship, adding to our understanding of this important field.

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Track 17
Perspectives on grand challenges in international business and implications for companies
Special Track

International Brand Activism: A Strategic Approach for Multinational Enterprises to Address Grand Challenges

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Abstract

Frame of the research. *As multinational enterprises (MNEs) increasingly engage in roles that extend beyond conventional business activities, their involvement in brand activism has become a focal point of interest. This development underlines the urgency for MNEs to address global challenges, positioning them as pivotal actors in the evolving narrative of corporate social responsibility and global activism.*

Purpose of the paper. *This research explores the relatively unexplored realm of International Brand Activism, with a focus on evaluating how MNEs either standardize or customize their activist communications to align with the diverse cultural and social contexts of the global markets they operate in. The primary objective is to analyze the strategies that MNEs employ to ensure that their brand activism effectively resonates across various international landscapes, while also assessing the equilibrium between global consistency and local relevance in their messaging.*

Methodology. *This research employs a case study analysis with Ben & Jerry's as the selected case. We examined the brand's Instagram activist communication worldwide to understand how this international brand engages in brand activism. A mixed-method approach, combining content analysis and semiotic analysis, was adopted to explore how a leading activist brand navigates the complex dynamics between global messaging and local engagement through its digital platform.*

Results. *This single case study reveals how a MNE conducts brand activism in different countries and adopts its communication by showing significant variation in activist commitment levels across markets. The analysis highlights the MNE's strategic adjustments to resonate with diverse global audiences, indicating a tailored approach to international brand activism.*

Research limitations. *The research offers valuable insights but is limited by focusing on a single MNE and using only Instagram for data analysis, and it concentrates solely on communication without exploring the MNE's practical actions. To enhance understanding, future studies could broaden their scope by incorporating a wider range of MNEs, examining brand activism across diverse digital platforms, and delving into the tangible actions that accompany such activism. This approach would offer a more comprehensive perspective on International Brand Activism.*

Managerial implications. *The insights gleaned from this study hold significant importance for MNEs as they navigate the realm of brand activism. It underscores the critical need for thoughtful decision-making when it comes to choosing between standardizing or adapting activist communications. These strategic considerations are vital not only for effectively engaging with global audiences but also for overcoming geographical barriers and enhancing legitimacy within their operational environments.*

Originality of the paper. *This research represents a groundbreaking advancement in the field, being the inaugural study to explore International Brand Activism and introduce a distinctive methodology for investigating MNEs' brand activism strategies. It pioneers the analysis of how MNEs communicate their activism across diverse global contexts and paves the way for in-depth investigations into brand activism. This sets the stage for future research to delve deeper into the intricacies of how such activism is conceptualized and executed on an international scale.*

Keywords: *International brand activism; multinational enterprises; adaptation; standardization; brand communication; corporate social responsibility; semiotic analysis; topic modeling*

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1. Introduction

In an increasingly polarized world, companies are being called upon to fulfill a social role that extends well beyond traditional business functions. This emerging responsibility places multinational enterprises (MNEs) at the forefront of a crucial dialogue within international business literature. Particularly, MNEs are not only recognized as significant contributors to global issues but also as potential architects of solutions (Zucchella *et al.*, 2023; Kolk *et al.*, 2010). This debate revolves around identifying innovative strategies that enable MNEs to address the grand challenges of our era, including climate change, poverty, peace, migration, and terrorism (Ghauri *et al.*, 202; Zhao *et al.*, 2021).

In this context, brand activism emerges as a clear and appropriate strategy to pursue social goods. Activism has significantly revolutionized the role of businesses and the entire management field (Podnar & Golob, 2024), providing a potential response to the social role expected of businesses from an international standpoint. Nowadays, companies are frequently viewed as political actors, leveraging their influence and voice to champion contentious causes and draw public attention to them (Moorman, 2020; Ocelìk *et al.*, 2023).

Recent instances of brand activism include Microsoft and McDonald's in 2022, both taking a stand against the Ukraine-Russia conflict. In 2023, Stella McCartney voiced opposition to women's violence; Gucci stood against domestic violence, Versace continued its support for the LGBTQIA+ community, and Starbucks expressed solidarity with Palestine. Additionally, in 2022, Airbnb showed support for immigration; Ferragamo advocated for abortion rights, and Balenciaga raised awareness for Iranian women. Notably, Patagonia has a longstanding commitment to environmental causes. These examples showcase the varied approaches through which brands actively participate in social and political issues, reflecting an increasing inclination of MNEs towards activism.

The field of brand activism has advanced significantly in recent years, particularly since around 2020 (Pimentel *et al.*, 2024; Cammarota *et al.*, 2023a), with scholars primarily focusing on understanding and conceptualizing the phenomenon before moving towards its operationalization. However, to the best of our knowledge, brand activism has not been extensively examined from an international marketing communication perspective. Therefore, this paper aims to address this gap by focusing on the following research questions:

RQ1: Do brands engage in activism within the international markets where they operate?

RQ2: What is the extent of brands' commitment to activist communication in foreign countries?

RQ3: How do brands adapt or standardize activist communication in foreign countries?

This study represents a pioneering effort to analyze brand activism from an international perspective, with the goal of guiding MNEs in addressing grand challenges while pursuing their business objectives. The present research makes significant theoretical contributions and provides insights for businesses on multiple fronts. Firstly, it lays the foundation for a new avenue of inquiry within the realm of brand activism, which we term International Brand Activism. Secondly, it sheds light on how MNEs can effectively respond to escalating social expectations by adopting an activist strategy, which could lead to increased appreciation and acceptance in foreign markets. Thirdly, the study delves into the adaptation or standardization of activist strategies across diverse markets, particularly from a communication standpoint, offering intriguing insights. Lastly, the research highlights the varying intensity of activism in foreign markets, recognizing the additional complexities posed by social, political, and cultural factors.

2. Literature review

2.1 The New Role of Multinational Enterprises in International Business Research

The emergence of MNEs as pivotal actors in addressing grand challenges carries significant implications for International Business (IB) research (Ghauri *et al.*, 2021). Operating as global entities

across diverse socio-political contexts, MNEs are increasingly acknowledged not only as economic entities but also as political and social actors capable of influencing and being influenced by the grand challenges confronting societies worldwide (Kolk *et al.*, 2010; Ocelìk *et al.*, 2023). These challenges, such as climate change, poverty, and infectious diseases, transcend national borders, making them inherently multinational and necessitating a coordinated response that MNEs are uniquely positioned to provide (Bucley *et al.*, 2017).

The engagement of MNEs with grand challenges demands a reassessment of their roles and strategies. The way in which MNEs create value, design cross-border operations, manage local employees, and formulate international strategies must now consider the complexity of these global issues. MNEs must navigate the complexities of local policies and institutional environments related to Sustainable Development Goals (SDGs), adapting to multiple regulations, societal values, and stakeholder pressures. Operating within diverse environments presents both challenges and opportunities, requiring MNEs to acquire new knowledge, establish local legitimacy, and access critical resources specific to each SDG (Van Zanten & Van Tulder, 2018).

Operating within varied regulatory frameworks and stakeholder ecosystems, MNEs must reconcile the need for a unified global approach to sustainability with the necessity of local adaptation. The transfer of socially responsible practices to subsidiaries is often complicated by differences in institutional contexts, creating a landscape where MNEs must be both globally coordinated and locally nuanced in their operations.

MNEs thus find themselves at the intersection of economic, social, and political agendas, where their business activities are inherently linked to broader sustainability goals. The political dimensions of MNE activities further extend to their direct interactions with governments and other political entities (Ghauri *et al.*, 2019). From this perspective, MNEs can be agents of change, influencing policies through lobbying and alliances, or conversely, reacting to government regulations and initiatives. Their role as political actors underscores the need for IB research to integrate an understanding of MNEs within a broader social science conversation, recognizing the interplay between business, politics, and society.

Partnerships stand as a cornerstone in the strategic toolkit of MNEs aiming to address global challenges, to advance socio-economic welfare and sustainable outcomes (Zucchella, 2023). By aligning with governments, non-governmental organizations (NGOs), local communities, academic institutions, and even competitors, MNEs can amplify the impact of their sustainability efforts (Horan *et al.*, 2019). A prime example is engagement in Fairtrade partnerships, which directly contribute to the development of local communities. Through Fairtrade initiatives, MNEs support sustainable practices and fair wages, fostering economic growth and improving living standards within those communities. This not only addresses broader sustainability goals but also demonstrates MNEs' commitment to the socioeconomic well-being of local populations, showcasing their integral role in fostering global and local development simultaneously (Peattie *et al.*, 2018).

Moreover, digital technologies offer MNEs unprecedented opportunities to communicate their commitment to addressing grand challenges, engage with diverse stakeholders, and advocate for change (Nambisan, 2020). Digital platforms enable MNEs to narrate their sustainability journeys, highlight achievements, and discuss challenges openly, fostering a transparent dialogue with their audience. By strategically leveraging digital communication, MNEs can build a global community of supporters, customers, and advocates who are informed, engaged, and motivated to contribute to collective sustainability goals.

Hence, this technological revolution holds the potential to contribute to addressing the formidable challenges progressively impacting the global scenario. It presents vast opportunities for companies to not only enter but also fortify their positions in foreign markets, contingent upon their adept implementation of an appropriate marketing strategy aiming to pursue both social and economic purposes.

2.2 Brand Activism to Address Grand Socio-Political Challenges

Based on the above premises, brand activism is a relatively novel marketing strategy that has rapidly garnered significant interest among scholars and brand managers, fundamentally changing the role of businesses in society (Podnar & Golob, 2024; Schmidt *et al.*, 2022), aimed to address both societal good and corporate interest. Stemming from the concept of corporate social responsibility, it evolves into a much stronger, complex, and impactful direction (Sarkar & Kotler, 2020), being defined as a purpose-driven strategy (Rohmanue & Jacobi, 2024) and an intersection between marketing and politics (Jung & Mittal, 2020).

Activist brands take public stances in support of or against controversial socio-political issues through statements and/or actions (Bhagwat *et al.*, 2020; Moorman, 2020). The goal is to generate social change by firstly encouraging prosocial intentions, attitudes, and behaviors among individuals on these issues and, secondly, exerting pressure on institutions and policymakers to address these issues at a macro level (Eilert & Nappier Cherup, 2020; Den Hond & Bakker, 2007).

The activist strategy targets different stakeholders such as consumers, employees, investors, policymakers (Cammarota *et al.*, 2023a), suppliers (Kapitan *et al.*, 2022), and other businesses. It incorporates a comprehensive view of the supply chain (Kapitan *et al.*, 2022), addressing internal and external targets (Cavdar Aksoy *et al.*, 2023), and focusing on both the domestic and international markets. Activist actions find their fullest expression in the domestic market, but they are inherently linked to global issues and primarily operate in alignment with these.

The brand activism phenomenon represents a paradigm shift in the marketing and management landscape (Andersen & Johansen, 2024), showcasing the dynamic interplay between businesses and societal concerns. As companies increasingly embrace purpose-driven strategies, the impact of brand activism on shaping consumer perceptions, influencing policy decisions, and fostering social change becomes a crucial area to understand for both companies and researchers.

The activist strategy has been born in response to an increasingly strong social demand from stakeholders, urging businesses to contribute beyond mere philanthropy and become true catalysts for societal well-being (Verlegh, 2023; Chu *et al.*, 2023). Furthermore, this increasingly central, decision-making, and public role of businesses in addressing the global socio-political challenges of our time is also linked to a growing negative perception of institutions and governments (Weber *et al.*, 2023). From this perspective, consumers appear to have lost trust in institutions, stating that these actors are not able to tackle significant challenges or are simply disinterested (Radanielina Hita & Grégoire, 2023). Consequently, in an increasingly vulnerable and polarized society, with often inadequate and unprepared political leadership, a void has quickly been filled by businesses. Activist brands make their voices heard on these issues, expressing strong opinions, seeking support, issuing calls to action, participating in street protests with social movements or non-governmental organizations (NGOs), and engaging in and promoting social initiatives (Lee *et al.*, 2024; Cammarota *et al.*, 2023a).

This “new” role of businesses as agents of social change represents a response to the current societal landscape characterized by a lack of confidence in traditional institutions, positioning these brands as influential actors in addressing pressing local and global challenges and fostering positive societal outcomes. Based on this, although activism originates from the CSR construct, it distinctly differs in several aspects. First, CSR is confined to “doing well by doing good” (Varadarajan & Menon, 1988), aiming to take positive actions for society; in contrast, activism seeks to exert pressure, draw attention to a social issue, effect societal change, and modify individual and collective behaviors (Eilert & Nappier Cherup, 2020). Advocacy, in fact, is one of its defining elements, without which brand activism would lack purpose (Bhagwat *et al.*, 2020). Second, CSR addresses less controversial issues where public opinion agrees (Mukherjee & Althuizen, 2020); activism, by its nature, requires taking a stance on contentious and complex topics (Ahmad *et al.*, 2022), where public opinion is fragmented and in disagreement (Vredenburg *et al.*, 2020). For example, issues such as abortion, LGBTQ + marriages, major wars, modern slavery, sexual freedom, climate change, gun control, or police violence - a topic that are controversial and complex, particularly in the United States, but that

have recently become polarizing even in countries like Italy. Third, CSR is usually not a risky strategy; rather, it is a well-accepted and normalized action (Aboelenien & Nguyen, 2024), almost always eliciting positive responses from stakeholders, particularly consumers. In contrast, activism is an extremely risky strategy as it still generates negative, polarized, and unpredictable responses (Guha & Korschun, 2024; Bulmer *et al.*, 2024). These negative reactions can lead to significant boycotts against brands, causing not only substantial reputational damage but also, especially, financial losses (Pasirayi *et al.*, 2023; Hydock *et al.*, 2020). The recent case of Bud Light (2023) serves as an illustrative example of brand activism's risk by signaling that it must be implemented and managed with extreme caution. Moreover, anti-brand actions against activist brands are intensified by the use of social media, sometimes even sparking firestorms against the brand (Muraro *et al.*, 2023; Pöyry & Laaksonen, 2022).

From this perspective, another distinguishing element is publicity; activism is a strategy that would make no sense without the communicative aspect (Bhagwat *et al.*, 2020). By its nature, activism is an inherently public strategy that needs to be communicated through social media, mass media, public relations, events, or any other visible means (Korschun, 2021). All of this accentuates both the risks and opportunities of the activist strategy.

Notwithstanding its complex outcomes and implementation modalities, brand activism's potential to truly contribute to society is evident. Additionally, it is a strategy that can enhance or establish a stronger relationship with consumers or other stakeholders. It allows for premium positioning or repositioning in the market (Schmidt *et al.*, 2022), enabling companies to be seen as experts in socio-political issues. This strategy opens the doors to engaging in the socio-political debates about the big challenges of our times and, additionally, enables companies to enter a new market or strengthen their position in an existing market.

Until around 2010, companies have typically sought to avoid entering the socio-political sphere and taking positions on controversial issues (Pimentel *et al.*, 2024). This action was considered too risky and polarizing, leading them to prefer ignoring non-business issues (Podnar & Golob, 2024) and maintaining neutrality to avoid getting entangled in sticky and complicated situations (Cammarota *et al.*, 2023a).

In today's society, the activist strategy must consider an additional element, that is, the fact that neutrality is no longer a feasible option for businesses (Pimentel *et al.*, 2024; Shetty *et al.*, 2019). Remaining silent on significant socio-political challenges is now considered a deliberate choice that can result in even greater risks and negative consequences than taking a stance. Neutrality has evolved into a decision in itself, yet it is frequently criticized by consumers who expect companies to utilize their power and visibility to confront the major challenges confronting various countries worldwide.

2.3. Balancing Adaptation and Standardization: The Dilemma for MNEs

Brand Activism can serve as a strategy to mitigate the "liability of foreignness", which is a critical issue for companies expanding abroad, by establishing local legitimacy in foreign countries (Del Bosco and Misani, 2016; Resciniti & Matarazzo, 2012). It is widely recognized that multinational corporations (MNCs) need to swiftly implement sustainable strategies that are tailored to the specific environmental needs of their host countries. This approach is essential for meeting the growing expectations for positive environmental impact in these markets (Kawai *et al.*, 2018). A pivotal aspect of the internationalization strategy is the decision whether to standardize or adapt communication and/or products. Multinational Enterprises (MNEs) face a spectrum of social, political, cultural, and economic risks, collectively referred to as distance dimensions (Kraus *et al.*, 2015), which should also be given primary consideration for controversial socio-political issues.

From an internationalization perspective, it is necessary to understand whether the activist strategy also follows a logic of adaptation or standardization, being in fact above all a communication strategy (Pimental *et al.*, 2024). Adaptation involves tailoring strategies to align with the unique cultural, legal, and political contexts of each country. This approach allows for greater sensitivity and responsiveness

to local nuances, potentially enhancing the effectiveness and acceptance of activism efforts. Glocalization, a hybrid strategy, seeks to balance global objectives with local adaptations, ensuring that core values are maintained while allowing for regional specificity. Standardization, on the other hand, advocates for a consistent approach across all markets, prioritizing brand coherence and simplicity over localized differentiation (Rajabia *et al.*, 2017; Resciniti & Fortuna, 2012).

This choice necessitates thorough consideration of social, cultural, political, and economic factors, along with the specific risks associated with operating in diverse international environments. Additionally, the decision should consider the potential impact on the company's reputation, the effectiveness of the strategy, and the overarching goals of the MNE. Therefore, the adaptation versus standardization dilemma in MNEs can also affect a new strategy like brand activism, particularly considering its risky nature (Bhagwat *et al.*, 2020). Consequently, with the consideration of grand challenges, social demands placed on businesses, and the increasing attention to brand activism, this strategy can be a "winning formula" for MNEs to enter foreign countries and foster their position while simultaneously addressing social good.

However, to pursue this strategy of brand activism on an international level, it is necessary first to understand the opinions and attitudes of the residents of that country towards a given socio-political issue. Second, it is crucial to explore the potential and risks associated with brand activism in an international context, considering the inherent nature of this strategy. Third, an investigation into whether this approach should be adapted or standardized is essential, along with an examination of the current practices employed by companies. As far as we know, there is a lack of studies providing an international perspective on brand activism. While this strategy is currently undergoing significant analysis, particularly focusing on aspects such as consumer response in the domestic market and corporate outcomes, there remains a notable gap in the literature regarding its global implications.

3. Methodology

Based on the study's objectives, we employed a single-case study method, which is particularly well-suited for examining specific, unique, remarkable, or revealing cases aimed at developing or advancing relevant theory (Yin, 2017). This approach facilitates an in-depth understanding of the phenomenon under investigation (Zarestky, 2023; Ninci, 2019), particularly valuable when exploring new corporate phenomena (Yin, 1984) such as brand activism from an international perspective. We chose Ben & Jerry's as our case study, given its global recognition as an activist brand (Cammarota *et al.*, 2023b). Specifically, we analyzed Ben & Jerry's activist communication on social media platforms, which provide unique insights for marketers through web data scraping and analysis (Marino *et al.*, 2020). The steps involved in data collection and analysis are outlined in Figure 1 and are thoroughly explained in the subsequent paragraphs. The countries selected for analysis were chosen using a funnel process as part of a meticulous approach to data collection. Subsequently, we conducted two separate studies to address the research questions outlined in this paper.

3.1 Data Collection

3.1.1 Brand's Country Profiles Selection

To collect data, we selected the Instagram profile of Ben & Jerry's since it is the most used digital platform from the brand. The Instagram platform has been compared with the other brand's social media in terms of publication's frequency of posts and engagement rates (i.e., the number of likes, comments, and shares) for all Ben & Jerry's countries' profiles. This decision was also supported by The Digital 2024 Global Overview Report which outlined that Instagram with 2 billion monthly active users is the first favorite and fourth most used social media platform in 2024.

Countries were selected using the GLOBE Project (2020), encompassing all GLOBE clusters: Eastern Europe, Latin America, Latin Europe, Confucian Asia, Nordic Europe, Anglo, Sub-Saharan

Africa, Southern Asia, Germanic Europe, and the Middle East. Subsequently, we examined the Instagram profiles of Ben & Jerry's in each country within every cluster to identify the most representative profile for in-depth analysis. From this initial list, we narrowed down our selection to countries where the brand's Instagram profile exhibited the highest frequency of posts, indicating greater activity. Consequently, we excluded the Sub-Saharan Africa and Middle East clusters since the brand does not operate in countries within these regions. Similarly, we omitted the Southern Asia cluster due to the brand's presence only in Thailand, which lacked sufficient activity for effective benchmarking against other profiles. Additionally, for the Anglo cluster, we analyzed the United Kingdom profile instead of the US profile, despite the latter's higher activity level, as the former adheres to different operational strategies (Cammarota *et al.*, 2023b).

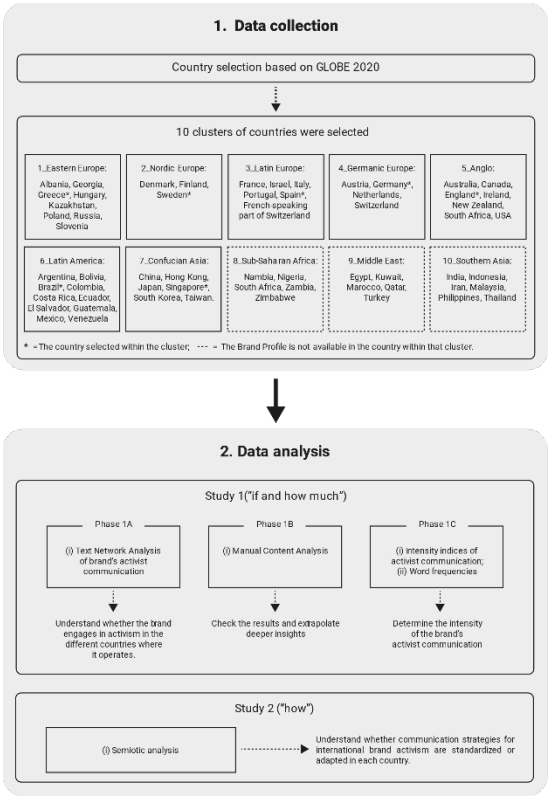
Following a systematic funnel process of selection and evaluation for each country within every GLOBE cluster, we identified the following seven profiles suitable for analysis: Greece, Brazil, Spain, Singapore, Sweden, United Kingdom, and Germany. The details of this process are depicted in Figure 1.

3.1.2 Brand's Instagram Posts Collection

Data was scraped for each selected country using Apify software (https://www.instagram.com/benandjerrys/). Specifically, to capture the brand's posts, we utilized the "Instagram Post Scraper" tool. The data acquisition process took place between December 2023 and February 2024. All Instagram posts were collected without a specific time frame to provide a comprehensive understanding of the phenomenon.

Thereafter, all datasets were meticulously reviewed manually to ensure robustness, including the removal of duplicates or empty cells. As a result, a total of 11,000 post captions were obtained. Specifically, we collected 1,580 posts from the Brazilian profile, 1,155 from the Greek profile, 1,954 from the German profile, 1,081 from the Spanish profile, 1,701 from the Swedish profile, 785 from the Singaporean profile, and 2,920 posts from the UK profile.

Fig. 1: Title



Source: Authors' elaboration

3.2 Data Analysis Procedure

The collected posts underwent analysis using various methods. Initially, our focus on the textual material (Study 1). Thus, we commenced with an automatic text network analysis using InfraNodus Lab (Study 1 - Phase 1.A). Subsequently, to ensure more robust findings, we conducted a Manual Content Analysis (Study 1, Phase 1.B). Finally, after comparing the results of the automatic analysis with those of the manual analysis, we estimated the Intensity Indices of brand activism communications in each country (Study 1, Phase 1.C). Second, we focused on the multimodal nature of collected posts. Multimodal text integrates different modes of communication, that is, different semiotic resources, such as written material, images, video, sounds, and link (Baldry & Thibault, 2006; Kress, 2010). Hence, we conducted a semiotic analysis (Study 2) of brand activism campaigns to understand whether communication strategies for international brand activism were standardized or adapted in each country.

3.2.1 Text network analysis (Study 1, Phase 1.A)

After collecting, controlling, and cleaning the data, we conducted an automatic text network analysis using InfraNodus Lab software (https://infranodus.com). Text network analysis enables us to derive significant insights from the selected text (D'Arco *et al.,* 2023). Specifically, it is a computational technique that reveals relationships between words (Hunter, 2004). It is widely recognized that text network analysis facilitates a deeper understanding of the text (Malliaros & Skianis, 2015) by revealing topical clusters, influential keywords, and relationships between themes within a textual body (Feyissa & Zhang, 2023). As reported in Figure 1, the purpose of this first analysis was to identify if and how topics related to various controversial issues emerged in the different Ben & Jerry's profiles. Additionally, we aimed to detect initial differences between the activist communication of the brand in different countries.

InfraNodus utilizes graph theory to cluster thematically similar words, a method that stands apart from probability distribution-based approaches (D'Arco *et al.,* 2023). This methodology organizes words into distinct clusters, thereby revealing the main thematic areas generated by GPT AI (Feyissa & Zhang, 2023). Specifically, employing advanced visualization tools enhances our understanding of the textual discourse's structure through graph theory, facilitating the exploration of thematic connections and country-specific differences (Paranyushkin, 2019). Furthermore, this tool allowed us to exceed the language barriers. The text analysis was carried out in the original language of the posts by the software itself, to obtain a more accurate result. InfraNodus also supports several languages such as English, German, Spanish, Portuguese, or Swedish languages.

3.2.2 Manual Content Analysis (Study 1, Phase 1.B)

In Phase 1.B, as illustrated in Figure 1, we conducted a manual content analysis. Initially, we cross-referenced all findings from InfraNodus with the respective Instagram profiles of the brands. Subsequently, the results from Phase 1.A highlighted three primary contentious themes prevalent across all countries: environmental concerns, human rights, and LGBTQAI+ rights. To delve deeper into these themes, we meticulously examined the nuances in communication on each brand's Instagram profile (Rahkova *et al.,* 2023). Notably, we observed that, for these three topics, the brands featured specific campaigns aligned with three major global events in the majority of the selected countries. These significant international events include Earth Day for environmental issues, World Refugee Day and Fairtrade Day for human rights, and International Pride Month for LGBTQIA+ rights. Consequently, we compiled all posts from each country's profiles related to these three overarching challenges. These posts will serve as the foundational dataset for the semiotic analysis of the campaigns in Study 2.

3.2.3 Intensity Indices and Word Frequencies (Study 1, Phase 1.C)

Phase 1.C of study 1 was conducted to answer RQ2. How much do brands engage in activist communication in foreign countries? Our objective was to gauge the level of activist communication across various countries, as this is indicative of the extent of activism undertaken. In this context, we hypothesized that brands might exhibit varying degrees of activism in different countries, influenced by factors such as social, political, cultural, or economic considerations. We conceptualize this degree of activist communication as the "intensity of activism", a vital metric for analyzing and comprehending this emerging phenomenon. The intensity of the profile activist commitment is calculated through this score:

Instagram Profile Activism Score = (Thematic Nodes in Posts / Total Categories of Nodes Analyzed) + (Theme-Related Stories / Total Highlighted Stories)
Normalisation Factor = 1 / Total Number of Posts on the Profile

To develop the Activism Score, we focused on analyzing the frequencies of thematic nodes extracted from both Instagram posts and stories. This method was carefully designed to distill the essence of the brand's activist communication efforts. By examining these frequencies, we can distinguish between posts, reflecting sustained commitments, and stories, capturing real-time engagement with pressing issues. This comprehensive approach offers a well-rounded view of a profile's activism strategy. To ensure fairness in comparisons across profiles with varying levels of social media activity, we incorporated the total number of posts as a normalization factor. Additionally, we calculated non-normalized scores for the four primary causes identified through topic modeling. This step allows us to assess the emphasis each profile places on specific causes. Subsequently, we aggregated these scores to derive the overall Activism Score, which we then normalized. This methodological approach provides a nuanced measure of an MNE's commitment to social, political, and environmental causes on a pivotal digital platform. It effectively reveals the depth and focus of their activism efforts.

3.2.4 Semiotic analysis (Study 2)

If text network analysis examines the textual components of an Instagram post, semiotic is a discipline that pays attention to both the textual and visual elements. The meaning of an Instagram post is conveyed through the combination of various semiotic resources, which "are created to be understood together as a single text, [...] where the written and image components are to be read as one semantic entry" (Mehmet & Clark, 2016, p. 96). This approach offers greater precision than solely textual analysis in understanding the degree of standardization or adaptation present in Ben & Jerry's International Brand Activism campaigns. As semiotic focuses on various discrete elements of analysis (Solik, 2014), our attention was directed towards specific elements, such as texts and visual format pivotal to the standardization/adaptation logic (e.g., Backhaus & Van Doorn, 2007; Bulmer & Buchanan-Oliver, 2006; Gliniecka, 2022). Specifically, we employed the following code to analyze the selected posts: Same visual format and same text in English language (= S); Same visual format and text translated into the national language (= T); Different visual format and different text in the national language (= D); Different visual format and different text in English language (= E).

4. Findings and Discussion

4.1 Brands Engage in International Brand Activism

The findings of the first phase (1.A) of Study 1 show the most frequent topics discussed in Ben & Jerry's communication on its Instagram profiles. Socio-political topics emerge strongly from this

communication by signaling a brand engagement in these grand challenges on foreign countries. To obtain this first result, we extrapolated the influential keywords that emerged, the relationships between the words and the topical clusters automatically generated by the software. These elements enabled us to understand if and how much the brand's socio-political values, causes and supported movements. Some relevant issues that emerged are racial justice, fair trade, rights and dignity of refugees, LGBTQ+ rights, and climate justice. After that, we investigated each profile of our sample, to understand the percentage of activist topics covered in the different countries and whether there are countries where the brand communicates certain social, political, economic, or environmental issues more strongly than others. Table 1 reports the results for the official Ben & Jerry's UK profile; in particular, the first three categories that emerged from the analysis are "climate coalition", "fair trade flavors", and "refugee rights".

Tab. 1: Topic Modeling of Ben & Jerry's UK Instagram Profile

Topical Cluster	Percentage of Influence	Total Nodes	Percentage of Entries	Total Nodes
1	52%	18	17%	18
2	22%	39	10%	39
3	9%	24	4%	24

Source: our elaboration

Additionally, the text network analysis has highlighted 150 nodes with an average frequency of 57.36. Among these nodes, "refugee", "asylum", "free", "climate", and "vegan" have values greater than 45, followed by "government", "fairtrade", "seeking", and "immigration" with frequencies greater than 30. In summary, the UK Instagram account of the brand places significant emphasis on crucial societal issues. In particular, the account focuses on topics such as environmental sustainability, promoting fair trade practices, advocating for the rights of refugees, and raising awareness about the challenges of migration.

Then, Table 2 shows the topic modeling resulting from Ben & Jerry's Brazil social media account. In this country, the brand focuses its activist communication foremost on the LGBT Pride theme. However, the other two themes are not directly linked to brand activism.

In addition to the first three themes, "Food Justice" with a 3% influence and "Sustainable Commerce" with a 1% influence also emerged, although with much lower percentages.

Tab. 2: Topic Modeling of Ben & Jerry's Brazil Instagram Profile

Topical Cluster	Percentage of Influence	Total Nodes	Percentage of Entries	Total Nodes
1	47%	78	25%	1. LGBT Pride
2	33%	17	6%	2. Delicious Ice Cream
3	13%	26	11%	3. Decadent Desserts

Source: our elaboration

The Brazilian profile focuses strongly on diversity and inclusion, particularly about LGBT rights. This is evident in the individual topics that are frequently discussed. For instance, the term "amor" has an average frequency of 95.07 and appeared 110 times in the data. "LGBT" and "trans" were also frequently mentioned, with frequencies of 62 and 33, respectively. Another topic that emerged frequently was "vegan," which had a frequency of 93.

Also, for the German profile of Ben & Jerry's, results reveal socio-political topics (see Table 3). Specifically, the topmost theme focuses on veganism, followed by refugee rights, climate action, and fair trade. The nodes that have emerged have an average frequency of 100.65. Among them, "vegan" has the highest frequency of 261, followed by "climate justice" with a frequency of 67. Next on the list are "@proasyl" with a frequency of 56, "deportation" with a frequency of 50, fairtrade with a frequency of 43, "safe" with a frequency of 38, and "right to say" with a frequency of 36. The most frequently discussed topic is climate justice and veganism, followed by a focus on refugee rights, similar to the UK profile.

Tab. 3: Topic Modeling of Ben & Jerry's Germany Instagram Profile

Topical Cluster	Percentage of Influence	Total Nodes	Percentage of Entries	Total Nodes
1	42%	26	47%	1. Vegan Ice Cream
2	20%	45	16%	2. Refugee Rights
3	20%	18	11%	3. Climate Action

Source: our elaboration

Furthermore, it has been observed that Ben & Jerry's Swedish profile (see Table 4) has a lower number of captions containing activist topics, in fact, Table 4 does not present any socio-political topics since the brand communication in this country is focused foremost on the product. However, some controversial topics are still present such as "Fairtrade Desserts", with 8% influence, and "LGBTQ Rights", with 3% influence, are present. In terms of nodes emerged, the word "fairtrade" appears twice with frequencies of 86 and 40, respectively. On the other hand, the word "vegan" has a total frequency of 91, "labor" with a frequency of 18, and "love" and "LGBTQI" with frequencies of 16 and 18.

Tab. 4: Topic Modeling of Ben & Jerry's Sweden Instagram Profile

Topical Cluster	Percentage of Influence	Total Nodes	Percentage of Entries	Total Nodes
1	48%	60	39%	1. Cookie Flavors
2	21%	17	10%	2. Ice Cream Scoops
3	12%	19	10%	3. Peaceful Treats

Source: our elaboration

Subsequently, Table 5 reports the main themes that emerged in the Spanish profile were not directly related to activism. However, some activist topics are also communicated like "Social Justice" and "Vegan Treatments", which had an 8 per cent influence. The nodes "love" (67), "change" (49), "right" (44), "vegan" (50), and "refugee" (30) emerged with an average frequency of 44.63.

Tab. 5: Topic Modeling of Ben & Jerry's Spain Instagram Profile

Topical Cluster	Percentage of Influence	Total Nodes	Percentage of Entries	Total Nodes
1	40%	30	30%	1. Ice Cream Love
2	19%	33	3%	2. Theme Park Fun
3	16%	14	18%	3.Online Giveaway

Source: our elaboration

Table 6 reveals that the main activist topic covered by the Greek profile of the brand is "Climate Action", which holds an influence of 14% in the issues covered by the brand. Regarding the nodes present in the profile, they are based on an average frequency of 46.34. The nodes include climate (45), fairtrade (18), and planet (12).

Tab. 6: Topic Modeling of Ben & Jerry's Greek Instagram Profile

Topical Cluster	Percentage of Influence	Total Nodes	Percentage of Entries	Total Nodes
1	32%	59	42%	1. Ice Cream
2	29%	17	6%	2. Ben & Jerry's
3	14%	41	23%	3. Climate Action

Source: our elaboration

Finally, according to the results, the Singapore profile primarily reflects the concept of "Fair trade", with an influence of 11 per cent (as shown in Table 7). The two most frequent concepts in the profile

are “vegan” and “fairtrade” with frequencies of 23 and 22, respectively. The average frequency of all concepts is 33.53.

Tab. 7: Topic Modeling of Ben & Jerry’s Singapore Instagram Profile

Topical Cluster	Percentage of Influence	Total Nodes	Percentage of Entries	Total Nodes
1	33%	28	22%	1.Indulgent Desserts
2	25%	38	28%	2. Ice Cream Fun
3	11%	24	18%	3. Fairtrade Treats

Source: our elaboration

Thus, this first phase of analysis reveals that Ben & Jerry’s is deeply committed to activism across the diverse foreign markets it operates in. However, the communication of this commitment varies significantly, with the brand emphasizing different themes in different countries. In the United Kingdom, Ben & Jerry’s plays a robust role in activism, particularly focusing on refugee rights, environmental issues, and fair trade. Brazil places a strong emphasis on LGBTQ rights, mirroring the brand’s commitment to social causes. In Germany, the brand aligns itself closely with the themes advocated in the United Kingdom, demonstrating a consistent and intense activist stance. On the other hand, in Sweden and Spain, Ben & Jerry’s adopts a more subdued activist role, primarily centering its communication around the product itself. In Greece, the brand places a focal point on environmental issues as a core aspect of its activist communication. Lastly, in Singapore, the emphasis shifts prominently towards fair trade.

These preliminary findings underscore Ben & Jerry’s as an activist brand, dedicated to implementing activist strategies tailored to each country’s specific dynamics. The varied thematic focuses and communication approaches highlight the necessity of understanding the nuanced logic at play in each market to comprehensively comprehend the brand’s international activist strategy.

4.2 The Intensity of Activist Communication

This study seeks to initially understand whether a brand exhibiting activist tendencies domestically also extends its activist initiatives abroad across various countries of operation. Subsequently, the goal is to identify potential patterns of similarities or differences in these endeavors. To address this objective, we endeavored to gauge the extent of the brand’s activist communication within different countries. This involved assessing factors such as the frequency of activist posts or stories, aiming to detect the intensity of activist communication. Thus, since some profiles present an activism communication strategy based not only on posts but also on stories, we quantify the *intensity* of activism for each cause. Table 8 shows the *activism score* for each cause of every analyzed profile. The causes were selected based on the results of topic modeling by extrapolating the most emerged themes, as reported in section 3.1. In fact, Fair Trade emerged for economic activism, Climate Action issue for environmental one, Refugee Rights and LGBTQAI+ Rights for what concerns human rights and civil rights covering both political and social activism.

The results (see Table 8) show that Ben & Jerry’s UK profile has the highest score of activist content with a particular emphasis on Refugee Rights, which received a score of 1.4, the highest ever among the present profiles related to specific causes. High activism then emerges for both the German and Brazilian profiles, but they drop in the ranking given the general high activity of the profiles. The Brazilian one emerges for its focus on civil rights, particularly “trans rights.” The German profile also shows a particular focus on refugee rights. The Swedish and Spanish profiles focus particularly on the issue of Fair Trade. The Spanish one in particular shows high activism in stories but is almost absent in posts. The Greek profile, despite being one of those with lower scores, acquires a higher score considering the profile’s high activity. Finally, Singapore presents a very low score with almost no activism despite the profile’s high activity.

Tab. 8: Instagram Profile Activism Score

Issue	Brand's Official Instagram Account						
	UK	Brazil	Germany	Sweden	Spain	Greece	Singapore
Fair Trade	0,3	0,4	0,3	0,7	0,2	0,27	0,1
Climate Action	0,4	0,1	0,5	0	0	0,4	0
Refugee Rights	1,4	0,01	0,9	0,4	0,25	0,2	0
LGBTQAI+ Rights	0,1	0,8	0,01	0,17	0,01	0	0
Total	2,2	1,3	1,7	1,2	0,46	0,87	0,1004
Total x Normalisation Factor	0,0014	0,0007	0,0004	0,0007	0,0004	0,0014	0,0001

Source: our elaboration

4.3 Country-specific activist communication

Considering that the main purpose of brand activism is to put pressure on institutions and policymakers to create social change (Eiler & Nappier Cherup, 2020), we attempted to determine if Ben& Jerry's activist communication pertains to country-specific elements or if it is more general. Thus, we employed a comprehensive keyword string encompassing terms related to the specific country, government bodies, legislation, policy reforms, and public governance to detect potential country-specific elements in Ben & Jerry's activist communication. Specifically, this selection was informed by an initial review of Ben & Jerry's global and country-specific content, focusing on recurrent themes in their activism and advocacy efforts. We refined this list by incorporating terms related to specific governmental structures (e.g., parliament, senate) and processes (e.g., legislation, reform) that are pivotal in policy discussions and changes. The final keyword string was tailored to capture both direct actions (e.g., "executive order", "municipal ordinance") and broader policy dialogues (e.g., "civil rights", "environmental law"), ensuring a comprehensive approach to analyzing the brand's policy engagement across different countries. We also selected keywords directly related to specific countries such as "Germany" or linked words such as "iberico" for Spain.

We then conducted a comparative analysis to discern variations in activism communication across different countries. The context and frequency of these keywords provided insights into how Ben & Jerry's navigates and responds to each country's political and legislative environments. For the German Instagram profile, the word "Germany" appears 180 times in the brand communication, this could indicate a tailored approach to resonate with German audiences. Instead, the UK's profile reveals 30 mentions of the word "government" which signals targeted communication on governance issues of the country. Additionally, the Spanish profile reports 15 mentions of "Fair trade Iberica", denoting a strategic emphasis on the ethical consumerism of local people.

Examining the occurrence of country-specific keywords within Ben & Jerry's Instagram profiles, a disparity emerges that seems partially explained by the country's press freedom index, reported in Table 9. The World Press Freedom Index can justify how the level of press freedom within a country can significantly influence MNEs' communication and activism strategies (Fiaschi *et al.*, 2017). For instance, in environments where press freedom is robust, MNEs may adopt more cautious strategies to mitigate public scrutiny and avoid de-legitimation. Conversely, in regions with restricted press freedoms, MNEs might find opportunities to operate with less immediate oversight, though this does not exempt them from ethical considerations. Therefore, we reported in Table 9 the country's position within the world press freedom rank and the relative score for each of them. The UK and Germany are in very excellent positions, 26 and 21 respectively, and in fact the activist communication of these two profiles contains many country-specific elements.

Spain reports a substantial number of country-specific elements in activist communication, and its ranking of 32nd in the World Press Freedom Index is likewise pretty strong. Conversely, the lack of specific mentions in the Swedish Profile, despite its strong World Press Freedom Score, can suggest a possibly globalized approach to activism or silent activism on contentious local issues (Vredenburg *et al.*, 2020). Finally, the lack of country-specific elements in activist communication in countries

such as Brazil, Greece and Singapore could find possible explanations precisely in the low world press freedom score of these countries.

Tab. 9: World Press Freedom Index Global Score (2023)

Country	Country Position in World Press Freedom Rank	World Press Freedom Score
Sweden	4	88,15
Germany	21	81,91
UK	26	78,51
Spain	36	75,37
Brazil	92	58,68
Greece	107	55,2
Singapore	129	47,88

Source: our elaboration

4.4 Adaptation vs Standardization of International Brand Activism: A semiotic analysis

Table 10 presents information on various campaigns undertaken by Ben & Jerry's across different countries and years, focusing on issues related to climate action, human rights, and civil rights. The table provides details on the visual and textual aspects of the campaigns, categorizing them based on whether they maintained the same visual format and text in English, used the same visual format with text translated into the national language, employed different visual formats with different texts in the national language, or utilized different visual formats with different texts in English. Specifically focusing on the Earth Day campaign, we observe a trend of standardization across several instances, indicating uniform presentation across different countries. Conversely, the World Refugee Day campaign predominantly showcases varied visual formats and national language texts. Similarly, both the Fairtrade Day and International Pride Month campaigns exhibit a lower degree of standardization. It follows that there are some cultural and moral factors in certain countries that lead to proposing the campaign with a different format, or in some cases, the campaign is not present in that country.

Tab. 10: Semiotic analysis

Issue	Campaign	Year	Country						
			UK	Brazil	Germany	Sweden	Spain	Greece	Singapore
Climate action	Earth day	2021	S	T	D	S	T	D	S
		2022	n.a.	n.a.	yes	n.a.	n.a.	n.a.	n.a.
		2023	S	T	n.a.	S	D	n.a.	E
Human rights	World refugee day	2021	n.a.	n.a.	T	E	T	n.a.	n.a.
		2022	n.a.	n.a.	D	n.a.	D	n.a.	n.a.
		2023	S	D	T	D	D	n.a.	n.a.
	Fairtrade day	2021	n.a.	T	T	S	D	n.a.	n.a.
		2022	D	n.a.	n.a.	n.a.	D	E	n.a.
		2023	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	yes
Civil rights	International Pride Month	2021	n.a.	E	E	E	D	E	n.a.
		2022	D	D	n.a.	S	D	S	S
		2023	n.a.	D	E	n.a.	D	E	n.a

Note: S: Same visual format and same text in English language; T: Same visual format and text translated into the national language; D = Different visual format and different text in the national language; E = Different visual format and different text in English language; yes = the campaign is present in that country; n.a. = the campaign is not present in that country.

Source: our elaboration

4.5 Theoretical Implications

This pioneering research establishes foundations for understanding international brand activism, marking a significant leap in the study of how multinational enterprises (MNEs) engage in brand activism across diverse global contexts.

It is the first to undertake an international comparison of brand activism communication, unraveling the complex interplay between local, glocal, and standardized strategies within the fraught

terrain of social, political, economic, and environmental issues. This exploration sheds light on the varying logics of activism on an international scale, laying the groundwork for the concept of international brand activism.

This concept opens up avenues for future research to delve into how activism can be leveraged as a strategy for market entry and engagement in foreign markets.

The study adopts a comprehensive approach, combining quantitative and qualitative analyses to dissect digital brand activism on Instagram. By quantifying the frequency and scope of MNEs' communications on specific contentious topics, it offers a robust framework to assess the extent and focus of their activism efforts. This quantitative foundation provides a broad overview of MNEs' commitments to various causes, establishing a baseline for understanding their engagement levels with controversial issues.

Further enriching this analysis, the research incorporates a qualitative semiotic examination of brand's Instagram campaigns. This method allows for a deeper understanding of how brands construct and communicate their activist messages, revealing the strategic use of visual and textual elements to connect with audiences and express complex socio-political narratives. The combination of quantitative data and qualitative semiotic insights captures the multifaceted nature of brand activism on Instagram, highlighting the sophisticated strategies MNEs employ to align their messages with both global causes and brand identity.

In doing so, this study significantly advances our theoretical understanding of digital communication strategies, offering a nuanced view of brand activism's dynamics and effectiveness. By elucidating the diverse logics underpinning international brand activism, this research paves the way for future investigations into how activism can serve as a potent strategy for navigating and succeeding in foreign markets.

4.6 Managerial Implications

This research provides essential insights for multinational enterprises (MNEs) stepping into the critical role of brand activism. It offers a clear strategy for those looking to expand their activism efforts internationally or integrate specific social issues into their communications, emphasizing the need for a careful balance between global reach and local relevance.

Through detailed case studies, this study outlines key practices and considerations for MNEs operating in various countries. It helps in selecting causes that align with both local preferences and the brand's global values. Moreover, it highlights the importance of understanding local political and media contexts, using tools like the World Press Freedom Index, to avoid risks like censorship or backlash (Keeney & Winterfeldt, 1986).

Focusing on Instagram, the research draws insights from a leading brand known for its effective activism communication. It demonstrates how this brand navigates the challenges of addressing issues on social media across different countries.

Ultimately, this study equips MNEs with practical knowledge to manage brand activism successfully in diverse environments, encouraging social responsibility and promoting strategic growth.

5. Conclusion, Limitations, and Future Directions for Research

This study has illuminated the delicate equilibrium that MNEs must navigate in their brand activism endeavors, underscoring the essential requirement of aligning global objectives with local sensitivities. Gaining legitimacy to address socio-political challenges across varied contexts necessitates a profound commitment to local communities and a comprehension of unique cultural and social dynamics (Hooper, 2016). At the core of this undertaking lies the strategic decision

between adapting and standardizing activist communication, a choice that significantly impacts the efficacy of MNEs' campaigns across global markets.

However, our exploration, centered on digital communication through Instagram, recognizes its preliminary nature in a field that remains largely unexplored. By focusing on a single platform, we have provided valuable insights but also acknowledge the limitation of our scope. Future research should extend beyond Instagram to include website analysis and other social media platforms, offering a more comprehensive understanding of MNEs' brand activism strategies.

Looking ahead, several directions for future research emerge from our initial findings. A qualitative analysis of MNEs' actions, exploring their efforts to gain legitimacy in foreign markets through direct engagement and local partnerships, would deepen our understanding of brand activism's practical aspects. Additionally, comparing brand activism approaches across various MNEs through multiple case studies could illuminate how different companies address civil rights, human rights, environmental sustainability, and political challenges, enriching our understanding of their strategies' effectiveness.

Another promising area for future inquiry is the institutionalization of activism within MNEs, examining how brand activism becomes an integral part of corporate strategies and operations. Furthermore, while this study has highlighted press freedom as a potential barrier in specific countries, further research is needed to identify and analyze the broader range of factors and risks related to distance dimensions that MNEs must navigate when engaging in brand activism across different countries.

A future goal emerging from this research is to establish a comprehensive framework that serves as a guide for MNEs looking to internationalize their brand activism efforts. This framework would include a detailed consideration of multiple aspects and indexes that influence brand activism strategies in international contexts. This endeavor would provide a strategic blueprint for MNEs to navigate the complexities of international brand activism, fostering a more informed and effective approach to addressing global challenges.

In conclusion, this research serves as a foundational step towards understanding the complexities of brand activism within MNEs. It opens the door for further investigation into how corporations can effectively contribute to socio-political discourse, bridging the gap between global connectedness and local nuances. Our study underscores the importance of continued exploration into MNEs' role as agents of change, offering a roadmap for future research aimed at enhancing corporate social responsibility and strategic business growth in the global arena.

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General management

Esplorare l'eco-innovazione: l'impatto della diversità nei consigli di amministrazione

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Abstract

Frame of the research. *L'eco-innovazione, una strategia chiave per affrontare le sfide contemporanee della sostenibilità, è caratterizzata dalla creazione, dall'incorporazione o dall'uso di prodotti, processi, servizi o approcci di gestione innovativi che riducono gli impatti ambientali e le relative conseguenze derivanti dall'uso delle risorse.*

Purpose of the paper. *L'articolo contribuisce alla letteratura sottolineando la necessità di considerare contemporaneamente diversi tipi di diversità e di comprenderne i molteplici effetti sull'eco-innovazione. Lo studio sfida l'approccio tradizionale che considera le caratteristiche individuali in modo isolato e sottolinea la saggezza collettiva dei consigli di amministrazione all'interno del processo decisionale.*

Methodology. *L'analisi empirica coinvolge un campione di 1215 società quotate nell'Unione Europea, coprendo un periodo che va dal 2013 al 2022.*

Results. *Riteniamo che, in generale, la diversità abbia un effetto positivo sull'eco-innovazione e che anche considerare separatamente l'età, la nazionalità, le dimensioni, le qualifiche e il genere abbiano un impatto positivo.*

Research limitations. *In futuro potremmo esplorare altri contesti e includere società non quotate, ma al momento mancano dati affidabili. I risultati potrebbero essere influenzati da fattori interni all'azienda e dalle caratteristiche dei dirigenti, come la carica e il ruolo. La valutazione di come il contesto culturale esterno possa influenzare l'eco-innovazione potrebbe essere interessante per la ricerca futura.*

Managerial implications. *Le implicazioni manageriali e politiche dello studio includono la promozione della diversità e dell'inclusione per migliorare l'eco-innovazione, considerando vari tipi di diversità. Si suggerisce che i risultati abbiano applicazioni immediate per le decisioni manageriali e le raccomandazioni politiche, fornendo approfondimenti sulle decisioni strategiche relative all'eco-innovazione.*

Originality of the paper. *Questo è il primo studio che indaga il ruolo della diversità nella promozione dell'eco-innovazione. Prendiamo in considerazione diversi aspetti della diversità, in particolare l'età, la nazionalità, la qualifica, le dimensioni del consiglio di amministrazione e il genere.*

Key words: *eco-innovazione; innovazione verde; diversità; consiglio di amministrazione*

1. Introduzione

L'eco-innovazione, nota anche come innovazione ambientale o verde, è una strategia importante per affrontare le attuali sfide sostenibili e la sua gestione sta acquisendo un'enorme importanza (Bossle *et al.*, 2016). Secondo Cheng e Shiu (2012) l'eco-innovazione si differenzia da altre forme di innovazione. "L'eco-innovazione si riferisce alla creazione, all'incorporazione o all'utilizzo di un prodotto, di un processo di produzione, di un servizio, di un approccio di gestione o di un metodo di business innovativi che sono nuovi per l'organizzazione (creandolo o acquisendolo) e che riducono il rischio ambientale, l'inquinamento e altre conseguenze negative derivanti dell'uso delle risorse (compreso l'uso di energia) durante il suo intero ciclo di vita rispetto alle alternative pertinenti".

Le aziende possono ridurre il loro impatto sull'ambiente (Ahmad *et al.*, 2021), ottenere un vantaggio sul mercato (Kuo *et al.*, 2022), aumentare i loro profitti (López Pérez *et al.*, 2024) e

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aumentare la loro affidabilità agli occhi del pubblico attraverso la ricerca dell'eco-innovazione. I consigli di amministrazione delle aziende hanno un ampio margine di manovra per decidere come adottare efficacemente l'eco-innovazione (Shui *et al.,* 2022).

I principali fattori che la letteratura riconosce come impattanti sull'eco-innovazione includono: fattori interni, riferiti principalmente ai singoli membri del consiglio di amministrazione; caratteristiche a livello di impresa, comprese le dimensioni dell'impresa e i risultati finanziari dell'impresa; e fattori contestuali, ovvero pressioni esterne, comprese le norme sociali, i regolamenti e le pressioni degli stakeholder (He *et al.,* 2018).

Molti ricercatori e ricercatrici ritengono che i membri del consiglio di amministrazione e la governance svolgano un ruolo fondamentale nel determinare comportamenti sociali e morali, tra cui, a titolo esemplificativo ma non esaustivo: sensibilizzazione del pubblico sulle questioni ambientali, rendicontazione delle divulgazioni sociali, incoraggiamento delle influenze filantropiche, applicazione di codici etici, rispetto di leggi e politiche, monitoraggio degli indicatori del mercato azionario (El-Kassar *et al.,* 2015; Issa and Bensalem 2023; Uyar *et al.,* 2023). In genere, i e le consiglieri/e di amministrazione, situati ai vertici di un'azienda, hanno il compito di supervisionare la gestione, offrire guida e accesso alle risorse, prendere decisioni riguardo l'eco-innovazione dell'azienda e altri piani a lungo termine (Dong *et al.,* 2019; Yousaf *et al.,* 2022; Walls and Berrone 2017; Bajaba *et al.,* 2020). Tuttavia, le scelte dei consigli di amministrazione sono influenzate dalla loro struttura e dalla diversità dei loro membri. Fattori come l'età, il sesso, la nazionalità, l'indipendenza e l'esperienza giocano tutti un ruolo nelle scelte del consiglio di amministrazione (Rao and Tilt 2016; Yakubu and Oumarou 2023; Galia *et al.,* 2015).

La letteratura è divisa sul tema della diversità che aiuta i comitati a stimolare l'eco-innovazione e a superare le barriere all'adozione dell'eco-innovazione (Jain and Jamali 2016) e ci sono prove empiriche contrastanti (Sierra-Morán *et al.,* 2021). La maggior parte degli studi sulla composizione del consiglio di amministrazione prende in considerazione solo alcuni aspetti della diversità quando fa le proprie stime (Jain and Jamali 2016).

Questo è il primo studio che indaga il ruolo della diversità nella promozione dell'eco-innovazione. Prendiamo in considerazione diversi aspetti della diversità, in particolare l'età, la nazionalità, la qualifica, le dimensioni del consiglio di amministrazione e il genere. Utilizziamo un quadro multi-teorico perché è improbabile che una teoria sia in grado di spiegare completamente questa relazione (Konadu *et al.,* 2022). La ricerca moderna sottolinea il valore della combinazione di diverse teorie per comprendere le pratiche di corporate governance e la diversità del consiglio di amministrazione (Haque and Jones 2020). Teorie come upper echelons theory (Hambrick 2007), stakeholder theory (Freeman *et al.,* 2010), resource dependence theory (Hillman *et al.,* 2009) and social identity theory (Stets and Burke 2000), offrono una base teorica per il complesso fenomeno della diversità e dell'eco-innovazione.

Esaminiamo un panel di dati composto da 1,215 aziende dal 2013 al 2022. Il campione comprende le società quotate nell'Unione Europea.

Riteniamo che, in generale, la diversità abbia un effetto positivo sull'eco-innovazione e che anche considerare separatamente l'età, la nazionalità, le dimensioni, le qualifiche e il genere abbiano un impatto positivo.

Il nostro studio contribuisce alla letteratura precedente. Proponiamo un passo avanti nella comprensione della relazione tra la diversità del consiglio di amministrazione e l'eco-innovazione. In particolare, abbiamo confermato la necessità di considerare contemporaneamente diversi tipi di diversità (ad esempio, età, nazionalità, qualifica, dimensioni del consiglio di amministrazione e genere) poiché hanno effetti diversi sull'eco-innovazione e sono caratteristiche demografiche associate alla persona che sussistono contemporaneamente. I risultati del nostro studio hanno un'applicazione immediata alle preoccupazioni manageriali e alle raccomandazioni dei responsabili politici. Aggiungiamo alla discussione sulla composizione del consiglio di amministrazione da un punto di vista manageriale, sottolineando i vari tipi di diversità e sottolineando il valore del raggiungimento di un alto livello di diversità per migliorare l'eco-innovazione. Sottolineiamo

l'importanza di incoraggiare la gestione della diversità da un punto di vista politico come un'opportunità per migliorare l'eco-innovazione aziendale.

2. Dati

Il campione per lo studio comprende 1,215 aziende, dal 2013 al 2022. Il campione di imprese comprende le società quotate appartenenti agli Stati dell'Unione Europea. I dati sono stati raccolti attraverso un processo di fusione che ha coinvolto sei database: Orbis (Bureau Van Dijk), Orbis Intellectual Properties, BoardEX and Thomson Reuters.

Con 45 milioni di record che includono informazioni finanziarie precise, il database Orbis (Bureau Van Dijk) copre 450 milioni di aziende ed entità in tutto il mondo. Da Orbis abbiamo recuperato i dati relativi alle informazioni finanziarie pertinenti.

Orbis Intellectual Property è un'espansione del database Orbis di Bureau Van Dijk che fornisce una combinazione di dati aziendali e dati globali sui brevetti. Collega queste informazioni alle aziende e ai gruppi che le possiedono, facilitando la gestione e lo sviluppo della proprietà intellettuale. Le informazioni relative alla proprietà intellettuale sono state recuperate da Orbis Intellectual Property.

I dati contenuti in BoardEx riguardano più di 2,2 milioni di aziende e includono 1,7 milioni di dirigenti aziendali e membri del consiglio di amministrazione. I fattori che compongono la biografia di un dirigente includono per esempio l'età, il sesso, il titolo di lavoro e il background educativo. Le informazioni relative ai dati demografici del consiglio sono state recuperate da BoardEx.

Thomson Reuters fornisce uno dei più ampi database ambientali, sociali e di governance (ESG) disponibili, con una copertura di oltre 6.000 aziende pubbliche e 400+ misure ESG che coprono dal 2002 in poi. Ogni azienda dell'universo ESG di Thomson Reuters ha il proprio set unico di 400 indicatori ESG e gli analisti elaborano scrupolosamente ciascuno di essi a mano per garantire la coerenza e la standardizzazione dei dati su tutta la linea. Thomson Reuters è stata utilizzata per ottenere dati sulle caratteristiche di sostenibilità dell'azienda.

2.1 Variabili

Nella Tabella 1 sono riportate le definizioni delle variabili e le fonti.

Variabile dipendente. Un modo tipico per misurare l'innovazione è quello di esaminare la spesa in ricerca e sviluppo (R&S) o il numero di scienziati impiegati in vari settori. Ma questi sono più simili a input che a output quando si tratta di innovazione. I dati provenienti dai brevetti, che si concentrano sui risultati dell'invenzione, sono stati a lungo considerati un indicatore del progresso tecnico (Griliches *et al.,* 1987). Questi vantaggi sono rilevanti anche quando si pensa all'eco-innovazione. I sistemi di gestione ambientale (come la ISO 14000) non sono stati utilizzati come misure di eco-innovazione in alcune ricerche (Hojnik and Ruzzier 2016). Tuttavia, questo approccio ha i suoi limiti dovuti al fatto che si tratta di un indicatore che non cambia nel tempo. D'altra parte, i brevetti rivelano fino a che punto la crescita e l'innovazione tecnica ambientale sono arrivate all'interno delle aziende, rivelando quanto siano innovative le loro capacità. Rispetto ad altre metriche di innovazione, i dati sui brevetti offrono diversi vantaggi: commensurabilità, per poter beneficiare di un brevetto, un'invenzione deve soddisfare determinati criteri, tra cui essere innovativa, non ovvia e utile; confrontano la spesa in R&S o i dati commerciali con i risultati intermedi, che misurano i risultati del processo creativo; quantitativo, la forma numerica dei dati ne facilita l'analisi statistica. I dati che non sono soggetti a licenza proprietaria sono disponibili pubblicamente e quindi accessibili. La disaggregazione tecnologica è essenziale per l'analisi dell'innovazione "ambientale" perché consente di concentrare lo studio dell'innovazione in domini specifici. Secondo l'OCSE (2015), ci sono tre ragioni principali per cui i brevetti non forniscono una misura completa dell'innovazione: a) non tutte le innovazioni possono essere brevettate, specialmente quelle che non coinvolgono la tecnologia; b) per alcune invenzioni brevettabili vengono utilizzati metodi alternativi di protezione,

come i diritti d'autore; c) la qualità delle invenzioni brevettate varia, non tutte hanno successo commerciale, anche dopo averne sostenuto i costi. I nostri modelli quantificano l'eco-innovazione utilizzando la quantità di domande di brevetto ambientale (Pan *et al.,* 2021). Wagner (2007) ha dimostrato che è possibile valutare il successo dell'eco-innovazione esaminando i dati dei brevetti, sulla base della sua ricerca sulla relazione tra gestione ambientale, innovazione e brevettazione. Il Centro Internazionale per il Commercio e lo Sviluppo Sostenibile (ICTSD), il Programma delle Nazioni Unite per l'Ambiente (UNEP) e l'Ufficio Europeo dei Brevetti (EPO) hanno collaborato per stabilire uno schema di etichettatura specializzato per le tecnologie a basse emissioni di carbonio, sostenibili e di mitigazione dei cambiamenti climatici (CCMT). Al fine di identificare le tecnologie di mitigazione dei cambiamenti climatici (CCMT), l'EPO ha creato la metodologia "Y02/Y04S tagging scheme" aggiungendo le sezioni Y alle otto sezioni standard preesistenti (A-H) (Ricerca di classificazione) (EPO, 2016). Questo approccio viene utilizzato dal Joint Research Centre (JRC) della Commissione Europea per distinguere tra brevetti verdi e quelli che non lo sono (Bellucci *et al.,* 2023; Pasimeni *et al.,* 2021; Pasimeni *et al.,* 2018).

Variabili indipendenti. In primo luogo, esaminiamo le *Iniziative di investimento ambientale* (Griliches *et al.,* 1987), che mostra se un'azienda dichiara di effettuare spese ambientali proattive, investimenti volti a ridurre i rischi in futuro o a cogliere opportunità legate all'ambiente. Questo ci aiuta a capire il livello di impegno profuso da un'azienda per la sostenibilità ambientale.

Utilizziamo diversi indici di diversità di genere che tengono conto della proporzione di persone in ciascuna categoria (donne e uomini), in accordo con la letteratura precedente (Abad *et al.,* 2017; Saona *et al.,* 2019). Queste misure indicizzate sono l'indice di Blau (1979) e l'indice di diversità di Shannon (1948). L'indice di Blau è calcolato come:

$$\text{Indice di Blau} = 1 - \sum_{i=1}^{n} P_i^2$$

Dove p_i è la percentuale di ciascuna categoria e I = (1, 2, n) è il numero di categorie. Questo indicatore può avere valori compresi tra 0 e (n-1)/n, che rappresentano la presenza di una categoria sul tabellone e la rappresentazione paritaria delle categorie.

L'indice di Shannon viene calcolato con gli stessi input dell'indice Blau:

$$\text{Indice di Shannon} = -\sum_{i=1}^{n} P_i ln P_i$$

La variabile in questione ha valori che vanno da 0 (che indica l'assenza di diversità di categorie) a 0,693 (che indica una distribuzione uguale di tutte le categorie esaminate in questo studio).

Originariamente creato nell'ambito della biologia, l'indice di diversità di Simpson stima la probabilità che due persone scelte casualmente rientrino nello stesso gruppo utilizzando la seguente equazione (McLaughlin *et al.,* 2016).

$$\text{Indice di Simpson} = 1 - \frac{\sum_{i=1}^{n} n_i(n_i - 1)}{N(N-1)}$$

Dove N è il numero totale di creature, I è il numero di categorie e ni è il numero di persone che rientrano nella categoria i. L'indice di Simpson può mostrare la dispersione in diverse categorie quando un attributo è descritto da più di due categorie (Simpson 1949). Il valore dell'indice di diversità di Simpson è compreso tra 0 e 1, maggiore è il valore di questo indice, maggiore è la diversità di genere.

Utilizzando la variabile *Token,* una variabile fittizia che assume valore 1 se l'azienda ha un solo amministratore donna e 0 in caso contrario, abbiamo misurato l'esistenza di un solo amministratore donna (Rixom *et al.,* 2023; Vafaei *et al.,* 2021; Lafuente and Vaillant 2019). In secondo luogo, utilizzando la variabile *Massa critica* una variabile fittizia con valore pari a 1 se l'azienda ha almeno tre amministratori donne e 0 in caso contrario, abbiamo valutato la presenza di almeno tre

amministratori donne (Saggese *et al.,* 2021; García-Meca *et al.,* 2023; Wiley and Monllor-Tormos 2018).

L'*Età* è la deviazione standard dell'età degli amministratori nel consiglio di amministrazione (Ferrero-Ferrero *et al.,* 2015; Ferrero-Ferrero *et al.,* 2013), mentre *Nazionalità* fornisce informazioni sulla diversità internazionale del consiglio di amministrazione mostrando la percentuale di amministratori provenienti da varie nazioni (Dodd and Zheng 2022; Agustia *et al.,* 2022). La deviazione standard del numero totale di qualifiche è rappresentata da *Qualifica* (Cumming and Leung 2021; Hosny and Elgharbawy 2022). La *Dimensione del board* mostra il numero complessivo di amministratori (Vafaei *et al.,* 2021; Berezinets *et al.,* 2019).

Variabili di controllo. Sulla base di studi precedenti, teniamo conto di una serie di fattori specifici dell'azienda che supportano la capacità di innovazione di un'azienda. Prendiamo il *ROA* (return on assets) come misura della redditività aziendale in quanto la produttività e la redditività dell'impresa sono legate alla propensione all'innovazione (Jiang *et al.,* 2021; Pan *et al.,* 2021). Il rapporto tra il reddito operativo e le attività totali viene utilizzato per calcolare il ROA. L'*Età dell'azienda* è tipicamente inclusa come variabile di controllo e funge da proxy per la complessità e l'esperienza organizzativa (Srivastava and Gnyawali 2011). A causa dell'inerzia organizzativa, le aziende con una lunga storia sul mercato potrebbero dover fare maggiori sforzi per innovare (Egri and Herman 2000). Pertanto, gli anni dalla fondazione dell'azienda fungono da proxy per l'età dell'azienda (Pan *et al.,* 2021; Frenz and Ietto-Gillies 2007). Studi recenti hanno discusso l'esistenza di un *Comitato di sostenibilità CSR* come una delle strutture di governance cruciali del consiglio di amministrazione, in particolare per quanto riguarda le prestazioni di sostenibilità (Haque 2017; Hussain *et al.,* 2018). Secondo Spitzeck (2009), Dixon-Fowler *et al.,* (2017) e Liu e Zhang (2017) la creazione di comitati di sostenibilità migliora la governance aziendale, che a sua volta migliora le prestazioni aziendali, le prestazioni sociali e le prestazioni ambientali. Il più grande programma volontario di governance globale che affronta le responsabilità sociali e ambientali delle multinazionali è il Global Compact delle Nazioni Unite (Voegtlin and Pless 2014) (Ples *et al.,*2014). Pertanto, consideriamo il *Comitato CSR Sostenibilità* e il *Firmatario del Global Compact* come deleghe per l'attività di sostenibilità di un'azienda. Infine, includiamo *Industria*, una variabile categoriale che descrive il settore dell'azienda. Sono stati utilizzati i codici della NACE Rev. 2 aggregati al livello più ampio, questo perché l'innovazione è una strategia utilizzata prevalentemente in determinati settori.

Tab. 1: Definizione delle variabili

Variabile	**Definizione**	**Fonte**
Variabili dipendenti		
Eco-innovazione	Numero di brevetti realizzati in tecnologie sostenibili	Proprietà intellettuale di Orbis
Variabili indipendenti		
Iniziative di investimento ambientale	L'azienda riferisce di effettuare investimenti o spese ambientali proattivi per ridurre i rischi futuri o aumentare le opportunità future?	Thomson Reuters
Token	Variabile fittizia che assume il valore 1 se un'impresa presenta una sola donna amministratore e 0 in caso contrario	Scheda Ex
Massa critica	Variabile fittizia che assume il valore 1 se un'impresa presenta almeno tre amministratrici donne e 0 in caso contrario	Scheda Ex
Genere indice di Blau	Variabile con valore da 0, quando c'è un solo genere sulla scacchiera, a 0,5, quando la scheda ha un numero uguale di donne e uomini	Blau
Genere indice di Shannon	Variabile con valore da 0, quando c'è un solo genere sulla scacchiera, a 0,693, quando la scheda ha un numero uguale di donne e uomini	Shannon
Genere indice di Simpson	L'indice è compreso tra 0 e 1, maggiore è il valore di questo indice, maggiore è la diversità	Simpson
Età	Deviazione standard della popolazione delle età degli Amministratori e delle Amministratrici	BoardEx
Nazionalità	Percentuale di Consiglieri e Consigliere provenienti da diversi paesi	BoardEx
Qualifica	Deviazione standard del numero totale di qualifiche	BoardEx
Dimensione del board	Numero di Consiglieri e Consigliere	BoardEx
Variabili di controllo		
Firmatario del Global Compact	L'azienda ha aderito al Global Compact delle Nazioni Unite?	Thomson Reuters
Comitato CSR Sostenibilità	L'azienda dispone di un comitato o di un team CSR?	Thomson Reuters
Età dell'azienda	Numero di anni trascorsi dalla fondazione dell'azienda	ORBIS

ROA	Reddito sul totale attivo	ORBIS
Industria	Variabile categoriale che descrive il settore in cui opera l'impresa opera, con i seguenti livelli: "Attività dei servizi di alloggio e ristorazione", "Attività amministrative e di servizi di supporto", "Agricoltura, silvicoltura e pesca", "Arti, intrattenimento e tempo libero", "Costruzioni", "Fornitura di elettricità, gas, vapore e aria condizionata", "Attività immobiliari", "Attività finanziarie e assicurative", "Attività sanitarie e di assistenza sociale", "Informazione e comunicazione", "Industria manifatturiera", "Industria estrattiva", "Altre attività di servizi", "Professionale, attività scientifiche e tecniche", "Pubblica amministrazione e difesa, previdenza obbligatoria", "Commercio all'ingrosso e al dettaglio" e "Trasporto e magazzinaggio"	ORBIS

Fonte: nostra elaborazione

3. Modello

Data la natura delle variabili che abbiamo preso in considerazione e le serie temporali studiate, abbiamo individuato l'analisi dei dati panel come il metodo più efficace da utilizzare. Abbiamo dati che vengono raggruppati nel tempo e nello spazio poiché la stessa unità di sezione trasversale viene interrogata ripetutamente (Naciti 2019). Data la natura della variabile dipendente e la natura panel del database, abbiamo adottato un modello di regressione di panel Poisson per stimare l'influenza delle variabili indipendenti sulla variabile dipendente e il ruolo moderatore del contesto culturale (Greene *et al.*, 2020; Wooldridge 2010). Più specificamente, le stime OLS aggregate ci aiutano ad aggirare questo problema, ma producono stimatori distorti e incoerenti quando l'effetto non osservato è associato alla variabile indipendente. I ricercatori e le ricercatrici che esaminano la connessione tra la corporate governance e le prestazioni aziendali hanno raccomandato di utilizzare le differenze iniziali o gli stimatori a effetti fissi (interni) per combattere questo problema econometrico (Andres and Vallelado 2008). Ciononostante, un consiglio di amministrazione si stabilisce endogenamente, come dimostrato da Weisbach e Hermalin (2000). Quando la condizione di esogeneità rigorosa non è soddisfatta, c'è un'incongruenza tra le prime differenze e gli effetti fissi. Poiché gli stimatori degli effetti fissi non prendono in considerazione l'impatto della performance dell'impresa sull'attuale struttura del consiglio di amministrazione, sono distorti nella situazione specifica della struttura del consiglio di amministrazione (Wintoki *et al.*, 2012). Dopo aver messo in atto una struttura di corporate governance, un'azienda ha bisogno di tempo per vedere i risultati delle prestazioni (Haniffa and Cooke 2005). Di conseguenza, selezioniamo tutte le variabili indipendenti con ritardi di un anno (Ashwin *et al.*, 2015; Liang *et al.*, 2013), per tenere conto di un potenziale problema di endogeneità. Infine Hilbe (2011) ha osservato che "gli stimatori di effetti casuali sono più efficienti degli stimatori di effetti fissi quando i dati provengono da una popolazione più ampia di osservazioni, così come quando ci sono più pannelli nei dati", motivo per cui sono stati impiegati effetti casuali.

Per dimostrare le nostre ipotesi considerando l'impatto che l'età, la nazionalità, la qualifica, le dimensioni del consiglio di amministrazione e il genere hanno sull'eco-innovazione con i seguenti modelli:

Modello 1 *Eco-innovation = f(Iniziative di investimento ambientale + Token + Massa critica + Genere indice di Blau + Età + Nazionalità + Qualifica + Dimensioni del board + Variabili di controllo)*

Modello 2 *Eco-innovation = f(Iniziative di investimento ambientale + Token + Massa critica + Genere indice di Shannon + Età + Nazionalità + Qualifica + Dimensioni del board + Variabili di controllo)*

Modello 3 *Eco-innovazione = f(Iniziative di investimento ambientale + Massa critica + Genere indice di Simpson + Età + Nazionalità + Qualifica + Dimensioni del board + Variabili di controllo)*

4. Risultati

La **Tabella 2** mostra i risultati delle analisi di regressione lineare multipla del pannello di Poisson.

Tab. 2: Risultato delle regressioni

	Eco-innovazione		
	Modello 1	**Modello 2**	**Modello 3**
Iniziative di investimento ambientale	-0,1875 ***	-0.1874 ***	-0,1875 ***
	(0.011)	(0.011)	(0.011)
Token	-0,0269 *	-0,0273 *	-0,0269 *
	(0.0125)	(0.0125)	(0.0125)
Massa critica	-0,1350 ***	-0,1356 ***	-0,1350 ***
	(0.0087)	(0.0086)	(0.0087)
Genere indice di Blau	0,0855 **		
	(0.0323)		
Genere indice di Shannon		0,0804 ***	
		(0.0244)	
Genere indice di Simpson			0,0855 **
			(0.0323)
Età	0,0114 ***	0,0114 ***	0,0114 ***
	(0.0014)	(0.0014)	(0.0014)
Nazionalità	0,0762 ***	0,0761 ***	0,0762 ***
	(0.019)	(0.019)	(0.019)
Qualifica	0,1227 ***	0,1218 ***	0,1227 ***
	(0.012)	(0.012)	(0.012)
Dimensione del board	0,0088 ***	0,0085 ***	0,0088 ***
	(0.0016)	(0.0017)	(0.0016)
Età dell'azienda	-0,0843 ***	-0,0844 ***	-0,0843 ***
	(0.001)	(0.001)	(0.001)
ROA	-0,0030 ***	-0,0030 ***	-0,0030 ***
	(0.0003)	(0.0003)	(0.0003)
Firmatario del Global Compact	0,2316 ***	0,2318 ***	0,2316 ***
	(0.0103)	(0.0103)	(0.0103)
Comitato CSR Sostenibilità	0,1559 ***	0,1559 ***	0,1559 ***
	(0.0077)	(0.0077)	(0.0077)
Industria	Sì	Sì	Sì
Intercetta	7.9013 ***	7.9063 ***	7.9013 ***
	-20.054	-2.007	-20.054
Sigma	0,0508 ***	0,0507 ***	0,0508 ***
	(0.0016)	(0.0016)	(0.0016)
Osservazioni	10935	10935	10935

** P<0,05 ** P<0,01 *** P<0,001*

Fonte: nostra elaborazione

Variabili indipendenti. I modelli mostrano come l'età, la nazionalità, la qualifica e le dimensioni del consiglio di amministrazione hanno un impatto positivo sull'eco-innovazione. Al contrario, la diversità di genere (token e massa critica) hanno un impatto negativo. La diversità di genere ha invece un impatto positivo. I nostri dati implicano anche che tre donne non sono sufficienti all'interno dei campioni considerati per ottenere risultati migliori. Risultati precedenti dimostrano che quando il numero di donne aumenta gli ostacoli che le opinioni minoritarie diminuiscono (Kanter 2000) e che i risultati migliori derivano dalle interazioni tra vari gruppi (Wiersema and Mors 2023). I nostri risultati confutano la tesi secondo cui tre sia il numero di donne oltre al quale esse vengono ascoltate e riescano di conseguenza a impattare sui risultati misurati. Inoltre, i dati confermano che avere un solo direttore donna non ha un impatto significativo sull'eco-innovazione.

Variabili di controllo. Per quanto riguarda le variabili di controllo, in tutti i modelli i risultati evidenziano che alcune variabili predicono in modo significativo l'innovazione ambientale delle imprese. *Firmatario del Global Compact* e *Comitato CSR Sostenibilità* aumentano la propensione a sviluppare l'innovazione ambientale. L'*Età dell'azienda* e il *ROA* hanno un effetto negativo e

statisticamente significativo. Infine, le variabili di settore hanno un effetto statisticamente significativo.

5. Discussione e conclusione

Le eco-innovazioni sono un mezzo per raggiungere obiettivi sociali, ambientali e finanziari (Läpple *et al.,* 2015). Molta attenzione è stata attirata sui problemi ambientali che ne sono derivati. Di conseguenza, le aziende hanno iniziato a modificare i loro metodi di produzione e le loro idee per costruire una reputazione positiva (Liao and Tsai 2019), ottenere un vantaggio competitivo e realizzare uno sviluppo sostenibile (Ortega-Lapiedra *et al.,* 2019). Negli ultimi decenni, c'è stata una crescente convinzione che idee e legislazioni rispettose dell'ambiente possano aiutare le aziende a diventare più competitive (Porter and Linde 1995). L'istruzione e l'apprendimento hanno ricevuto maggiori finanziamenti a seguito del crescente interesse per le innovazioni e le proprietà intellettuali da parte di una varietà di parti interessate, nonché delle spese per le infrastrutture e la protezione dell'ambiente. Di conseguenza sono emerse forze produttive che sono state cruciali per la crescita e l'influenza delle imprese (Lundvall 2002). Diversi punti di vista sono stati presi in considerazione riguardo il tema delle invenzioni verdi, con l'obiettivo generale di chiarire i fattori alla base della loro adozione e le potenziali vie di promozione.

Si tratta del primo studio che indaga il ruolo della diversità nella promozione dell'eco-innovazione. Sono stati presi in considerazione diversi aspetti della gestione della diversità, in particolare l'età, la nazionalità, la qualifica, il genere e le dimensioni del consiglio di amministrazione.

L'evidenza empirica mostra che l'età, la nazionalità, le dimensioni del comitato di qualificazione e la diversità di genere hanno un impatto positivo sull'eco-innovazione. I nostri dati implicano anche che tre donne sono insufficienti, il che è contrario ad altre ricerche. Risultati precedenti dimostrano che quando il numero di donne aumenta, gli ostacoli e le opinioni minoritarie diminuiscono (Kanter 2000) e che i risultati migliori derivano dalle interazioni tra vari gruppi (Wiersema and Mors 2023). I nostri risultati confutano questa teoria. Inoltre, i dati confermano che avere una sola donna ha un impatto negativo sull'eco-innovazione. In linea con la letteratura esistente, una singola donna è vista come meno capace e più come un simbolo. Secondo questi risultati empirici, le dinamiche di gruppo e le decisioni di performance, comprese quelle che coinvolgono l'eco-innovazione, non possono essere influenzate da una singola direttrice donna.

In terzo luogo, abbiamo anche considerato l'influenza della scelta di un'impresa di spendere in iniziative legate all'eco-innovazione, assumendo che questa scelta sia un input chiave da considerare in un modello che cerca di spiegare i driver dell'eco-innovazione. L'impatto negativo evidenzia come questo fenomeno necessiti di ulteriori indagini, considerando l'effetto mitigante che un ambiente esterno più competitivo e sostenibile potrebbe avere su questo fenomeno

Lo studio amplia le attuali conoscenze sulla relazione tra il ruolo della diversità e la promozione dell'eco-innovazione. Abbiamo stabilito che i vari livelli di rappresentanza delle donne nei consigli di amministrazione devono essere presi in considerazione, così come l'entità della diversità di genere nei consigli di amministrazione.

Questo documento ha diverse implicazioni. Le implicazioni del nostro studio si estendono direttamente al processo decisionale manageriale e informano le raccomandazioni dei responsabili politici, facendo così progredire la nostra comprensione delle scelte strategiche relative all'eco-innovazione. I/le direttori/rici e i/le proprietari/e possono imparare molto su come un consiglio di amministrazione diversificato possa influire sulle iniziative di eco-innovazione di un'azienda. I legislatori dovrebbero considerare gli effetti della diversità nei consigli di amministrazione quando redigono leggi relative all'innovazione ambientale e valutano le collaborazioni con le imprese private. I risultati del nostro studio evidenziano l'importanza di consigli di amministrazione diversificati nel sostenere l'eco-innovazione e forniscono supporto alle iniziative internazionali che mirano ad aumentare la rappresentanza della diversità nella leadership aziendale e la diversità e l'inclusione. Da un punto di vista manageriale, contribuiamo alla conversazione sulla composizione del consiglio di

amministrazione sottolineando il valore di abbracciare la diversità in tutte le sue forme e i vantaggi di raggiungere un alto grado di diversità per migliorare i risultati dell'eco-innovazione. L'importanza della diversità nella promozione dell'eco-innovazione a livello aziendale è evidenziata dalla nostra ricerca, evidenziando la necessità di interventi politici che promuovono la diversità nei quadri di governo societario per migliorare le prestazioni dell'eco-innovazione.

Questo studio ha alcune limitazioni. Innanzitutto, il nostro studio si concentra sulle società quotate nell'Unione Europea, sarebbe interessante in futuro approfondire considerando altri contesti geografici ed estendendo lo studio alle società non quotate. Ad oggi non è stato possibile a causa della mancanza di dati affidabili. In secondo luogo, i nostri risultati possono essere influenzati da caratteristiche interne all'azienda, come la cultura aziendale, o altre caratteristiche degli amministratori, come il mandato e il ruolo di dirigente o meno, che potrebbero essere prese in considerazione in futuro. In terzo luogo, potrebbe essere interessante valutare gli effetti che il contesto culturale esterno può avere nel mitigare alcuni effetti sull'eco-innovazione.

In conclusione, è imperativo che le aziende diano priorità alla diversità e all'inclusione in tutti gli aspetti delle proprie operazioni, compresa la composizione del consiglio di amministrazione, dato il suo potenziale di produrre molteplici benefici sia per l'organizzazione che per la società in generale. Questo deve essere fatto tenendo in considerazione tutti i fattori che possono influenzare l'eco-innovazione, compreso il contesto culturale in cui opera un'azienda.

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Assessing product sustainability: A comprehensive framework[1]

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Abstract

Frame of the research. *Achieving successful design and manufacturing of sustainable products requires the capability to measure and assess the sustainability performance of products. In this regard, it is imperative to use a product sustainability assessment framework that comprehensively considers the economic, environmental, and social dimensions, adhering to the triple bottom line approach across the entire life cycle of a product.*

Purpose of the paper. *This study aims to develop a comprehensive framework that can effectively guide manufacturing companies in assessing the sustainability performance of their products.*

Methodology. *The framework developed in this study involves adopting factors considered for sustainable product design and/or product sustainability assessment in the literature. The overall structure of the framework was designed using the plan-do-check-act (PDCA) cycle. Additionally, the framework considered both triple bottom line and total product life cycle approaches.*

Results. *This study provides a comprehensive framework with a detailed guideline to facilitate the measurement, evaluation, and interpretation of product sustainability performance.*

Research limitations. *This study lacks empirical analysis, which opens an opportunity for future research to conduct empirical studies aimed at testing and validating the proposed framework.*

Managerial implications. *The framework proposed by this study can serve as a valuable tool for designers and managers, aiding in the assessment and improvement of the sustainability performance of their products.*

Originality of the paper. *This study addressed a research gap observed in previous studies, which lacked a framework with detailed guideline for measuring, evaluating, and interpreting of the sustainability performance of a product.*

Key words: *factor; framework; product sustainability assessment; industrial sustainability; sustainable manufacturing*

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1. Introduction

The concept of product sustainability is essential for developing products that reduce the excessive use of natural resources and mitigate negative impacts on the economy, environment, and society. In this regard, the design and manufacturing of sustainable products emerge as a crucial issues for manufacturing companies aiming to adopt sustainable manufacturing (Ghadimi *et al.*, 2012). In other words, as the demand for the implementing sustainable manufacturing practices continues, manufacturing companies should make decisions concerning the sustainability of their products (Eastwood and Haapala, 2015). For this purpose, it is imperative to simultaneously considers the economic, environmental, and social aspects, applying the triple bottom line approach, during the product design and development process (Eastwood and Haapala, 2015; Lacasa *et al.*, 2016). Furthermore, when addressing product sustainability in the product design and development process, it is vital to consider the total product life cycle approach, recognizing the considerable economic, environmental, and social impacts that a product incurs across its life cycle (Hapuwatte and Jawahir, 2021; Tarne *et al.*, 2017). The total product life cycle approach is typically composed of the supply, manufacturing, use, and post-use stages (Shuaib *et al.*, 2014).

Product sustainability involves the manufacturing of sustainable products (Lin *et al.*, 2019). To achieve effective design and manufacture of sustainable products, it is essential to possess the capacity to measure and assess product sustainability performance (Feng and Mai, 2016; Shuaib *et al.*, 2014). For this purpose, it is crucial to consider the economic, environmental, and social dimensions, employing the triple bottom line approach, across the entire life cycle of the product (He *et al.*, 2019; Thies *et al.*, 2019). The sustainability assessment of a product involves the use a set of multidimensional indicators (Ghadimi *et al.*, 2013; He *et al.*, 2019), which are referred to as factors in this study. Product sustainability assessment can be applied in the development of a new product, involving the estimation of sustainability impacts, the selection of best design from multiple design alternatives, and the generation of optimal product design. It can also be employed to improve existing products through activities such as estimating the improvement potential, exploring various improvement options, and selecting the most optimal improvement option (Thies *et al.*, 2019).

Most sustainability assessment approaches, including those observed in studies conducted by Eastwood and Haapala (2015), Feng and Mai (2016), Ghadimi *et al.* (2012), He *et al.* (2019), Roy *et al.* (2014), and Omodara *et al.* (2023), largely focus on measuring product sustainability performance. However, they often lacked detailed guidelines for product sustainability performance evaluation, such as comparing the actual product sustainability performance with respect to a predefined product sustainability target, and interpreting of the results to ascertain whether the product is sustainable or requires improvement actions. This highlights a gap in research regarding a comprehensive framework for assessing product sustainability.

Therefore, the primary objective this study to propose a comprehensive framework designed to guide manufacturing companies in measuring, evaluating, and interpreting the sustainability performance of their products. As a result, a comprehensive factor-based framework with detailed guideline for measuring, evaluating, and interpreting sustainability was developed, taking into account both the triple bottom line and the total product life cycle approaches.

This study has significant implications for academics, managers, and policymakers. It establishes a theoretical basis for future research work on product sustainability that incorporates both the triple bottom line and the total product life cycle approaches. The framework presented in this study can serve as a valuable tool for designers and managers, aiding in the assessment and improvement of the sustainability performance of their products. Additionally, policymakers engaged in formulating and implementing policies related to sustainable manufacturing and industrial sustainability can benefits from the insights provided by the framework.

The remainder this study is divided into three sections. Section 2 describes the methodology employed for the study. Section 3 presents the proposed framework with its overall structure and a detailed guideline for its implementation. Finally, the conclusions, including the implications of the study are presented in Section 4.

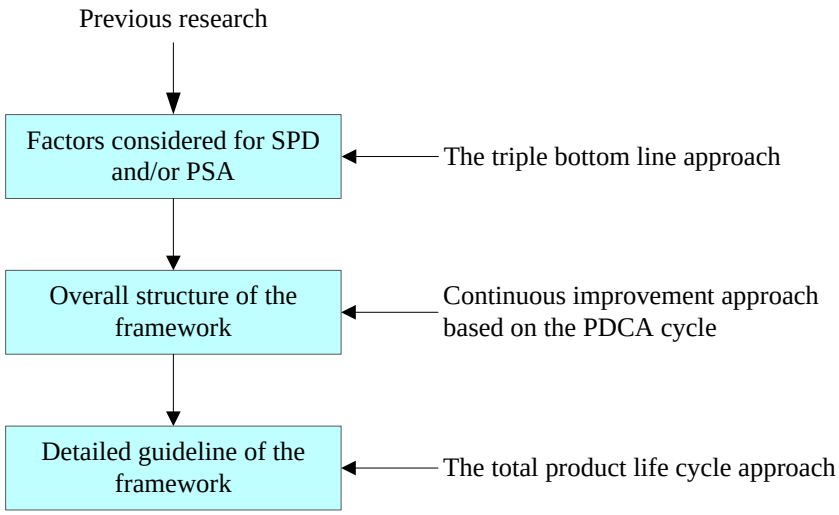
2. Methodology

To achieve the objective of the study, the methodological approach presented in Figure 1 was applied. This approach primarily involves (1) incorporating factors from a previous study, as presented in Table 1, and (2) developing a framework for assessing product sustainability based on the factors that were adopted. The factors specifically were derived from previous research on the analysis of factors considered for sustainable product design and/or product sustainability assessment in the literature. As presented by Mengistu *et al.* (2023), some of the previous studies from which the factors were explored include Chatty *et al.* (2022), Chunhua *et al.* (2020), Hassan *et al.* (2022), Gholami *et al.* (2022), Hapuwatte and Jawahir (2021), Trojanowski (2022), Soomro *et al.* (2021), Faradilla *et al.* (2022), and Kolling *et al.* (2022).

To address the need for continuous assessment and improvement of product sustainability, the overall structure of the framework adopts a continuous improvement approach based on the well-known plan-do-check-act (PDCA) cycle (ISO, 2021; Venkatraman and Nayak, 2010). The PDCA cycle serves as a crucial tool for the continuous improvement of performance, including sustainability performance, by providing a structured and systematic approach (Silva *et al.*, 2017).

To put implement the proposed factor-based framework, a detailed guideline was formulated. The detailed guideline was developed by adapting key elements from the continuous-loop model for measuring the sustainability performance, as presented by (Veleva and Ellenbecker, 2001). Additionally, the framework incorporates two key approaches of product sustainability: (1) the triple bottom line (TBL) approach and (2) the total product life cycle (TPLC) approach. The TBL approach encompasses the economic, social, and environmental dimensions of sustainability (Elkington, 1997). Meanwhile, the TPLC approach mainly includes the supply, manufacturing, use, and post-use stages of the product (Shuaib *et al.*, 2014).

Fig. 1: Methodology applied to conduct the study



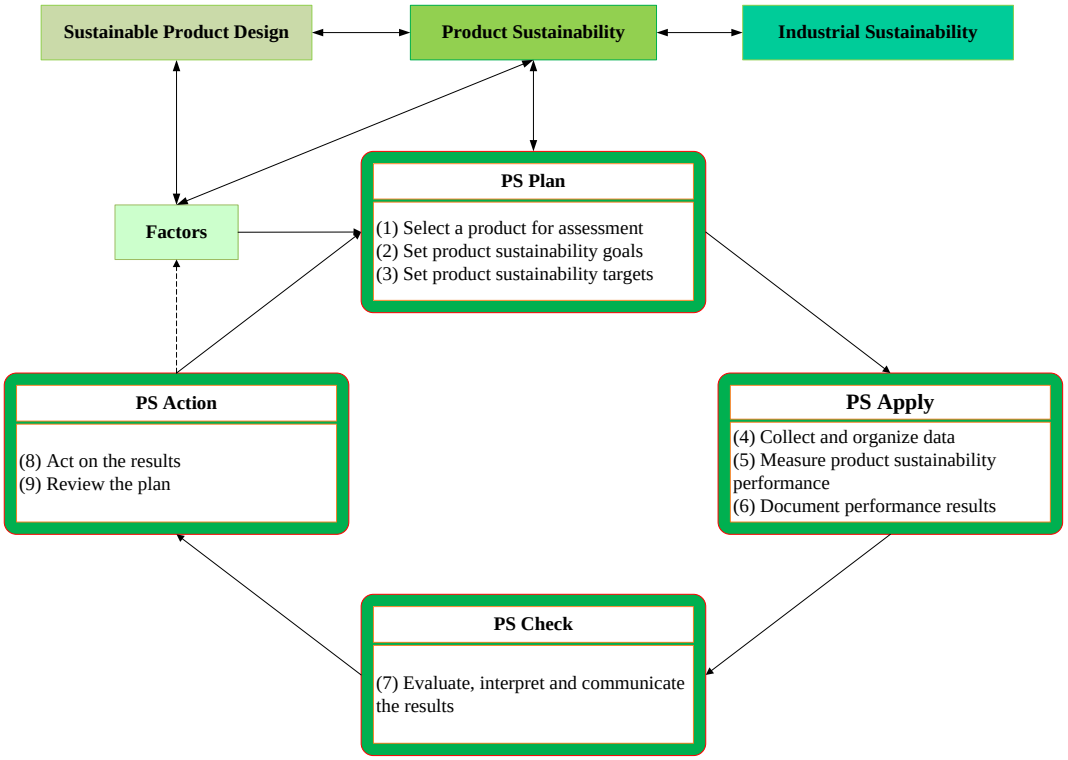
3. Framework for product sustainability assessment

3.1 Overall structure of the framework

The framework for product sustainability (PS) assessment, as shown in Figure 2, has four stages (i.e., PS plan, PS apply, PS check, and PS action) defined according to the well-known PDCA cycle, as stated in the methodology section. The tasks under each stage of the framework were defined by

adapting the continuous-loop model for defining and measuring the sustainability performance of organizations proposed by Veleva and Ellenbecker (2001).

Fig. 2: The overall structure of the framework



Stage 1 - PS Plan: This stage includes (1) selecting a product to assess and improve its sustainability performance, (2) setting sustainability goals that align with the specified factors. This specifically focuses on determining the desired direction of each factor, whether it be increase/improvement, minimization/reduction, or optimization, based on the factor's intended purpose. Additionally, (3) setting product sustainability targets based on the factor is a crucial aspect of this stage. Establishing product sustainability targets is a crucial task that needs to be carried out during the design stage of a product.

Stage 2 - PS Apply: It involves (4) gathering and organizing the necessary data, (5) measuring sustainability performance for the reporting period and (6) documenting the performance results for proper reporting.

Stage 3 - PS Check: It focuses on (7) comparing the obtained product sustainability performance results with their corresponding product sustainability targets, interpreting the results to check whether the performance of a product is sustainable or needs improvement, and communicating the final results to managers and stakeholders to establish a shared understanding for initiating improvement actions.

Stage 4 - PS Action: It consists of (8) taking actions to address the product sustainability performance results that needs improvement and (9) reviewing the plan for continuous product sustainability improvement.

3.2 Detailed guideline of the framework

In order to effectively implement framework for assessing product sustainability, a detailed guideline presented below was developed. The guideline was proposed by adapting the key elements outlined by Veleva and Ellenbecker (2001), as shown in Table 1.

Tab. 1: Key elements of the guideline

Key elements	Description
Goal	• It refers to the desired direction of a factor, which can be characterized by an increase/improvement, minimization/reduction, or optimization goal based on the factor's intended purpose in achieving the sustainability of a product.
Product life cycle stages	• It focuses on identifying the product life cycle stages (such as supply, manufacturing, use, and post-use) to which a factor corresponds.
Target (T)	• Represents the tolerable value (plan, threshold, standard, or norm) of the product sustainability to be measured. It is basically set during the design phase of a product.
Actual performance (P)	• The actual sustainability performance of a product against the targets.
Evaluation	• It involves comparing the actual product sustainability performance (P) with the corresponding predefined product sustainability target (T). The evaluation can be carried out by determining: Ratio (W), i.e., W = P / T when T greater than zero, or Distance (D), i.e., D = T - P when T is equal to zero. This approach is employed to make the evaluation process simple, logical, and more interpretable.
Interpretation	• Based on the evaluation result, deciding whether the performance of the product is sustainable or needs improvement.

The abovementioned crucial elements of the guideline were detailed for each factor depending on its nature and intended purpose. This was done to facilitate the measurement, evaluation, and interpretation of product sustainability performance, as described below.

The detailed guideline for implementing the framework:

Economic dimension			
Factors/Indicators	**Goal**	**Life cycle stages**	**Target (T)**
Durability/Lifespan (F_{DL})	• Increase the useful life of the product	• Supply, Use	• The expected lifetime of a product in which it serves its intended purpose (Year, Month)
Product quality (F_{PQ})	• Improve the features incorporated into the product to meet customer needs	• Manufacturing, Use	• The target set during the design stage of a product to meet customer needs
Modularity (F_{MD})	• Make a product using modular components	• Supply, Manufacturing, Use, Post-use	• The target set during the design stage of a product to make it using modular components
Upgradeability (F_{UP})	• Making the product simple and economical to upgrade	• Manufacturing, Use	• The target set during the design stage of a product for making it easily upgradeable
Serviceability (F_{SR})	• Making a product simple and economical to get it back to work in the event of a failure	• Use	• The target set during the design stage of a product for making it easily serviceable
Reliability (F_{RL})	• Making a product to operate without failure for an intended period	• Supply, Use	• The target set during the design stage of a product for making it to operate without failure for an intended period
Maintainability (F_{MT})	• Making a product simple and economical for maintenance	• Use	• The target set during the design stage of a product for making it easily maintainable
Assemblability (F_{AM})	• Making the product simple and economical to assemble	• Manufacturing	• The target set during the design stage of a product for making it easily assemblable
Repairability (F_{RP})	• Making the product simple and economical to repair	• Use	• The target set during the design stage of a product for making it easily repairable
Material cost (F_{MC})	• Reduce the cost of input materials and/or components consumed to produce a product	• Supply	• The target material cost of a product estimated during its design stage (Euro, USD)
Energy cost (F_{EC})	• Reduce the cost of energy consumed to produce and operate a product	• Manufacturing, Use	• The target energy cost of a product estimated during its design stage (Euro, USD
Maintenance cost (F_{MTC})	• Reduce costs related to lubricants, spare parts, and others for the maintenance a product	• Use	• The target maintenance cost of a product estimated during its design stage (Euro, USD)
Profit (F_{P})	• Increase the profitability of a product	• Supply, Manufacturing, Use	• The target profitability set during the design stage of a product (Euro, USD)
Environmental dimension			
Factors/Indicators	**Goal**	**Life cycle stages**	**Target (T)**
Material consumption (F_{MCO})	• Reduce the consumption of input materials and/or components to produce a product	• Supply manufacturing	• The target material consumption of a product set during its design stage
Energy consumption (F_{ECO})	• Reduce the consumption of input energy (i.e., electricity and/or fuel) to produce and operate a product (kWh, Liters)	• Supply, Manufacturing, Use	• The target energy consumption of a product set during its design stage (kWh, Liters)

Recycled material use (F_{RMU})	• Increase the use of recycled materials to produce a product and for packaging	• Supply, Manufacturing	• The target recycled material use of a product set during its design stage
Renewable energy use (F_{REU})	• Increase the use of renewable energy to produce a product	• Supply, Manufacturing, Use	• The target renewable energy use of a product set during its design stage (kWh, Liter)
Packaging material use (F_{PMU})	• Reduce the use of packaging materials for a product	• Supply, Manufacturing	• The target packaging material use of a product set during its design stage
Product weight (F_{PW})	• Reduce the weight of a product without compromising design for manufacturing	• Supply, Manufacturing	• The target product weight set during its design stage (Kg)
Waste (F_W)	• Reduce input material waste and product waste	• Supply, Manufacturing, Use, Post-use	• The target waste estimated during the design stage of a product
Greenhouse gas emissions (F_{GHG})	• Reduce CO2, N2O, CH4, CFCs and other GHG emissions	• Manufacturing, Use	• Zero emissions
Recyclability (F_{REC})	• Make a product recyclable after its useful life	• Post-use	• The target set during the design stage of a product to make it easily recyclable
Reusability (F_{REU})	• Make a product reusable after its useful life	• Post-use	• The target set during the design stage of a product to make it reusable
Disassemblability (F_{DSM})	• Make a product easily disassemblable after its useful life	• Post-use	• The target set during the design stage of a product to make it easily disassemblable
Remanufacturability (F_{REM})	• Make a product easily remanufacturable after its useful life	• Post-use	• The target set during the design stage of a product to make it easily remanufacturable
Disposability (F_{DSP})	• Effective disposal of the non-recyclable or non-reusable product	• Post-use	• The target set during the design stage of a product to make it easily remanufacturable

Social dimension

Factors/Indicators	Goal	Life cycle stages	Target (T)
Functionality (F_{FN})	• Make a product to perform effectively	• Use	• The target set during the design stage of a product to make it perform effectively
Usability (F_{US})	• Make a product easy to use	• Use	• The target set during the design stage of a product to make it easy to use
Ergonomics (F_{ERG})	• Make a product fit and comfortable for a person's use	• Use	• The target set during the design stage of a product to make it ergonomically correct
Cleanability (F_{CLN})	• Make a product easy to clean after every use	• Use	• The target set during the design stage of a product to make it easily cleanable
Accessibility (F_{ACC})	• Make a product to be usable for a diverse group of people	• Use	• The target set during the design stage of a product to make it easily accessible
Aesthetic (F_{AST})	• Improve the look, feel and/or color of a product	• Use	• The target set during the design stage of a product to have a good aesthetic value
Product safety (F_{PSF})	• Make a product safe to use	• Use	• Zero injuries and illnesses during the use of a product (#)
Health and safety (F_{HF})	• Improve health and safety during the production and use of a product	• Manufacturing, Use, Post-use	• Zero injuries and illnesses during the production and use of a product (#)
Ethical responsibility (F_{ER})	• Ensure fair and ethical production and marketing of a product	• Supply, Manufacturing, Use, Post-use	• The target set during the design stage of a product to ensure ethical responsibility
Customer satisfaction (F_{CS})	• Offer a product that satisfies customer needs	• Supply, Manufacturing, Use, Post-use	• 100% satisfied customers with a product offered (#)
Employee satisfaction (F_{ES})	• Improve job satisfaction during the production of a product	• Manufacturing	• 100% satisfied employees during the production of a product (#)

Actual performance (P):

- Measure the actual performance of a factor against its predefined target

Evaluation:

- Ratio (W) = P / T, this applies for most of the abovementioned factors with a target (T) is greater than zero
- Distance (D) = T - P, this applies for factors greenhouse gas emissions, product safety, and health and safety with a target (T) is equal to zero

Interpretation:

- WF is greater than one: Sustainable, WF is less than one: Needs improvement, for a factor with an improvement goal and a target (T) greater than zero. *For instance*, for the factor product quality (F_{PQ}), if WF_{PQ} is greater one, a product from the perspective of this factor can be considered sustainable. Conversely, if WF_{PQ} is less than one, actions are required to improve product quality.
- WF is less than one: Sustainable, WF is greater than one: Needs improvement, for a factor with a reduction goal (T) and a target greater than zero (e.g., energy cost). Taking the factor energy cost (F_{EC}) as *an example*, if WF_{EC} is less than one, a product from the context of this factor can be deemed sustainable. Otherwise, if WF_{EC} is greater than one, actions are needed to reduce energy cost.
- DF is equal to zero: Sustainable, DF is less than zero: Needs improvement, for a factor with a reduction goal and a target (T) of zero. *For instance*, for the factor greenhouse gas emissions (F_{GHG}), if WF_{GHG} is equal to zero, a product from the perspective of this factor can be considered sustainable. Conversely, if WF_{GHG} is less than zero, actions are required to reduce greenhouse gas emissions.

The primary purpose of the guideline to assist manufacturing companies in systematically assessing the sustainability performance of their products. It is designed to facilitate the effective implementation of the framework developed for assessing product sustainability. The framework is characterized by being goal-driven, target-based, continuously improving, flexible to implement. It is easily adaptable for assessing the sustainability performance of various products across manufacturing companies. These features collectively contributes to the framework's comprehensiveness in effectively assessing and improving product sustainability performance. In accordance with the framework, manufacturing companies need to start the product sustainability assessment process by selecting a product for assessment, setting product sustainability goals and targets, followed by measuring the actual product sustainability performance. Afterward, the companies are advised to evaluate their product sustainability performance by comparing it to the predefined targets. The subsequent steps involve interpreting the results, taking actions based on the performance results, and conducting a review to ensure continuous improvements of product sustainability performance.

The essence of the core functions of the framework lies in the factors, also known as indicators, as highlighted in previous studies. These factors stand as the primary element of the framework, enabling manufacturing companies to set product sustainability targets and measure, evaluate, and interpret their product sustainability performance. The economic factors are instrumental in assessing the sustainability performance associated the quality, reliability, manufacturing, and maintenance of a product, along with the costs related to its production and use. Meanwhile, the environmental factors are crucial for assessing sustainability performance concerning resource utilization, waste and emissions, and the management of end-of-life product. In addition, the social factors play a vital role in assessing sustainability performance related to the user-oriented aspects of a product and the well-being of stockholders. The framework attempts to assign measurement units for some factors, such as the use of time as the common accepted measure for the factor durability/lifespan regardless of the product type. However, empirical studies are essential to establish reasonable measures for the remaining factors. In addition, during implementing the framework, manufacturing companies have the flexibility to define specific measures for the factors based on their unique products.

The execution of the detailed guideline requires the involvement of internal actors (internal stakeholders) such as managers and the product design and development team within a manufacturing company. In addition, external actors (external stakeholders), including sustainability experts, sustainability regulators, sustainability auditors, and organization engaged in developing sustainability standards and guidelines, play a vital role in implementing the proposed framework. This includes active participation in the setting product sustainability goals and targets, interpretation of the sustainability performance of a product, and taking improvement actions based on the interpretation results. More specifically, establishing measurable product sustainability targets requires the involvement of not only internal stakeholders but also external stakeholders. Implementing this approach is crucial to prevent the establishment of poor targets.

Furthermore, the involvement of customers is crucial for evaluating the sustainability of products by comparing with those of competitors. One effective approach to engage customers in the product sustainability assessment process is by using the quality function deployment (QFD) method, specifically employing a matrix called preplan. Adapted from Maritan and Panizzolo (2009), the QFD: preplan primarily involves (a) determining the degree of importance of each factors to customer on a scale of 1 to 5 through a questionnaire; (b) determining how well does the customer perceive a company's product performance on each factor, using a scale of 1 to 5; (c) selecting the competitor that the customers believe the performs best on a specific factor and having them assign a score from 1 to 5 to the selected competitor; (d) a company determines the importance of a factor on a scale from 1 to 5, reflecting how crucial the factor is to the company's strategic sustainability objectives; and (e) calculating the ratio between the value obtained in step (c) and step (b), referred as the rate of improvement. If this ratio greater than one, it indicates the need improving the factor. This approach can serve as an alternative to overcome challenges associated with establishing measurable

sustainability targets of certain factors. However, this approach could face challenges, particularly if the customers lacks adequate awareness of sustainability and/or the competitors do not offer the best sustainable products for benchmarking. Implement these approaches is crucial to prevent the establishment of poor targets.

4. Conclusions

This study presents a factor-based framework to assess the economic, environmental, and social sustainability performance of a product across its life cycle. The framework is designed to be generic and flexible, allowing its application for any product across diverse manufacturing companies. In practical implementation, the framework provides flexibility, enabling manufacturing companies to decide whether to fully or partially use the factors presented in this study based on their priority. Furthermore, the manufacturing companies have the option to introduce additional factors that align with their specific industry context and product type. The framework provides a comprehensive perspective on product sustainability, including the initial sustainability planning of a product to the measurement, evaluation, and interpretation of its sustainability performance. Furthermore, the framework emphasizes taking actions based on the performance results and reviewing the plan for continuous improvement. Additionally, it can serve as both a reporting mechanism and a continuous improvement tool for evaluating product sustainability performance. Ultimately, this comprehensive framework can facilitate the effective assessment and improvement of product sustainability performance. In turn, it has a potential to contribute significantly to the achievement of industrial sustainability goals.

This study holds considerable implications for academics, managers, and policymakers. From an academic standpoint, it lays a theoretical foundation for future research on product sustainability assessment. It is also expected to stimulate further discussions on the effective implementation the framework proposed by this study for assessing the sustainability of various products across manufacturing companies. *For example*, future research can take this study as a valuable input for conduct pilot studies and case studies on varies research areas related product sustainability. These may include designing sustainable products, assessing the improvement potentials of product sustainability, identifying and selecting the best solutions to improve product sustainability, and exploring the integration of the proposed framework with other product design tools such as quality function deployment method. From a managerial viewpoint, the framework can be a valuable tool for the designers and managers within manufacturing companies to assess and improve the sustainability performance of their products. Furthermore, the framework will be helpful for policymakers involved in formulating and implementing policies related to product sustainability, industrial sustainability, and sustainable manufacturing.

By providing a comprehensive based on both the triple bottom line and the total product life cycle approaches, this study makes notable contributions to the existing knowledge in the field of product sustainability performance assessment. However, it is subjected to a limitation as it lacks empirical validation, including defining measurement units for the factors, establishing measurable sustainability targets of a product, and demonstrating how to measure actual product sustainability performance using the factors. These limitations opens an opportunities for future research to conduct empirical studies aimed at testing and validating the proposed framework.

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