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Since the Second World War, the EU has been a successful example of the potential of globalization, but the upheavals of recent years have undermined its certainties and called into question the three central pillars of the Union's competitiveness: market, security, and energy. Mario Draghi's report identifies some basic strategic lines, translated into concrete economic policy proposals.

PODCAST
Carlo Altomonte

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In search of impact
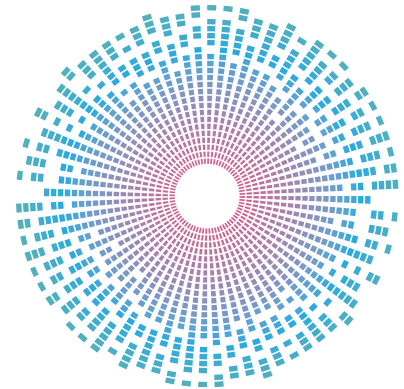
In order to translate the vast body of scientific knowledge into practices that transform organizations and processes to create value for business and wellbeing for society, a dialog between academic research and management practice is essential. Although the impact of research has traditionally been measured in academic terms, it is now also being considered from a socioeconomic perspective, assessed according to how it affects society, the economy and the environment. Innovation can only be accelerated and the ramifications of research maximized by fostering mutual learning between academia and business through an interdisciplinary approach.

IMPACT//RESEARCH//INNOVATION//VALUE CREATION//MANAGEMENT

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How can we improve the impact of scientific research on management practice and create real value for business and society, while avoiding the "ivory tower" isolation effect of academia? This question is one of the overarching challenges facing many of today's management disciplines. Indeed, the most innovative and rapidly developing economies are the ones that are able to produce high-impact research. For this reason, the need for a closer dialogue between academic research and management practice is now widely recognized, not only by academics and research centers, but also by European institutions, governments, managers and companies.

Since it was founded, SDA Bocconi has played a prominent role in helping bridge the gap between the world of academic research and management practice, including through the *Economia & Management* journal. This is precisely the premise of the webinar "In Search of Impact: from Theories to Practices,"[1] promoted by the journal's Scientific Committee and featuring **Nic Beech** and **Katy Mason**, respectively Vice Chancellor and Dean of Salford University Business School, **Paola Cillo**, Deputy Dean for Research at SDA Bocconi, and **Barbara Cominelli**, CEO of JLL, which has long focused on the dynamics linking the world of research with that of management practice.

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1 A recording of the webinar is available at the following link: emplus.it/talkspace.

The presentation of the work of Beech, Hibbert and Mason (2024) provided the initial impetus for an in-depth discussion on the topic of impact research. How can we translate the immense wealth of knowledge produced by the scientific community into management practices capable of transforming organizations and processes, creating value for businesses and institutions, and generating broad societal benefits? The study highlights how learning is essential to fostering interdisciplinary collaboration and achieving remarkable results. To support this view, the authors propose a framework for mutual learning between academia and management, divided into four interrelated steps: developing skills within both the academic and management communities to gain experience; facilitating dialogue and communication between the two communities (which is also often difficult due to issues of language diversity); adopting an interdisciplinary approach to consolidate and improve best practices; and finally, promoting reflective learning to initiate a gradual transformation of the academic and management communities. Ultimately, a growing commitment to learning is needed to improve the quality of relations between the two spheres, accelerate innovation and maximize the impact of research results.

During the webinar, Paola Cillo shared her experience in innovation studies to show how today it is increasingly complex to generate disruptive innovations. The key to meeting this challenge is to adopt an interdisciplinary approach that can produce knowledge capable of fostering radical innovation, overcoming the limitations of more traditional specialized strategies. The importance of activating "context innovation" and not only "content innovation" is another salient point emerging from innovation research. In this sense, SDA Bocconi's research platforms, with their various Labs, are a concrete example of a multidisciplinary innovation environment capable of effectively linking scientific research with management practice.

Barbara Cominelli's managerial perspective was an insightful contribution to the discussion, reiterating the importance of an ongoing dialog with academia. While management today is often focused on short-term deadlines and routine activities, academia can help broaden the managerial vision to a more strategic, long-term perspective. Difficulties in deciphering the content of academic papers, which are often characterized by technical language that makes them hard to read and understand, also emerged during the discussion. To help address this issue with papers that are more theoretical or that involve more complex methodologies, researchers could publish clearer and more concise versions highlighting the managerial implications of their work. In addition, according to the managerial perspective, it would be appropriate to take inspiration from the corporate world by introducing an incentive system that links the career progression and bonuses of academics to their actual ability to create social and economic impact.

The topic of impact has been explored both in the academic literature and by institutions concerned with research assessment, such as the Research Excellence Framework (REF) in the United Kingdom, the Research Quality Framework (RQF) in Australia, the Coalition for Research Assessment (COARA) in Europe, and the International Federation of Scholarly Associations of Management (IFSAM) worldwide. Initially, research impact was assessed primarily in academic terms, measuring the influence of publications on other researchers. This approach is based on quantitative indicators such as impact factor and H-index, which calculate the number of citations a journal, article, or author has received within the scientific community. A high citation rate, apart from opportunistic behavior that needs to be carefully monitored, should reflect the impact exerted on the academic community. Similarly, the publication of a study in a prestigious journal with a high impact factor is generally interpreted as an indication not only of the quality of the work, but also of its ability to reach a wide audience of scholars within the same field.

However, as impact cannot be confined to the academic dimension alone, many institutions, including those mentioned above, have begun to explore new metrics to measure the real ramifications of research, encompassing and especially beyond academia. For example, there has been an emphasis on assessing socioeconomic effects through indicators related to intellectual property, such as patents, and the profitability generated in terms of business (Australian Research Council, 2008). Indeed, the Research Excellence Framework defines research impact as the effect on the economy, society, culture, policy or public services, health, the environment or quality of life beyond academia. This means that the knowledge and publications resulting from research can be translated into concrete applications, such as new products, services or processes that can add value. But measuring impact is not without its obstacles and complexities. Among the most recurring issues are (1) factoring in the time lag between when research is conducted and when its impact becomes apparent; (2) directly attributing impact to a specific piece of research; and (3) gathering sufficient evidence about the actual impact of research in management.

In this issue of the magazine we find many interesting examples of impactful research. First of all, this issue's Focus section, written by colleagues from the Devo Lab and the Channel & Retail Lab at SDA Bocconi, which analyzes the implementation of artificial intelligence in a business context. The empirical research, based on development projects carried out at Microsoft's AI L.A.B., provided a specific understanding of the actual use of the technology by a sample of companies and the different ways in which they integrate AI with management skills to improve products, services and business processes. Focus, authored by **Meregalli**, **Ciacci**, **Diaferia**, **De Rossi** and **Raimondi**, addresses the issue

of AI implementation in companies from the perspective of academic studies and managerial practice, providing a concrete example of the link between scientific research and practical application. In this context, the authors noted that AI, as a general-purpose technology, needs sufficient time to manifest its full potential and truly transform business processes. For this reason, the Focus proposes a post-digital approach capable of overcoming impulsive enthusiasm and integrating AI in a strategic and, well, focused way.

Ciacci's and **Testa**'s reviews on AI and crisis communication, respectively, offer a synthesis of the immense body of work from hundreds of research papers on the topics under investigation. Literature reviews, when easily accessible to a managerial audience, are a very useful way to take stock of academic studies and understand what management can learn from a large body of research on specific topics. In particular, Testa's review in the Science section analyzes the use of social media in crisis communication strategies, highlighting how these platforms should not only provide information, but also respond to the emotional needs of the public, helping people manage their negative emotions (with the support of opinion leaders). This research also suggests effective tools to protect corporate reputation and rebuild trust in markets.

Also in the Science section, the paper by **Calcaterra**, **Colantoni** and **Sanesi** examines biodiversity – a key component in environmental sustainability – from the perspective of financial markets. This study highlights how biodiversity has a significant bearing on stock returns, underscoring the importance of integrating it into corporate strategies, even to meet today's increasingly stringent corporate environmental sustainability goals.

Continuing in the Themes section, **Nunziata**'s article highlights how companies that invest in resilience, not just agility, outperform the competition by demonstrating a greater ability to adapt and recover in the face of unforeseen events. Next, **Vizzaccaro**'s piece shows how title insurance in Italy has helped revitalize the market for donated real estate, securing purchases and sales, facilitating access to credit, and generating substantial economic value. Finally, the contribution by **Corbellini**, **Cerini** and **Paladino** examines the final stage of the distribution channel in the fashion and design sector: store management and, in particular, sales force management. The authors emphasize how essential sales staff are in developing strong narrative and advisory skills, as well as an entrepreneurial and sustainability-oriented approach, in order to promote a more informed buying process and enhance the attractiveness of this vital interface role.

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CREATING VALUE WITH AI
POST-DIGITAL BUSINESS STRATEGIES

Despite the optimism and the rush to create increasingly powerful AI models, the overall benefits of artificial intelligence remain unclear outside of large tech companies. In many realities, the tangible effects are not evident, despite the wide accessibility of available solutions. This is because, as a general-purpose technology, AI takes time to manifest its full transformative potential. In this context, a post-digital approach that overcomes impulsive enthusiasm is proposed as the ideal solution to integrate AI in a strategic, targeted way to create tangible value for businesses.

MANAGEMENT//ARTIFICIAL INTELLIGENCE//GENERATIVE AI//ICT//INNOVATION

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Since 2022, artificial intelligence (AI) has firmly established itself as a central topic on the innovation agendas of companies across a wide range of industries. From the first months of the launch of generative AI tools with easy-to-use interfaces targeting the consumer market, the scale of this phenomenon has been clear. OpenAI's ChatGPT, for instance, counted 100 million users within two months of its debut, becoming the fastest growing digital service ever. Fast forward to 2024, and the market's overall focus on generative AI is unmistakable, as evidenced by the upsurge in investments announced by major US tech companies deeply involved in the field. A significant portion of these funds are being channeled into the foundational infrastructure to support more and more advanced models and scale their application:

data centers. For instance, Amazon Web Services has committed to investing $100-150 billion over the next decade; Microsoft is constructing numerous data centers, including a $3.3 billion facility in Wisconsin and will invest €4.3 billion over the next two years to upgrade AI infrastructure and cloud capacity in Italy. Google beyond similar building projects, is going even further, having recently announced the acquisition of small nuclear reactors to meet its future energy needs. The first is expected to be operational by 2030. These developments highlight the transformative nature of this technology, which is reshaping the global ICT supply chain and impacting multiple sectors.

This wave of optimism, and the race among tech providers to develop increasingly powerful AI models, has led to a constant push for companies to adopt AI quickly, lest they miss out on its potential benefits. However, a thought-provoking article published by *The Economist* in the summer of 2024 offers a slightly different perspective. Despite the proliferation of generative AI solutions, which have become widely available at relatively low cost over the past two years, the tangible, large-scale effects outside the tech industry, and even within it, is less obvious. Many solutions have seen relatively stable adoption rates, macro-level productivity trends remain loosely linked to AI developments, and the stock of companies identified by Goldman Sachs as the most likely beneficiaries of the AI wave has underperformed on the S&P 500 index. This last observation has led some to argue, perhaps somewhat jokingly, that AI's impact is "everywhere but in the numbers."

A frequently cited explanation for this phenomenon is that AI, particularly generative AI, is a general-purpose technology with broad applicability across multiple sectors and domains. Historically, such tools take time to translate their potential into tangible value. While this reasoning is plausible at a macro level, it leaves serious questions for companies and managers who need to make timely investment decisions without the luxury of waiting for long-term impacts to materialize. Companies need to mitigate the risk of investing

in AI in ways that may be misaligned with their business needs and ultimately have negative repercussions on value creation. To do so, an effective strategy is to adopt a "post-digital" approach. This perspective promotes the idea of moving beyond the hype surrounding AI to a more pragmatic focus on the key business drivers that ensure AI applications deliver real value to organizations. It involves fostering a mature, deliberate attitude toward a technology that requires both the enthusiasm associated with a disruptive innovation and the critical thinking to avoid misaligning adoption efforts and business goals. Research conducted with Microsoft Italy highlights a promising range of AI use cases, particularly for small and medium sized businesses, demonstrating its enormous potential. At the same time, clearly such a powerful and pervasive technology is creating and will continue to create global economic asymmetries, affecting both businesses and individuals. That's why it is critical for companies to strive to position themselves on the right side of these shifts and avoid the trap of adopting AI tools simply by following trends. In practice, this means addressing the factors that, in hindsight, often explain the failure of attempts to implement technology. For example, it's essential to ensure access to the necessary infrastructure, verify that data and models are aligned with the specific needs of the company, and establish a regulatory framework that supports informed decision-making. These factors have guided the development of the HIT (High Impact Technology) Radar, a tool for assessing the effects and prerequisites for a value-driven - rather than hype-driven - approach to AI adoption within the post-digital framework.

For years, SDA Bocconi has been conducting research from this perspective through its DEVO Lab, with various initiatives exploring AI applications in business. The Focus section in this issue of *Economia & Management* addresses AI and generative AI through this lens, offering an overview of the current landscape, ongoing experiments and implementations in Italy, and a guide in the form of DEVO Lab's HIT Radar to help companies navigate AI adoption from a post-digital perspective.

ANDREA CIACCI

FROM THEORY TO PRACTICE
CRITICAL FACTORS IN AI IMPLEMENTATION

By investigating major trends in the literature on artificial intelligence, this article provides an up-to-date, structured overview of AI applications in the business context. In particular, it explores the most influential factors in AI implementation, divided into five main areas: drivers for adoption, skills needed for implementation, risks and challenges, key business processes where AI is applied, and outcomes resulting from its use. The article concludes with practical takeaways to translate this analysis into concrete actions, helping to map the elements that influence AI adoption and set measurable goals to optimize organizational processes and monitor the effectiveness of the overall business strategy.

ARTIFICIAL INTELLIGENCE//MANAGEMENT//MARKETING//BUSINESS PROCESSES//INNOVATION

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Artificial Intelligence (AI) is shaping new strategic landscapes by transforming competitive dynamics, interaction models, and value creation systems within the entrepreneurial ecosystem. The profound changes brought about by AI, combined with the promise of high returns on investment, have piqued the interest of both the academic community and industry professionals. In fact, AI has received increasing attention in recent management research, with findings showing that 70% of global CEOs are planning to make significant investments in AI over the next three years (KPMG, 2024), and that they view this technology as a disruptive factor with regard to competitive advantage. As shown in Figure 1, as of September 2024, the scholarly output of articles on AI in business, management, and accounting has

grown dramatically: since 2000, publications totaled 103,173, and of this number 48,833 have come out since 2020.

This rapid expansion of AI research has led to the production of numerous literature reviews aimed at synthesizing the findings of empirical and conceptual studies. However, the proliferation of these reviews has created a complex, fragmented landscape marked by a wide variety of approaches and perspectives, making it difficult for managers to gain a clear, unequivocal understanding of the most salient insights. In this context, by selecting and analyzing a number of noteworthy literature reviews that have made significant contributions to the field, this paper attempts to present a summary of the major trends and emerging issues in AI literature. In doing so, we aim to provide managers and researchers with an up-to-date, structured overview, focusing on what is most relevant to the business context.

Following a brief methodological note, the article presents the main factors and variables of AI, categorizing them into drivers for adoption, capabilities for implementation, risks and challenges, primary business processes in which AI is applied, and the outcomes it delivers. The article concludes with a number of practical takeaways.

METHODOLOGICAL NOTE

This research synthesizes the findings of literature reviews and conceptual papers on AI that are relevant from a managerial perspective. Our goal is not to provide an exhaustive overview of all existing literature, but rather to study the most representative literature reviews on business processes impacted by AI, concentrating on papers that offer a comprehensive vision of managerial implications, perspectives, and notable trends in the field.

The study focuses on English-language scientific articles published in leading international business, management, and accounting journals. The literature reviews were selected from the Scopus database using a search query that included keywords commonly applied in previous reviews on the topic, such as "artificial intelligence," "AI," "chatbot," "automated intelligence," and "neural network."

The selection process initially identified all articles on AI that matched these keywords. After excluding empirical studies and irrelevant articles, the final selection consisted of 14 articles. Our analysis was based on a thorough examination of the content of these articles to pinpoint the main

FIGURE 1 TIME TREND OF THE NUMBER OF SCIENTIFIC PUBLICATIONS ON AI IN THE FIELDS OF BUSINESS, MANAGEMENT, AND ACCOUNTING
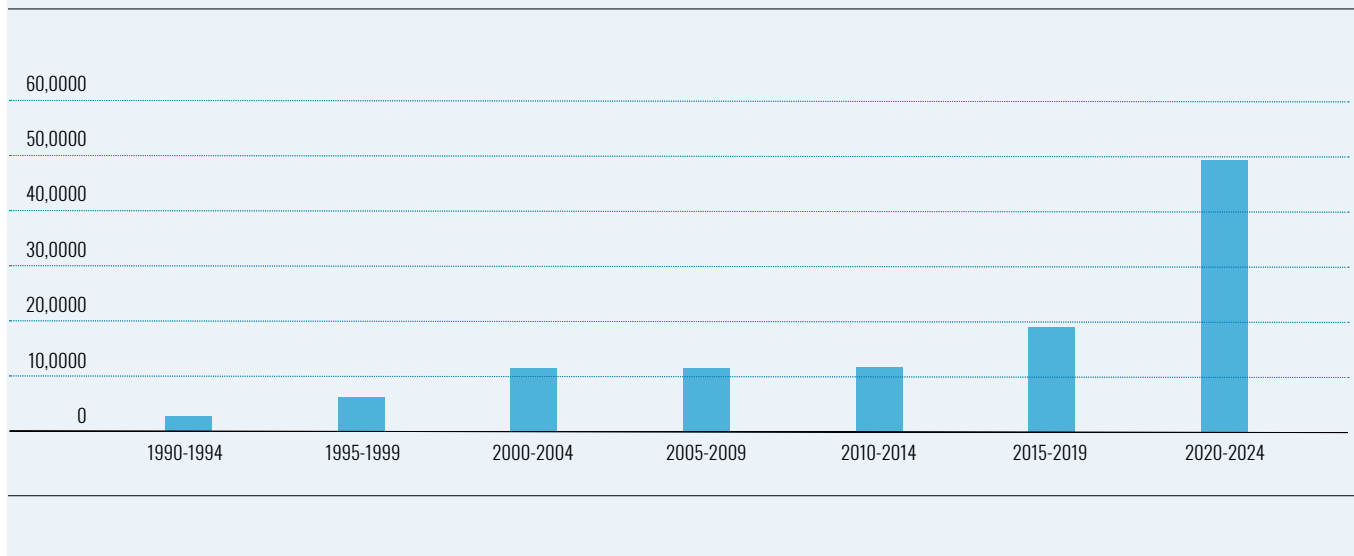
variables, categorizations, and the most frequently discussed business processes in the literature. This approach allowed us to compile a summary of today's most important research streams.

KEY FACTORS AND VARIABLES OF AI

Our analysis identified the main factors and variables involved in the AI implementation process, from adoption to outcome evaluation. These elements, as highlighted in the literature, include the antecedents of AI adoption, the capabilities required to implement AI, the risks and challenges

to be addressed, the business processes in which AI is most commonly applied, and the impact on business performance. Figure 2 provides a conceptual summary of the central factors for managing AI-driven processes.

Antecedents (drivers) of AI adoption
Antecedents represent the reasons and potential benefits that prompt a company to consider adopting AI. Among the most extensively studied are **economic and operational factors**. In fact, the potential economic benefits of AI are what incentivize its adoption. For example, AI cuts production and R&D costs and lead times, allowing

FIGURE 2: CONCEPTUAL FRAMEWORK OF THE KEY ELEMENTS INVOLVED IN AI IMPLEMENTATION

CAPABILITIES AND SKILLS FOR AI IMPLEMENTATION
Innovation and strategic development capabilities
Customer-centric orientation
Knowledge and information management capabilities
Technical capabilities, human skills,
and corporate governance models

ANTECEDENTS OF AI ADOPTION
Economic and operational factors
Technological factors
Algorithm-related factors
Organizational factors
Individual factors
Environmental factors

PROCESSES
Innovation
Decision-making
HR Management
Marketing
Supply Chain Management

AI BUSINESS OUTCOMES
Economic and operational outcomes
Strategic outcomes
Customer-level outcomes
Employee-level outcomes
Relational outcomes
Innovation outcomes
Environmental Outcomes

RISKS AND CHALLENGES IN AI IMPLEMENTATION
Technological and operational risks
Absence of effective risk management
Privacy breaches and regulation compliance
Talent management risk
Organizational risks

companies to offer more competitive prices for products and services (Mariani et al., 2023a). Applying AI to production processes enlarges capacity and optimizes resource management, so AI increases operational efficiency. What's more, multiple applications can lead to optimal management of the production stages (Pournader et al., 2021). In addition, AI supports decision-making processes to achieve better financial performance.

Technological factors are a fundamental set of AI enablers in the adoption phase, for instance big data (Mariani et al., 2023a). In marketing processes AI uses big data to analyze demographic, behavioral, and psychographic data to realize personalized products, marketing campaigns, and effective segmentation and targeting. Another example is the Internet of Things (IoT), which facilitates the adoption of AI by enabling high connectivity of devices that can collect and transfer data in real time (Toorajipour et al., 2021). And thanks to digital platforms, open-source strategies can be implemented from a user-centric perspective, which makes it easier to adapt to market changes.

Algorithmic factors (specifically, the design and transparency of algorithms) influence employees' willingness to trust AI and in turn promote its adoption (Mahmud et al., 2022). The modes and characteristics of algorithm interaction, such as response speed and accuracy, foster greater personal trust in AI and reduce aversion to its use (Glikson & Woolley, 2020). Anthropomorphizing interfaces of user-friendly algorithms can also encourage acceptance. Additionally, the ability of algorithms to learn from mistakes positively influences the likelihood of adoption. But ultimately this depends on the technology's ability to meet user needs in the specific application context, underscoring the importance of proper technology-task alignment (Prikshat et al., 2023). The adaptability of AI to existing business processes has a significant impact on the probability that it will be implemented.

Organizational factors are particularly important drivers at the managerial level. Specifically, organizational readiness, which includes the availability of technological, financial,

and human resources, is critical to AI adoption, as is the creation of specialized roles and cross-functional, interdisciplinary teams (Chowdhury et al., 2023). Moreover, top management can champion AI implementation by positively influencing the perception of its benefits and providing strategic support. The dynamic IT capabilities of the organization and the ICT skills of employees are also essential to facilitate both the adoption and routinization of AI.

Individual factors shape employees' willingness to use AI. In the relational domain, positive user experiences and the social influence of colleagues, friends, and supervisors increase the propensity to adopt AI. In addition, personal habits, such as familiarity with new technologies and digital training, can reduce anxiety and uncertainty, promoting individual AI adoption. Instead a tendency to rely on intuitive decision making can have the opposite effect (Mahmud et al., 2022). Psychological traits such as egocentrism, emotionality, anxiety, fear, uncertainty, and extroversion can produce mixed, offsetting the generally positive effects of financial and non-financial incentives (Mahmud et al., 2022).

Finally, **environmental factors** strongly shape a company's decision to adopt AI. These include the potential to introduce greener market solutions, reduce the negative consequences of climate change, and promote sustainability by optimizing green processes and reducing waste (Mariani et al., 2023a).

Capabilities and skills for AI implementation
With AI, companies can overcome human cognitive limitations and support managers by replacing them in some phases of certain business processes, thanks to enhanced data analysis capabilities that lead to the discovery of innovative solutions. For this to happen, however, businesses must equip AI with appropriate organizational, strategic, and process capabilities and skills, as the effectiveness of AI depends on the favorable conditions that management is able to create during implementation. Companies must also develop specific capabilities and competencies to implement

AI and to successfully manage it at a more advanced stage beyond adoption.

At this point, **innovation and strategic development capabilities** become critical. Effective strategic alignment means incorporating AI into long-term development plans and gradually integrating it into the core business (Borges et al., 2021). A rigorous performance monitoring system is essential to support AI and to achieve pre-defined goals. Without said alignment, there is a higher risk of failing to integrate AI into existing business processes. Maintaining a constant **customer-centric orientation** is also vital for successfully embedding AI into the core business and deriving maximum value from its use.

The **ability to manage knowledge and information** significantly determines the effectiveness of AI in business processes; this ability is contingent on refining knowledge management mechanisms (Chowdhury et al., 2023). Better knowledge and information management leads to greater accessibility and usability of critical information.

Technical capabilities, human skills, and governance models all contribute to maximizing AI's potential. Combining business expertise with AI usage skills is vital for translating AI insights into strategic decisions that support business objectives. For instance, uniting HR technical skills with AI usage skills can improve the accuracy and efficiency of recruiting, hiring, and performance management processes (Vrontis et al., 2023). In addition, leadership support is critical to driving AI adoption by fostering a culture of continuous innovation and organizational change, encouraging cross-functional collaboration across business units, and creating multidisciplinary teams with complementary skills.

Risks and challenges in AI implementation
Companies face many risks and challenges when implementing AI. **Technological and operational risks** arise for organizations that don't invest in data management or technology infrastructure, and don't allocate enough time or money for AI

projects. AI performance is critically dependent on the quality of the data used to train algorithms (Chowdhury et al., 2023). Incomplete, inaccurate, or biased data can lead to incorrect predictions and decisions, while outdated technological infrastructure can slow down processes and increase vulnerability to cyberattacks. Additionally, AI projects must be supported by financial resources commensurate with the scale and pervasiveness of the application. At the same time, goals must be timed to reasonably match the complexity of the project.

A **lack of effective risk management** can result in failing to identify and mitigate cybersecurity threats, exposing the organization to privacy and security issues. Privacy concerns, in fact, are one of the primary risk factors associated with AI (Mahmud et al., 2022). Because AI algorithms rely heavily on the use of data, data security in organizations is a serious responsibility. Inadequate management in this area can lead to **data breaches**, resulting in massive data exposure, customer churn, and compromised trust between employees and the company. When it comes to privacy and security, understanding and **adhering to existing regulations** is critical, as non-compliance with laws and security protocols can impact business operations, lead to crises of trust, and jeopardize relationships with stakeholders.

Talent management risks arise when the shortage of qualified individuals in data analysis and programming becomes a major obstacle, limiting the organization's ability to translate AI insights into actionable strategic plans (Benbya et al., 2020). As AI is a strategic resource with a wide range of applications, it's more essential than ever before to invest in talent and technical skills across various organizational levels and functional areas. This will determine a company's ability to successfully scale AI and find new opportunities for integration and pervasiveness.

AI management can also be ineffective due to **organizational risks**. Companies seeking to integrate AI must carefully consider these constraints, expedite knowledge transfer

across functional areas, and overcome outdated organizational models. The danger is that AI could be deployed in a fragmented manner if there is not a collaborative strategy between different business functions which would enable access to data across siloed structures, for example. Fragmentation can limit the ability to use AI synergistically across departments, resulting in the risk of functional isolation.

AI in business processes

Various processes - innovation, decision making, human resource management, marketing, and supply chain management - are the focus of the literature reviews in our sample. First, AI is critical to **innovation** due to its effectiveness in expanding the traditional boundaries of the creative process (Haefner et al., 2021). Basic AI relies on leveraging the existing knowledge base to process information beyond the cognitive limitations imposed by human mental models. More advanced AI systems extend the innovation process by generating new ideas, uncovering opportunities, and transcending local research routines to find less conventional solutions. These AI systems work in tandem with human managers. The more sophisticated capabilities of AI focus on exploring new paths in the innovation process, generating ideas with a high degree of creativity. These types of systems perform more complex tasks and not only support managers, but also replace them in certain tasks or phases of the processes mentioned above.

The applications of AI in **decision-making** processes are distinguished by their structural characteristics (Shrestha et al., 2019). The full human-to-AI delegation structure allows AI to make decisions without human intervention. This is used in domains where speed is crucial, prediction accuracy is paramount, and reproducibility of decisions is desirable. Then the sequential decision-making process involves humans and algorithms making decisions in sequence; and the aggregated human-AI decision process combines human and AI decisions into a collective effort based on aggregation rules such as majority voting or weighted averages.

In **human resource management**, two main strategic approaches to AI can be found: automation and augmentation (Chowdhury et al., 2023). Automation involves replacing humans in performing repetitive, rule-based tasks. This allows HR professionals to devote more time to creative, strategic activities. Augmentation, on the other hand, focuses on integrating AI's computational capabilities with human intelligence. When human decision makers combine AI with their own empathetic, cognitive, and organizational skills, they can leverage AI's potential to enrich the decision-making process. HR managers can also use automated or augmented AI in performance management processes to handle employee selection, monitor employee engagement in business activities, identify areas for improvement in diversity and inclusion, and plan workforce management strategies.

Moving on to **marketing**, AI is used in the three fundamental stages of **marketing** (Huang & Rust, 2021). First, AI provides enhanced data collection capabilities by automating information tracking, as well as fine-grained market analysis due to its superior ability to identify trends and customer preferences. As far as marketing strategies, AI assists in segmentation, targeting, and positioning. Through AI algorithms, marketers examine emotional data related to sentiments, preferences, and attitudes to deepen their understanding of customers, create detailed profiles, and personalize offers. Additionally, AI is applied to develop creative content, automate advertising campaigns, and optimize targeting. It can also reinforce loyalty management by scrutinizing purchase behavior and predicting retention and churn rates. Moreover, AI assists marketers in determining competitive product positioning. By employing data mining techniques and sentiment analysis, marketers can develop slogans and positioning statements that resonate on an emotional level with target customers. AI also plays a significant role in marketing promotions, with effective applications in pricing strategies. For instance, through machine

learning algorithms, AI enables automated pricing and optimizes dynamic pricing decisions.

AI is also widely applied in **supply chain management**, where it is used for detection and interaction functions, data learning, and decision making (Pournader et al., 2021). For example, AI evaluates unstructured text to automatically generate supply chain maps. Through computer vision and analysis of images or video, algorithms support inventory control activities as well. AI also enables real-time sharing of supply chain data, reinforcing connections with key stakeholders. This in turn hones the ability to optimize the supply chain, making it more resilient and responsive to changes. Using supervised learning from historical data, AI predicts future demand and plans production accordingly. Such learning allows for the discovery of hidden patterns in the data, identifying trends and anomalies that could impact the supply chain. Expert systems replicate the work of expert humans by using coded rules and fuzzy logic to assist human decision makers to make strategic and operational choices. More advanced modeling techniques make it possible to simulate alternative scenarios to deepen the understanding of supply chain behavior and risk management.

AI business outcomes

Among the most commonly studied AI outcomes in the literature are **economic and operational** in nature. Research has shown that AI strengthens business performance and effectiveness, reduces costs and processing time (Mariani et al., 2023a), upgrades operational efficiency by increasing delivery reliability and predicting potential service disruptions, optimizes inventory management and logistics, and limits bias and human error (Toorajipour et al., 2021). In addition, AI finetunes workforce management and assists managers in collaborative activities, boosting business efficiency. AI also provides more accurate performance measurement at the ecosystem level, helping companies assess risks associated with strategic partnerships.

Related to the above are the **strategic**

outcomes of AI. For instance, by enhancing data visualization through advanced tools that transform large volumes of data into intuitive graphical representations, AI perfects the accuracy of strategies (Borges et al., 2021). Predictive models increase strategic proactivity and reactivity by processing sales trends, consumer behavior, and market dynamics. The capacity for strategic adaptation is also heightened by AI's role in real-time price regulation based on demand, competition, and other market factors. Furthermore, AI enhances the effectiveness of loyalty strategies by probing purchase behavior and customer interactions, identifying clusters of customers at risk of churn, and suggesting actions to revive loyalty.

AI has a significant impact on the company's key stakeholders. Specifically, **customer-level outcomes** focus on the effectiveness of AI in extending engagement in business dynamics, enriching the shopping experience, and enhancing customer satisfaction. In terms of **employee-level outcomes**, AI allows companies to automate repetitive administrative tasks and promotes the re-skilling of employees for higher value-added activities. AI also boosts individual employee productivity and performance management capabilities through instant feedback systems (Prikshat et al., 2023). AI positively shapes not only the development of professional human capital, but also internal relational social capital, encouraging employee engagement and in turn enhancing their psychological well-being and organizational trust (Vrontis et al., 2023). In terms of **relational outcomes**, AI makes it easier for stakeholders to share and integrate data, positively influencing collaborative dynamics and communication among colleagues, functional areas, and strategic partners.

The literature on **innovation** has shown that AI facilitates the restructuring and reengineering of business processes and the creation of new business models. Thanks to AI, organizations can also explore the frontiers of product and service innovation (Mariani et al., 2023a). For instance, AI supports patent analysis for technology forecasting,

provides geospatial information on technological development in different geographic areas, and promotes innovation strategies tailored to a variety of contexts. By combining AI with individual and organizational dynamic capabilities, companies can generate innovative organizational models that serve as differentiators. Furthermore, AI also supports social innovations such as diversity and inclusion (Mariani et al., 2023b).

In terms of **environmental outcomes**, AI can identify greener solutions for new product introductions and promote the creation of sustainable, circular business models. AI also enables organizations to use of energy, water, and agricultural resources more efficiently. What's more, with AI sensors, companies can monitor the effectiveness of their production processes in real time, promoting initiatives for ecological improvement (Pournader et al., 2021).

CONCLUSIONS

The overview presented in this article provides a structured guide for understanding and contending with the opportunities and challenges associated with AI implementation in businesses. Our summary of critical success factors for AI can serve as a practical tool for managers to map the elements that facilitate or hinder AI adoption, guide the development of key capabilities and competencies, mitigate risks, optimize business processes, and evaluate outcomes by defining measurable objectives that make it possible to monitor the actual contribution of AI to the overall business strategy. Ultimately, this framework can be seen as a guide for integrating AI into organizations, helping to identify priority areas for investment to promote more informed adoption.

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THE REALITY BEYOND THE HYPE
THREE-DIMENSIONAL APPLICABILITY

DEVO Lab's HIT Radar framework helps organizations identify and evaluate use cases where artificial intelligence (AI) can concretely improve business processes and create sustainable value. In line with the post-digital approach, it provides a balanced perspective on the potential of AI, distinguishing opportunities for real impact from technological hype. Through a structured analysis of selected use cases, the framework makes it possible to assess their actual applicability considering three key dimensions: proximity to adoption, business impact and speed of evolution, and integrating internal and external factors such as infrastructure and regulation.

MANAGEMENT//INNOVATION//GENAI//SUSTAINABILITY//LARGE LANGUAGE MODEL (LLM)

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The technology landscape is often characterized by a succession of fads that either prove ephemeral or become permanently integrated into business processes and everyday life (Chen, Kazman and Matthes, 2015). Over the past decade, three technologies have stood out in terms of their anticipated impact:

- The Cloud promised unprecedented flexibility and modularity, allowing businesses to scale resources dynamically with superior cost efficiency (Bello et al., 2021).
- Big Data, along with the introduction of data lakes (vast repositories of unstructured data), was expected to offer a radically innovative way of collecting and analyzing information by using massive data analytics to predict trends,

improve decision-making, and personalize user experiences (Wang, Kung, and Byrd, 2018).

- Blockchain, initially driven by the explosion of bitcoin, brought with it the hope of radically decentralizing money transfers, with expected benefits in terms of security and traceability (Tapscott and Tapscott, 2018). However, its impact has been significant only in a few specific sectors, and its applications have turned out to be more limited than initially expected and restricted to certain business contexts (mainly due to technical challenges and high costs).

Looking at the diffusion of these technologies, we can see that some have indeed achieved massive and pervasive adoption, as in the case of the cloud, while for others, such as blockchain, expectations have diminished due to the lack of widespread and sustainable large-scale use cases.

Artificial intelligence (AI) is arguably the most talked about and potentially most promising technology today. With the advent of ChatGPT, millions of people have experienced the accessibility of generative AI, creating tremendous hype around the topic. Although AI did not emerge in 2024, its popularity, especially following the global success of ChatGPT, is unparalleled. AI is now predicted to become a driver of transformative change, helping companies to improve decision-making, personalize customer interactions, and streamline operations, among other things. Despite this excitement, it's worth asking whether AI might follow a similar trajectory to blockchain. In fact, there is a possibility that the current hype around AI may lead to expectations that exceed its actual value. To avoid "technological overenthusiasm," a structured and critical approach to AI is essential.

The aim of this article is to provide a balanced and thoughtful analysis of AI in 2024, adopting a *post-digital* approach (Castelli, G., Meregalli, S., & Pennarola, F., 2022) which seeks to go beyond simplistic views of AI, emphasizing a comprehensive digital strategy that identifies and properly assesses technological trends. Through the structured analysis outlined in the following

sections, we will review the most prominent AI use cases, with the aim of mitigating the hype surrounding AI and focusing on applications where businesses can genuinely derive value today.

A POST-DIGITAL APPROACH TO AI

As we previously mentioned, this article adopts a post-digital approach, based on DEVO Lab's HIT Radar methodology, which includes multiple sequential phases (Abbatemarco N., 2022). The first phase consisted of a multi-sector desk analysis to tap into the most relevant discussions around AI. The second phase focused on the systematization of the resulting database, allowing us to pinpoint the most discussed elements related to AI. Finally, we conducted an in-depth analysis of these elements.

Our research started with a technology scouting phase in which we found 56 specialized sources, including industry reports, technology analysis articles and consultancy studies, for a total of 92 documents. From these sources, 154 technological elements emerged that were relevant to AI, forming the basis for our preliminary analysis. This phase provided a systematic overview of the AI application landscape, resulting in the identification of six application areas, recurring themes across all our sources, which are of particular relevance to this article:

- **Generative AI Bots for Customer Interactions**: Using chatbots to enhance and personalize customer interactions.
- **Generative AI for Marketing Optimization**: Tools for optimizing marketing campaigns and messages.
- **Generative AI for Personal Productivity**: Solutions to improve personal efficiency and productivity.
- **AI for Demand Forecasting**: AI-based systems for forecasting customer demand.
- **Intelligent Document Management (IDM)**: Applications for advanced management and processing of business documents.

- **AI for Automated Image Analysi**s: Technologies for automated image analysis.

We analyzed these six applications using a multidimensional framework that considers three primary factors: *distance*, *impact*, and *speed*. The first assesses how close a technology is to practical adoption, considering technological maturity, compatibility with existing infrastructure, regulatory alignment, accessible skills, and financial feasibility. A high score on distance indicates greater readiness for adoption. The second dimension, impact, measures the benefits that the technology could bring to the company, evaluating aspects such as economic performance, organizational advantages, and effect on sustainability goals (ESG). This evaluation focuses on the positive repercussions the technology can have at various levels of the organization. The third dimension, speed, refers to how fast the technology is evolving, i.e., the pace at which it is advancing and disseminating, examining direct investment, regulatory changes, skill diffusion, and infrastructure development. Therefore, this framework provides a comprehensive view of the positioning and potential impact of each application, which we will detail in the following section.

THE MOST RELEVANT AI APPLICATIONS

From the perspective of a medium to large company operating in Italy, all the AI and generative AI applications we considered proved to be fully experimentable or adoptable, with a moderate potential impact and a high or very high rate of evolution. These findings confirm both the feasibility and the relevance of pursuing business innovation in these areas.

Generative AI Bots for Customer Interactions
Customer interaction chatbots are currently one of the most hotly debated applications in generative AI. These tools consist of conversational interfaces designed to assist users with a variety of tasks, such

as technical troubleshooting support, help with using a tool, purchase of new products, and more. Unlike previous iterations, these generative chatbots go beyond pre-programmed responses to provide more dynamic contextual responses.

Many companies are currently experimenting with these chatbots, particularly in customer service, sales, and internal support. These trials are often limited to specific business functions to test effectiveness and manage interactions in a controlled setting. A key focus of ongoing projects is to analyze the quality of responses generated, the accuracy of suggestions made, and the extent to which these chatbots can resolve issues without human intervention, monitored by user feedback. Typically, these solutions are based on AI models produced by external providers, such as specialized AI companies (e.g., OpenAI, Anthropic, Meta) or cloud providers (e.g., Google, Microsoft, Amazon Web Services). These basic models, known as Large Language Models (LLMs), are characterized by their complexity and high development costs. By starting with available market solutions, the chatbot can integrate foundational knowledge from the basic training dataset and further customize it to meet specific business needs. These customizations often use techniques such as Retrieval-Augmented Generation (RAG), which extends the model's standard knowledge base and amplifies its ability to provide relevant responses.

In terms of the distance dimension, this application is primed and ready for extensive experimentation or, in some contexts, full adoption. Accelerated technological progress in the last two years has paved the way to accessing core technologies, leading to the emergence of several specialized providers. Despite these promising advances, formidable challenges remain that could limit widespread adoption. Key risks include potential inaccuracies in the answers provided to users (so-called "AI hallucinations"). While certain techniques can mitigate these risks, close performance monitoring is always required to avoid potential problems for businesses. Also essential is the need to effectively integrate these chatbots

with existing information systems, ensuring that corporate data and internal functionalities are easily accessible and interconnected. Although this challenge is common to most digital applications, it's sometimes underestimated when there is a technology like in the picture, which seems to lower the barriers to entry. For the same reason, data accuracy and quality, along with proper preparation and cleansing, are critical prerequisites for creating a use case that is both contextual and aligned with business needs.

From an impact perspective, we are currently in an assessment phase, with a proliferation of experimental studies and use cases emerging in the public domain. Ongoing testing shows promising signs, such as increased operational efficiency, but the effectiveness of these chatbots still needs to be verified in different contexts. For this reason, many companies initially deploy these tools for internal use, to assist human operators in customer support or troubleshooting tasks, before aiming for full autonomy in customer interactions.

In terms of the expected speed of evolution, the pace of innovation in this area is particularly rapid, driven by sizeable investments across different sectors and continuous regulatory progress, especially in Europe, where new norms will be phased in over the coming years. Meanwhile, the foundational technologies for these types of chatbots are being quickly updated, with new language model versions and continuous improvements. Such changes are fueling intense competition in a burgeoning market for enterprise applications.

Generative AI for Marketing Optimization

Generative AI for marketing optimization aims to help companies enhance the personalization of messages and communication campaigns. These tools are designed to autonomously generate content based on data analysis of customer characteristics, tailoring promotional messages to the specific profiles of target users. Compared to traditional methods, generative AI can support more autonomous and continuous personalization

for the segments in question, with the goal of increasing the relevance and appropriateness of messages for each audience group.

Currently, many companies are testing generative AI in contexts such as email marketing, social media campaigns, and ad content generation for digital channels. These experiments often focus on the automated creation of text, images, and ad copy to optimize engagement and conversion rates. The actual development of these solutions follows a technological approach very similar to the one described in the previous application, involving customization of AI models already available on the market or a full-buy approach.

From the perspective of distance and impact, generative AI in this domain is similar to its application with chatbots. Various use cases and experiments are proliferating across all industries, with the goal of improving the effectiveness of customer communications in many ways. For example, a company focused on beauty and skin care is building and testing a system to create personalized messages for different customer targets, segmented by age range and predicted usage preferences for the product. Based on the same product description, the tool allows for customization of promotional copy, emphasizing aspects that may be more relevant to each target audience.

Despite promising experiments, we are still in the early stages of evaluation, and more evidence of economic and organizational impact will be needed to validate the widespread adoption of these approaches. A key consideration is the need to tailor available market models to the company's tone of voice and the specific characteristics of the targeted application area.

Generative AI for Personal Productivity

AI for personal productivity covers a wide range of applications designed to upgrade the efficiency of individual work activities, Which can range from more general tasks such as text processing, summarization, and information extraction from unstructured data, to more specialized tasks such

as programming. Programming and generative assistants that support developers are of particular interest. Many companies have started to test these tools in this area, facilitated by the accessibility of off-the-shelf products on the market. For instance, the widespread adoption of GitHub Copilot, which is intuitively integrated into the workflows of many organizations, has undoubtedly contributed to the popularity of this application.

Of course, there are many alternatives available, each with a slightly different focus or specialization. At the same time, some companies are taking a more customized approach to integrating generative tools for personal productivity. For example, Goldman Sachs, which has been experimenting with developer support solutions for months, has decided to build a proprietary technology platform to incorporate externally pre-trained AI models that are subsequently fine-tuned for specific use cases. This approach undoubtedly requires greater capability and resources for technical oversight, but also provides far more technological flexibility.

In terms of the distance dimension, these solutions are already being adopted in various contexts and tested in many others. On the impact side, several experiments have been conducted in recent months to isolate productivity effects. For example, research on several thousand programmers from three large companies showed a 26% upsurge in average weekly productivity, although this benefit was achieved with a sharp decline based on age and seniority. Additionally, other studies have shown that while code written by programmers using generative tools may be more exposed to security risks, the programmers themselves perceive it as entirely safe and of high quality. This finding has implications not only for the performance of AI, which is constantly evolving and improving, but also for understanding the perceptions of workers equipped with generative AI. These insights can prove valuable in planning and supporting adoption within companies. In addition to these applications, the we found three application areas linked to more traditional AI

techniques that could be equally useful in various contexts.

AI for Demand Forecasting

Customer demand forecasting systems are already in use across various business sectors. These systems often rely on traditional machine learning approaches to generate forecasts. They differ significantly from the cases described above both in terms of the technological approach and the underlying methodology. Generative AI models, for instance, are typically characterized by high complexity, substantial data requirements, and considerable computing power for training. In contrast, traditional machine learning approaches follow different principles. In the case of generative AI, companies on the demand side of the technology market will often rely, at least in part, on externally developed solutions. Conversely, with traditional machine learning, creating an internal predictive model using company-specific training data and techniques suited to the specific problem is often the most effective way to achieve desired outcomes.

Given the maturity of the techniques underlying these types of forecasts, such systems are already in use in many sectors. For example, a residential electricity provider in Italy recently updated its demand forecasting system, which must be reported in advance to the system operator, using a machine learning approach. Predictions based on historical data have achieved an accuracy rate of more than 96%.

In light of the above, demand forecasting applications appear to be well-established, both in terms of distance and impact. However, two potential limitations should be noted when evaluating this application. The first relates to the alignment of a forecasting system with the value creation mechanisms specific to the industry and company. In some fields, making reliable predictions based on historical user behavior data or external market factors may not be particularly helpful or realistic, as consumer behavior and purchasing trends may depend on numerous variables that are difficult to capture. Regardless of

the quality of the model, the lack of data that can effectively take into account all of the influencing factors may limit the actual benefits. The second limitation is the need to have the right data quality and management infrastructure in place to effectively develop and operate these models.

Intelligent Document Management (IDM)

Intelligent Document Management (IDM) is a set of digital technologies that automate and intelligently manage classify, store, and retrieve documents. This technology goes beyond traditional document management systems by integrating AI capabilities that support categorization, automatic data extraction, and content analysis to accelerate business workflows.

In terms of adoption readiness, IDM shows a high level of technological maturity, as it is already widely implemented in many companies and has a well-defined infrastructure ready for most business environments. Today's IDM solutions are compatible with digital and management systems, reducing integration costs and fostering interoperability. An established regulatory framework for managing and preserving digital data further enhance IDM readiness, particularly for companies in highly regulated sectors such as finance and healthcare. (In Europe this framework is subject to ongoing updates.)

The economic impact of IDM can be considerable, as this technology helps reduce document management time and costs, boost efficiency, and minimize manual errors in business processes.

Organizationally, IDM facilitates more streamlined and structured document management, promoting more agile business practices and an efficient operational structure. IDM also has a positive impact on sustainability by reducing paper consumption, promoting greener document management, and supporting governance through improved data management traceability and compliance.

AI for Automated Image Analysis

AI for automated image analysis includes advanced technologies that use deep learning models to process, interpret, and classify images in real time. This approach enables companies to automate quality control, medical diagnostics, and security analysis, sharply cutting analysis time and improving operational accuracy.

This application has reached a high level of technological maturity, with increasingly sophisticated algorithms capable of recognizing complex patterns and pinpointing specific details within images, often with performance comparable to or exceeding that of human operators. While the infrastructure required to implement these solutions can vary in different contexts, many companies already have the necessary hardware and software to handle large-scale image processing. Industry-specific regulations are evolving, especially in highly regulated areas such as healthcare, where accuracy and transparency are essential. Implementation costs are gradually becoming more affordable, making this technology relatively close to adoption for any number of organizations, and many specialized providers are available.

In terms of expected advantages stemming from adoption, this application offers substantial economic benefits, especially in sectors such as manufacturing and healthcare, where accurate image analysis can dramatically reduce the cost of errors and enhance operational efficiency. From an organizational perspective, this technology facilitates a shift toward more accurate, automated processes, potentially improving the quality and

speed of business decisions. Regarding sustainability, AI for image analysis contributes positively to process governance and operational traceability. Consequently, the overall impact of AI in this area can be rated as medium-high, with a broad range of economic and operational benefits.

In conclusion, AI for automatic image analysis is a mature, ready-to-deploy application with a potentially high impact and a rapid rate of evolution. Companies seeking to optimize control, quality, and safety processes can significantly benefit from this technology by leveraging its ability to improve operational accuracy and efficiency.

CONCLUSIONS

In this article we presented a post-digital approach to AI, emphasizing the need for a pragmatic view that seeks to manage expectations around AI technologies and escape the hype of the moment, always with the goal of creating business value. DEVO Lab's HIT Radar methodology is a structured framework that can help companies apply this mindset in practice by analyzing potentially relevant AI use cases through assessments in terms of distance to potential adoption, expected business impact, and anticipated speed of evolution. Each dimension is supported by a detailed assessment of different variables that capture both endogenous and exogenous elements (e.g., business infrastructure readiness, regulation).

Based on an analysis of more than 90 technical documents, we identified six recurring AI-enabled use cases and evaluated them using the HIT Radar methodology:

- **Generative AI Bots for Customer Interactions** improves customer service with conversational AI, providing contextual support and increasing operational efficiency through automation.
- **Generative AI for Marketing Optimization** supports highly personalized marketing campaigns by generating tailored content for specific targets to boost engagement and conversion rates.
- **Generative AI for Personal Productivity**: assists individuals with tasks such as text processing and programming, escalating efficiency and productivity.
- **AI for Demand Forecasting** leverages traditional machine learning to finetune demand forecasting, supporting resource planning and inventory management with high accuracy.
- **Intelligent Document Management (IDM)**: automates document categorization, data extraction and retrieval to improve workflow efficiency and reduce errors.
- **AI for Automated Image Analysis**: automates real-time image interpretation for tasks such as quality control and diagnostics, delivering precision in industries such as manufacturing and healthcare.

We found that sll of these AI applications are ready for advanced experimentation and eventual adoption. By integrating methodologies such as the HIT Radar approach, organizations can conduct progressive, iterative evaluations to assess potential AI use cases and avoid investments driven by the hype effect.

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SUCCESSFUL BUSINESS CASES
AI IMPLEMENTATION BEST PRACTICES

Through the analysis of successful business cases, the article aims to identify key steps and best practices in AI implementation in order to develop a set of principles that can guide managers in business practice. To optimize business operations and transform AI into a driver of innovation and value, specific development steps must be followed: from establishing a solid strategic and organizational foundation, to fostering optimization and continuous innovation, to promoting incremental operational and technological development. Each step is essential to ensure the long-term success and sustainability of AI business initiatives, thereby promoting adaptation to future challenges and overall improvement in business performance.

MANAGEMENT//STRATEGY//INNOVATION//AI//IMPLEMENTATION

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In September 2023, Microsoft Italy launched the AI L.A.B. (Learn – Adopt – Benefit) project, an initiative designed to help companies assess and implement generative Artificial Intelligence (AI) solutions through tailored consulting, training, and skill development to enhance individual productivity and business competitiveness. Including currently over 320 companies and 450 generative AI projects—half already in production—the program has also trained thousands of professionals in AI-related skills. The project involves universities, institutions, and strategic partners to bridge the digital skills gap and promote the responsible adoption of these technologies.

Within such a dynamic and innovative ecosystem, Microsoft and SDA Bocconi (DEVO Lab and Channel & Retail Lab) established a partnership

to evaluate the most successful case studies and acknowledge them as part of the AI Heroes Awards, rewarding the most innovative AI applications, and develop managerial best practices. As part of this partnership, the research team conducted semi-structured interviews with informants from companies across various sectors and sizes, identifying AI implementation processes and key activities within these processes.

The information gathered was rigorously analyzed to identify the critical stages and best practices in AI implementation, with the goal of creating a practical guide for managers. By synthesizing various corporate implementation models, a comprehensive framework has emerged, outlining the key steps, determining factors, and critical variables for success across the different implementation phases.

This article will briefly present the data collection and analysis methods, describe successful case studies – AI Heroes – with their distinctive characteristics, and, based on the analysis results, offer a ten-step guide to essential best practices for effective AI implementation in business.

METHODOLOGICAL APPROACH

The methodological approach of this research is based on multiple-case study design. The initial sample, on which surveys were conducted in April-May 2024, included all companies participating in the AI L.A.B. and Microsoft's corporate participants (N=300). A scientific committee, composed of industry experts and academics, conducted evaluations in a multi-phase selection process to narrow the total number of cases, focusing exclusively on the most relevant ones. Drawing from academic literature on the topic, a research protocol was developed to systematically analyze each company's AI implementation process, examining aspects of both practical and theoretical significance.

To gather in-depth information on the key aspects of AI projects, semi-structured interviews were conducted with 20 companies identified

in previous evaluation phases as being the most structured and innovative in their AI applications. In this stage, the research team gained insight into the general characteristics of these projects, including short- and long-term objectives, drivers of AI adoption, specific application areas, and the overall project scale. Interview questions focused on the implementation process to understand the strategies for project realization, including resources used, project management techniques, and the challenges companies faced in overcoming obstacles encountered along the way.

Additionally, key performance indicators (KPIs) were analyzed to understand how project success would be measured and assessed. Finally, the future development prospects of the projects were explored to evaluate the sustainability and scalability of the initiatives. To ensure accurate selection, supplement information, and verify critical project details, follow-up assessments and more detailed evaluations were conducted as needed.

This research ultimately examines six business case studies, identified through comparative analysis as the most innovative, well-designed, and top performing, i.e., the 6 most virtuous companies in the development of AI projects, which were recognized as part of the AI Heroes Awards born from the collaboration between Microsoft Italia and SDA Bocconi School of Management.

SUCCESSFUL CASE STUDIES

The interviews allowed for an in-depth examination of the AI implementation process in the most successful case studies – AI Heroes – selected based on criteria of innovation, impact, and scalability of AI applications. The following subsections detail the key characteristics of the analyzed cases and their respective AI projects.

Chimica HTS (AI Heroes Award in the Innovation Vision category)
Chimica HTS has been supporting companies involved in the distribution, production, and

development of sustainable products—especially cosmetics and detergents—for over 20 years. The company provides technical, scientific, and regulatory consulting services to help clients create innovative, compliant products and obtain environmental certifications, such as the EU Ecolabel. The corporate project developed by Chimica HTS, in collaboration with Microsoft Italy, has integrated AI to enhance several processes within the non-food industrial sector, with a special emphasis on legal compliance. Microsoft's generative AI aids in regulatory compliance, label verification, and error reduction, accelerating time to market and improving client service quality.

By using an incremental approach to change management and setting up specialized teams, Chimica HTS has achieved gradual, targeted adoption of new technologies that enable personnel to focus on higher-value activities. Key goals of this AI project include reducing training times, increasing operational efficiency, and enhancing the company's sustainability efforts, aligning with the broader goals of ecological transition.

Intercos Group (AI Heroes Award in the Marketing of the Future category)

Intercos Group, a global leader in the B2B cosmetics sector, focuses its activities on the ideation, development, production, and commercialization of cosmetics, skincare, and personal and hair care products. Collaborating with major international brands, emerging businesses, and retailers, the company delivers innovative solutions to the beauty market. Its core business is built on research, technological innovation, and sustainability, with a strong emphasis on eco-friendly processes and supply integration.

Intercos Group has incorporated Microsoft's generative AI into operations to revolutionize the creation of marketing fiches, combining the power of technological innovation with heightened attention to market trends. The project's goal is to develop tailored marketing fiches based on a combination of customer, product, and market data to build customized value propositions. AI trained

on historical documentation to generate textual content, refined through continuous iterations, to enhance productivity and operational effectiveness.

Leveraging its data powerhouse, Intercos Group integrates both internal and external information to ensure that its marketing fiches remain relevant and impactful.

illimity Bank (AI Heroes Award in Customer Centricity)

The first of its kind in Italy, illimity Bank is a new paradigm bank that has created a fully digital, modular, and cloud-based IT system. Founded five years ago to serve the Italian business market, illimity has surpassed €100 million in net profit (as of December 31, 2023), now has over 900 illimiters, and is distinguished by its innovative, digital approach to the banking sector. Its core business consists of providing credit to high-potential SMEs, particularly companies in growth phases or in moments of discontinuity that require restructuring or relaunch. Additionally, it offers direct digital banking services through illimitybank.com. The bank has implemented an innovative, AI-based governance model designed to standardize and monitor the use of AI and optimize operational costs. This system ensures security and compliance through an access control system for proprietary and open-source models. Two main use cases are already in production: Ermes, a virtual assistant based on Retrieval-Augmented Generation (RAG) technique, which allows retail customers to interact with the bank in real-time, improving customer service efficiency; and Pixie, a project that uses AI-generated images to personalize the user experience in the app, making it more engaging. The project, developed leveraging Microsoft's AI and Gen AI technologies, aims to boost operational efficiency and reduce costs while maintaining a high level of customer satisfaction, which is tracked through surveys and feedback.

SACE (AI Heroes Award in Innovation and People Engagement)

SACE, a company controlled directly by the Ministry of Economy and Finance, is the Italian

insurance/financial group specialized in supporting the competitiveness of companies in Italy and around the world. Collaborating with Microsoft Italy, SACE has adopted AI to enhance employee productivity and well-being. In fact, by leveraging AI tools, the organization has optimized its employees' daily work to free them from repetitive tasks and allow them to dedicate quality time to higher-value activities: personal development, well-being, and volunteer initiatives for the benefit of the whole community.

The project, which began with a pilot phase, has had a positive, tangible impact – with a 23% surge in productivity - supported by ongoing monitoring. Based on this outcome, SACE has further extended Microsoft's AI solutions to reach a Copilot utilization rate of 94% among its employees. The adoption of AI has been driven by a progressive approach involving pilot groups and co-design sessions, complemented by creating a community to foster cultural change and corporate literacy. SACE's goal is to have happier, more engaged, better prepared people and to equip them with the most advanced technology – all this to make the company more productive, enabling it to offer innovative solutions to its customers, both in Italy and abroad.

Reale Group (AI Heroes Award in Industry Innovation)
Reale Group is an international enterprise with a strong presence in the insurance, real estate, and banking sectors. Its core business centers on insurance solutions to cover personal and business risks, health, pensions, and savings. In addition to these activities, the Group also manages real estate and offers financial services. Leveraging its collaboration with Microsoft Italy, Reale Group has pioneered the adoption of AI on a large scale in this country to improve cooperation and business efficiency. As part of the Group's broader program to adopt and implement AI solutions, Reale Group first promoted a pilot project open to employees in different roles and countries, focusing on training and raising awareness of AI through dedicated workshops and internal communities. The company also aimed to optimize processes and develop new

skills in key areas of its core business, applying AI to claims management, automatic recognition of documents and images for expert reports, optimization of climate risk analysis, etc. Moreover, Reale Group introduced training and onboarding paths for agents and employees to level up sales capabilities and optimize operational flows. A feedback system integrated into a KPI dashboard also made it possible to monitor the impact of AI adoption, continuously measuring its effectiveness and efficiency. The entire program originated and continues to operate conforming with the guidelines of modern, responsible AI consistent with the Group's principles and values.

MAIRE (AI Heroes Award in AI-Driven Enterprise)
MAIRE is a leading technology and engineering group that develops and implements innovative solutions to enable energy transition. The Group creates value in 50 countries and relies on over 9,000 people. MAIRE has integrated Microsoft's generative AI to improve operational efficiency and foster technological innovation, and AI adoption has involved the entire organization, facilitated by an internal portal that encourages experience sharing and a continuous feedback system.

MAIRE's approach revolves around democratizing AI usage by equipping all employees with the basic functionalities of Microsoft Copilot and emphasizing the automation of document processes and the optimization of individual productivity. Key use cases include automated text generation, office automation, and intelligent processing, resulting in overall time savings of approximately four hours per month on daily activities for each employee.

Additionally, MAIRE has established a dedicated business unit for document management and a new business line focused on interface management systems. Looking ahead, the company plans to extend Microsoft Copilot usage to specific vertical scenarios such as SAP, legal, and service sectors, positioning itself as one of the leaders in AI adoption, with a strong commitment to a low-carbon future.

THE EMERGING FRAMEWORK FOR AI IMPLEMENTATION

From the analysis of the case studies above, we developed a multi-level framework (Figure 1). It outlines the essential steps for effective AI implementation, ranging from the initial strategic planning phase to long-term management and maturation. This framework consists of three distinct levels:

- **Strategic and organizational foundations** are the fundamental pillars that represent the requirements for effectively initiating and developing the AI implementation process.
- **Operational and technological development** is an intermediate level that encompasses the critical elements necessary for success during the transition phase. Once objectives are established and the path is mapped out, this step marks the transition from planning to execution.
- **Continuous optimization and innovation** includes development activities during the maturation phase of corporate AI, the guiding principles being ongoing monitoring and continuous innovation.

This section describes the three levels of the framework, outlining the key activities and actions to make the AI implementation process effective.

Strategic and organizational foundations
Integrate AI into the corporate strategy with leadership support
An AI initiative has to be fully integrated into the overall strategy of the company to generate a significant impact. This strategic alignment not only amplifies the value of AI but also contributes to making the implementation more coherent and effective in the long term. A fundamental pillar for the strategic success of AI is the commitment and support of corporate leadership, which is crucial for driving cultural change and ensuring that AI is perceived as a strategic priority. As evidenced by various case studies, leadership engagement makes it easier to overcome internal barriers and ensures strategic alignment between the company's objectives and AI tools. Corporate executives, supported by the key coordinating role of middle managers, are fundamental actors in effectively communicating the strategic vision of AI at all organizational levels. Said vision materializes in

FIGURE 1 FRAMEWORK OF THE AI IMPLEMENTATION PROCESS

CONTINUOUS OPTIMIZATION AND INNOVATION
Constant monitoring
Culture of innovation
Ethical governance

OPERATIONAL AND TECHNOLOGICAL DEVELOPMENT
Establishment of multidisciplinary teams
Agile approach and experimentation
Technology integration to business processes
Data governance

STRATEGIC AND ORGANIZATIONAL FOUNDATIONS
Strategic vision of AI
Education and training
Selection of high-impact use cases

the definition of an evolving roadmap that includes specific, achievable, and relevant objectives. This long-term horizon is interspersed with specific tasks and short-term goals that break down the AI implementation process into actionable, operational development phases. An effective roadmap not only ensures that AI implementation occurs in an orderly and gradual manner but also allows company leaders to track gradually finetune strategies as needed.

Cultivating AI skills to build the foundations for present and future prospects

Adopting AI requires sizeable investments in continuous training and upskilling for personnel. With regard to internal training programs, the companies in the study sample organize specific courses in data science and machine learning and prompt engineering to equip employees with the necessary skills to create a workforce capable of interacting with new technologies and maximizing their potential. Tailored training is particularly common, focusing on acquiring specific AI knowledge to achieve greater industry specialization based on employees' roles in the company.

The rationale behind this approach is rooted in the wide-ranging applications of generative AI, which can be utilized across various activities in the corporate value chain, necessitating technical knowledge at different organizational levels. Often, the companies engage in partnerships with universities and research centers to complement the knowledge developed internally that derives from collaboration with suppliers. Teams that are internally trained in AI have an easier time matching technical skill with the specific business dynamics of their organizations to effectively leverage AI in a value creation context. Furthermore, training employees also enhances their awareness of the potential benefits that AI can bring to the organization, making AI algorithms more understandable and transparent to a broader user base.

Focusing efforts on AI use cases that generate tangible results

The most successful case studies in AI implementation are the ones that select projects with a tangible, measurable effect. To generate maximum impact and increase corporate competitiveness, it's necessary to identify use cases based on the application scope of AI and the relative business needs. The selection of use cases must reflect a clear value proposition, which defines the benefits the company intends to achieve.

It is crucial to choose AI projects that offer a tangible return on investment, i.e., concrete and measurable benefits in terms of economic outcomes or operational efficiency. Case studies demonstrate that mapping business processes and selecting those with the biggest potential for transformation is

fundamental to ensuring concrete results. The most effective use of generative AI is found in projects aimed at upgrading efficiency, accelerating business processes, and automating tasks.

In particular, thanks to the support role of AI in repetitive, routine activities, individuals can turn their attention to higher-value tasks, and in doing so, enhance their creative potential. This example illustrates the broad potential of AI as a tool capable of enhancing the human capital of a company by replacing personnel in low-value, mechanical tasks, and allowing for a strategic reskilling of the workforce.

Operational and technological development
Creating mixed teams to maximize AI potential

AI is a technology that requires diverse skill sets, making it essential to build multidisciplinary teams. These teams should include not only technical experts such as data scientists and engineers, but also domain experts who understand the specific dynamics of the industry. This collaborative approach ensures that AI solutions are relevant and applicable to business needs. AI implementation involves strengthening and standardizing skills across the entire business chain to prevent misalignments, maximize the effectiveness of initiatives, and ensure AI's functional use for company requirements. The case studies analyzed here show that different corporate components can be aligned through cross-functional working groups and workshops designed to expedite interdepartmental and inter-unit integration.

Adopting an agile approach to experiment, learn, and adapt

AI implementation is rarely a linear or definitive process. Continuous experimentation and agile methodologies are crucial for iterating, testing, and improving solutions over time. Test and learn approaches allow for quickly experimenting with new ideas, learning from mistakes, and adapting flexibly. Successful AI implementation processes often rely on an agile approach, trialing prototypes before making significant investments. By

experimenting with new AI solutions in controlled contexts through pilot projects, companies can isolate the environment from perturbing variables, preventing negative impacts from cascading across multiple business operations.

An essential element for successful AI implementation is supporting an incremental evolution of AI-driven processes, using continuous feedback loops to progressively upgrade efficiency, refine models, and adapt to the company's evolving needs.

Integrating AI into business processes to scale innovation

Implementing AI requires robust, scalable technological infrastructure. Case studies highlight that using cloud-native platforms and modular architectures enables effective management of large data volumes and facilitates the broad application of AI solutions, ensuring flexibility and reduced IT management costs. A critical factor in this integration is planning for compatibility with existing technological architecture and evaluating scalability and modularity to support seamless AI adoption. Many companies utilize open APIs and microservices to connect new AI solutions with legacy systems, reducing implementation time and enhancing interoperability across business processes. Workflow automation and AI use in areas like supply chain management or customer service have further accelerated innovation, driving faster growth and operational efficiency on a larger scale.

Managing data with rigor for reliable AI and seamless processes

Companies that prioritize data quality and governance achieve smoother AI processes and more reliable outcomes. Domain experts in data management can ensure effective company policies, guaranteeing ongoing accessibility and protection of databases. As AI effectiveness depends on clean, structured data, it is essential to establish rigorous data governance protocols. Several companies have adopted tools for data lineage and cataloging to track data origins and flows, enhancing transparency

and minimizing error risk. In some cases, dedicated data management units are set up, tasked with monitoring regulatory compliance and maintaining optimal data quality throughout the AI project lifecycle. A proactive approach to data security and privacy also proves crucial in building trust both internally and externally.

Continuous optimization and innovation
Consistently measuring AI performance for ongoing optimization

Case studies emphasize the importance of rigorous monitoring that allows for real-time evaluation of AI projects across different development and process stages. This involves identifying specific, measurable KPIs to gauge AI benefits against initial objectives. Commonly used KPIs include efficiency, effectiveness, process quality, system accuracy, error rates, individual productivity improvement, time saved on routine tasks, and metrics related to customer satisfaction and user-level performance. Additionally, accurately defining and measuring ROI is crucial to justify AI implementation costs, demonstrate its value, and inform expansion plans through precise cost-benefit analyses. Integrated dashboards are needed to track AI performance, refine algorithms, and make timely adjustments to operations.

Fostering a corporate culture that embraces continuous innovation

Integrating AI into business processes requires an enduring culture that embraces innovation and continuous transformation by incentivizing experimentation and fostering individual proactivity in adopting new AI solutions. Accepting mistakes as part of a learning process is essential in such environments. For example, by setting up internal programs that reward employees who contribute to innovative AI projects, companies can encourage a mindset geared toward testing out new ideas. Strategic communication highlighting the importance of innovation further reinforces a culture aligned with technological advancement. An effective initiative seen in some companies is establishing AI communities where employees can

explore and innovate AI applications in isolated, risk-free environments. In summary, cultivating an innovation-focused mindset enables AI to serve as a tool for change, expanding its application across processes. Reaching this cultural milestone allows for the progressive integration of AI into core business functions.

Ensuring ethical governance for responsible and transparent AI

Ethical governance has emerged as essential for long-term AI success, especially in preventing bias and automated discrimination. Said governance becomes a critical element to sustaining business success along a path leading to creating lasting, sustainable value. As organizations mature in terms of AI utilization, they must ensure that AI is deployed transparently, fairly, and in compliance with regulations, thereby maintaining stakeholder and customer trust. Companies can establish key ethical principles through specific protocols, i.e., ethical frameworks that regulate the virtuous, transparent, responsible, privacy-respecting, and non-discriminatory use of AI.

CONCLUSIONS

In conclusion, empirical evidence suggests that implementing AI effectively demands a systematic, multi-level approach. From establishing robust strategic foundations to fostering a culture of continuous innovation and progressing through gradual operational and technological advancements, each stage is crucial to ensure the long-term success and sustainability of AI initiatives. AI Heroes case studies illustrate various configurations for effective implementation processes. Although there is no one-size-fits-all solution, results indicate that certain development steps are prerequisites for optimizing business operations and preparing for future challenges, transforming AI into a powerful engine of innovation and value.

ITALIAN STARTUPS GOING GLOBAL

The proliferation of digital platforms has revolutionized the way startups can access global markets and communicate with international customers and stakeholders, opening up new opportunities to compete on a global scale.
A study of a sample of Italian startups in the food tech sector sheds light on the supporting role of social media in the international growth of companies.

The research by Ginevra Testa (Research Fellow at the University of Genoa, CIELI - Italian Center of Excellence on Logistics and Infrastructure, Genoa, Italy) and Mirko Olivieri (Lecturer and Research Fellow in Economics and Business Management at the Faculty of Economics, Università Cattolica del Sacro Cuore, Milan, Italy), published in the journal International Marketing Review, aims to enrich the theoretical and practical understanding of the strategic use of social media to achieve international marketing goals in startups. Data were collected on a sample of 7 Italian food tech startups between April 2023 and January 2024 through semi-structured interviews, company observations, and analysis of company documentation and content posted on social media.

Social media communication by Italian food tech startups - a fast-growing sector that has attracted a large amount of investment in recent years - focuses mainly on three areas: spreading brand awareness and improving brand image in international markets (52.53 percent of the total), communication related to the positioning of their offerings (31.73 percent) and penetration of local business networks (15.73 percent). Social media, and LinkedIn in particular, are an indispensable tool for Italian food tech start-ups, not only to improve brand visibility and optimise offer positioning, but also to build valuable international networks and synergies that can create value. On the one hand, this integrated approach allows startups to better adapt to the needs of foreign markets, responding more precisely to specific local needs, and on the other hand, to develop strategic relationships with market players, ensuring easier access to foreign markets and overcoming knowledge gaps due to a lack of knowledge of the institutions and regulations in force in each country.

HOW FOOD TECH STARTUPS ARE USING SOCIAL MEDIA TO ACHIEVE INTERNATIONAL MARKETING GOALS

Expanding brand awareness and improving brand image in international markets

52.53%

Communicate the ethical behaviour of founders and CEOs, sustainable practices and the high-tech and innovative orientation of the company; promote the Italian food tradition and Italian food.

Penetrating the local commercial network

15.73%

Encourage partnerships with local suppliers, brokers and consultants; identify investors, institutions, online communities and local initiatives.

Positioning start-ups in international markets

31.73%

Communicate the features and benefits of the high-tech product and its usefulness in the consumer's life.

RECURRING THEMES IN THE COMMUNICATION OF FOOD TECH START-UPS AND THEIR STRATEGIC OBJECTIVES

		STRATEGIC OBJECTIVES
TRADITION AND AUTHENTICITY	Promoting the Italian culinary tradition	Build relationships with local online communities to gather information about foreign consumers
LOCAL PARTNERSHIPS	Working in partnership with local suppliers	Stay on top of local market needs to adapt their offerings
PRODUCT BENEFITS	Product/service benefits, with an emphasis on technological innovation	Make consumers aware of the added value of the solutions offered
SUSTAINABILITY AND ETHICAL BEHAVIOR	Communicating business practices and ethical behavior	Engage consumers, who are more likely to provide feedback and ideas
HIGH-TECH FEATURES	Communicating the high-tech features of the product/service	Identify investors and local institutions to gain visibility and support for initiatives

FINANCIAL MARKETS AND SUSTAINABILITY
HOW BIODIVERSITY AFFECTS INVESTMENT

Biodiversity, widely recognized for its role in environmental sustainability, remains an understudied topic in the context of the stock market. Using a combination of fixed regression models and random forest techniques, the research shows that biodiversity is a significant determinant of stock returns. This finding underscores the financial importance of integrating biodiversity into corporate strategies and decisions by providing valuable insights for investors, regulators, and companies interested in aligning their financial strategies with environmental sustainability goals.

BIODIVERSITY//FINANCE//ESG//FINANCIAL PERFORMANCE//SUSTAINABILITY

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INTRODUCTION

Biodiversity in nature is rapidly declining, a trend which is posing a concrete threat to ecosystems and, consequently, to investors. The variety of living species on Earth is diminishing at an alarming rate due to human activity, ranging from habitat destruction to greenhouse gas emissions. In this regard, although the world's 7.6 billion people represent only 0.01% of all living beings in terms of weight, humanity has already caused the loss of 83% of all wild mammals and half of all plants (World Economic Forum, 2020). The current extinction rate is tens or hundreds of times higher than the average of the last 10 million years, and it is accelerating. Current modes of production and consumption, land use and urbanization, demographic dynamics, trade, industry, and

governance patterns are responsible for this loss, requiring a radical reset of humanity's relationship with nature.

It is not surprising, then, that in 2024 the World Economic Forum placed biodiversity loss and ecosystem collapse among the top three risks in terms of probability and impact over the next 10 years. This, according to the organization's Global Risks Report (GRR) based on its comprehensive risk perception survey. The basic premise here is that human societies and economic activities fundamentally depend on biodiversity. In fact, research shows that $44 trillion of economic value, more than half of the world's total GDP, is moderately or highly dependent on nature and its services, and therefore exposed to biodiversity loss.

Together, the three largest sectors heavily reliant on nature generate approximately $8 trillion

of Gross Value Added (GVA): construction ($4 trillion); agriculture ($2.5 trillion); and food and beverages ($1.4 trillion) – taken together, that's roughly double the size of the German economy. While the risk to primary industries is easy to comprehend, the consequences for secondary and tertiary industries can be substantial too. For instance, six sectors - chemicals and materials; aviation, travel, and tourism; real estate; mining and metals; supply chain and transportation; retail, consumer goods, and lifestyle - with less than 15% of their direct GVA strongly dependent on nature, still have "hidden dependencies" throughout their supply chains. In fact, more than 50% of the GVA of their supply chains is highly or moderately dependent on nature (World Economic Forum, 2020).

Remarkable growth and prosperity have come

FIGURE 1 DEPENDENCE ON NATURAL CAPITAL (WORLD ECONOMIC FORUM, 2020)

50% of global GDP depends on nature

75% of global food crops rely on animal pollination

50% of crops at risk to soil erosion
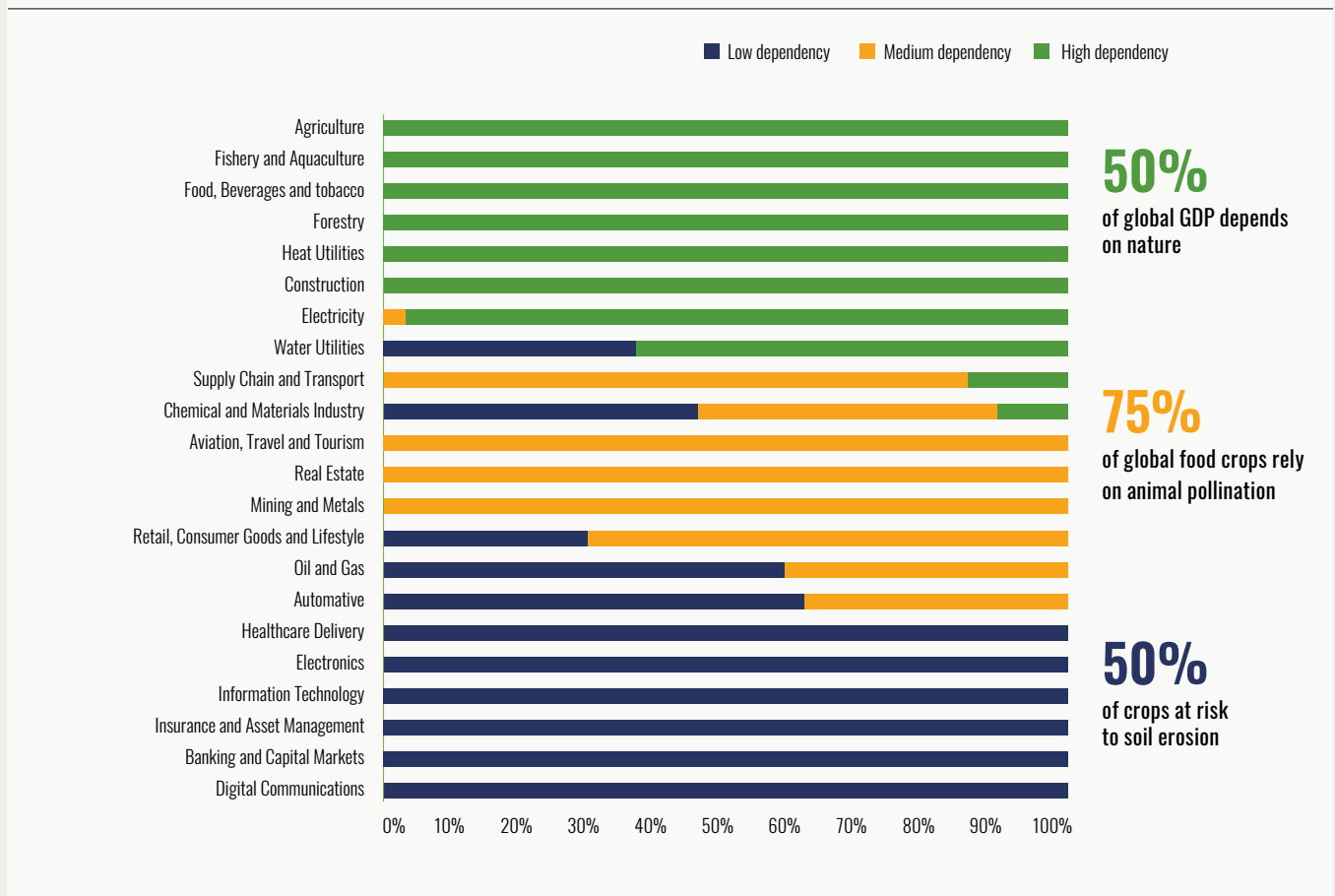
at a high cost to the natural systems that support life on Earth, and consequently, support these economic successes as well. Human activities have already severely altered 75% of the land and 66% of marine environments. About 25% of assessed plant and animal species are threatened by human actions, with one million species at risk of extinction.

Despite the growing awareness of biodiversity's financial relevance, and corporate policies that recognize this fact, there is still a gap in understanding its direct impact on stock performance. This paper seeks to bridge that gap by investigating the relationship between biodiversity and stock market outcomes. This issue is consequential because, unlike broader ESG factors, biodiversity has unique ecological and regulatory implications that could influence risk exposure, long-term sustainability, and market perception. Therefore, the significance of this study lies in its potential to provide actionable insights for businesses and investors. By empirically examining the relationship between biodiversity and financial returns, we aim to inform corporate strategies and investment decisions that align with sustainable development goals. This research not only advances our understanding of biodiversity's role in financial performance but also underscores the necessity for companies to integrate biodiversity considerations into their core business strategies.

Specifically, we explore whether listed companies that invest in biodiversity initiatives achieve superior stock performance compared to their peers. Using a comprehensive dataset across various industries and regions, this study examines the impact of biodiversity on corporate financial performance by analyzing firm-specific stock returns in an asset pricing framework, using the Fama-French five-factor model.

Our main results demonstrate a statistically significant, positive relationship between biodiversity investments and stock performance, confirming the hypothesis that firms that consider biodiversity tend to perform better financially. The study further identifies a market factor directly linked to biodiversity, underscoring its potential as a driver of stock returns. These findings suggest that biodiversity considerations could have

FIGURE 2 IMPACT OF HUMAN ACTIVITY (WORLD ECONOMIC FORUM, 2020)

Terrestrial ecosystems
- 1/3 of the world's topsoil has been degraded
- The Amazon has lost 17% of its size in the past 50 years
- More than 85% of wetlands have been lost
- 32% of the world's forest area has been destroyed

Oceanic ecosystems
- At least 55 percent of the ocean area is covered by industrial fishing
- 33% of fish stocks are overfished
- 50% of the world's coral reef system has been destroyed

Species
- 83% population decline across freshwater species population since 1970
- 41% of known insect species have declined in the past decades
- 60% population decline across vertebrate species since 1970

meaningful implications for corporate financial outcomes in the broader market. Therefore, the main contribution of our research lies in the identification of biodiversity as a distinct factor influencing stock performance, providing empirical evidence of its potential financial relevance for both companies and investors.

In the subsequent sections, we review the relevant literature on biodiversity factors and financial performance. We then detail our research methodology, including data sources, variables, and our analytical approach. Following this, we present and discuss our empirical findings, concluding with a summary of key insights and suggestions for future research avenues.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

General ESG Framework

The degradation of the environment poses a major challenge potentially hindering the growth and expansion of companies worldwide. This issue primarily stems from the unsustainable utilization of resources in the pursuit of economic gains, leading to pollution with adverse social ramifications. Firms are increasingly recognizing the imperative of striking a balance across various aspects of ESG. This equilibrium is crucial for ensuring sustainable long-term growth while fostering trust and support from the community (Almeyda and Darmansya, 2019).

Existing literature has delved into the efficacy of ESG factors in influencing stock prices as safety assets, particularly by analyzing their performance during bear markets. However, findings do not uniformly support this hypothesis in the short term, suggesting a longer-term perspective instead (Rebonato, 2023). This outlook shows that ESG investments can potentially serve as an alternative for risk hedging purposes for global investors (Rubbaniy et al., 2021; Taylor and Neff, 2022) and may impact the risk premium of companies (Faccini et al., 2023). Therefore, it becomes essential to regard ESG as a risk management tool for corporations rather than merely

a standalone driver of investment strategies. By integrating sustainability and social impact criteria, which also play a role in determining future financial performance, ESG factors can be effectively integrated into investment decision-making processes (Bradley, 2021).

Extensive research detailed in existing literature has focused on investigating the relationship between ESG activities and corporate financial performance over subsequent years. However, there remains a lack of consensus regarding the relevance and direction of the effects that ESG activities have on a firm's financial results (Martielli et al., 2022). The absence of a unified view on this topic is clearly observable in the data collected by Friede et al. (2015), underscoring the need for further exploration and a deeper understanding of the dynamics at play. In this sense, indeed, ESG is not a one-dimensional construct; its impact can vary appreciably based on the specific actions a firm undertakes. This highlights the importance of unpacking the various types of investments within the ESG framework, particularly as they relate to biodiversity. ESG initiatives are often characterized by unique environmental and social factors that can influence the returns they generate. Therefore, using a targeted approach will not only enhance our understanding of biodiversity's role in corporate financial performance but also provide valuable guidance for companies and investors looking to navigate the complexities of sustainable investing.

Biodiversity Loss: Definition and Causes

Biodiversity refers to the diverse array of life forms on Earth, including terrestrial, marine, and other aquatic ecosystems. It encompasses the genetic diversity within species, the variety among species, and the range of ecosystems they inhabit (United Nations, 2013). This comprehensive definition includes all life forms, even microorganisms like bacteria and viruses, which can sometimes pose risks to human health.

The majority of the world's biodiversity hotspots are located in the tropics, where fertile land supports a rich variety of life forms (Hanski, 2016).

However, biodiversity is unique to each country, with ecosystems that possess distinct characteristics and vulnerabilities (Dasgupta, 2021). Consequently, preserving biodiversity necessitates concerted efforts at global, national, and local levels. This requires the active participation of individuals, governments, nonprofit organizations, and critically, corporations and their supply chains (Salmi et al., 2023).

In the context of business and biodiversity, the literature frequently emphasizes land use change as a leading cause of biodiversity loss, implicating industries such as agriculture, forestry, and mining in particular. Other noteworthy drivers include pollution, the introduction of invasive species, overexploitation of natural resources, and climate change (Armenteras and Finlayson, 2012). Land use change involves converting natural areas into agricultural fields, orchards, tree farms, and residential or commercial developments (Turner et al., 1990). These transformations can lead to habitat destruction (Lambin et al., 2001) or habitat fragmentation (Winn and Pogutz, 2013), both of which are detrimental to biodiversity.

Pollution represents a critical but often underemphasized factor in biodiversity loss. It affects ecosystems by contaminating air, water, and soil. For example, emissions from power plants, including sulfur dioxide and nitrogen oxides, contribute to acid rain, which damages vegetation and aquatic systems (Grantz et al., 2003). Fertilizer runoff can lead to eutrophication, fostering algae blooms that severely disrupt aquatic ecosystems (Lyons et al., 2014). Furthermore, the pervasive use of pesticides and fertilizers modifies soil conditions, often making them inhospitable for various organisms and thereby diminishing soil biodiversity (Lyons et al., 2014).

Invasive species are a major driver of biodiversity loss (Butchart et al., 2010). These non-native species can be deliberately introduced by various industries, such as agriculture, forestry, aquaculture, and hunting, through the release of cultivated or bred plants and animals. Alternatively, they may be transported into a country or region unintentionally via the movement of goods, where invertebrates or pathogens hitch a ride in cargo holds (Essl et al., 2011). In regions where there are no natural predators or regulatory mechanisms to keep these invaders in check, and where environmental conditions are favorable, they can thrive and outcompete native species, leading to dramatic disruptions in local ecosystems (Butchart et al., 2010).

Finally, overexploitation of resources represents another major driver of biodiversity loss. The demand for wild animals and plants leads to excessive hunting and harvesting, often at rates that prevent populations from rebounding (Panwar et al., 2023).

Biodiversity Corporate Strategies

In today's rapidly evolving business landscape, integrating biodiversity considerations into corporate strategies has become increasingly critical (Salmi et al., 2023). Companies are recognizing that their operations do not occur in isolation but are deeply intertwined with the natural environment (Winn and Pogutz, 2013). As the impacts of human activity on ecosystems become more pronounced, businesses are compelled to address their role in biodiversity loss and adopt tactics to mitigate these effects. Corporate biodiversity strategies encompass a range of approaches designed to protect and enhance natural habitats, from implementing sustainable land use practices to investing in conservation initiatives. These strategies are not only essential for environmental stewardship but also hold meaningful implications for a company's financial performance, regulatory compliance, and public reputation (Panwar et al., 2023).

In this field, conservation is frequently employed as a broad term to describe efforts focused on protecting biodiversity proactively and on-site (Panwar et al., 2023). This approach is based on the premise that biodiversity loss can be prevented by designing business practices that avoid negative impacts on natural habitats. In essence, conservation represents a preventative strategy aimed at preserving the current state of

biodiversity before any harm occurs.

Restoration, while also implemented on-site like conservation, differs fundamentally in its approach. Unlike conservation, which aims to prevent biodiversity loss from occurring in the first place, restoration focuses on addressing biodiversity loss after it has happened. This strategy acknowledges the inevitability of some degree of biodiversity loss due to commercial activities and seeks to rehabilitate the affected areas once those activities have ended. The goal of restoration is often to revert an ecosystem to its condition prior to the disturbance in question (National Research Council, 1992). However, achieving this goal can be challenging due to the lack of comprehensive information about the original ecosystem and the complexities involved in recreating it, even when baseline conditions are known (Moerke & Lamberti, 2004).

Compensation is another preventative strategy, but it contrasts notably with conservation. Whereas conservation presumes that it is possible to conduct business in a way that avoids or minimizes biodiversity loss on-site, compensation, like restoration, concedes that the project site will see some degree of biodiversity loss. But instead of striving to prevent that loss, compensation focuses on offsetting the impact by developing or safeguarding biodiversity in a different location. This approach, known as spatial separation, enables companies and development planners to address the inherent conflicts between preserving biodiversity and pursuing economic development goals (Büscher & Dressler, 2007).

Finally, reparation functions as a post-impact form of compensation. It shares the fundamental goal of compensation—addressing biodiversity loss—but it is implemented after the damage has already occurred. This strategy is often driven by regulatory mandates as well as voluntary corporate commitments. In regulatory settings, reparation is commonly associated with in-lieu fee mitigation, where companies contribute financial resources to conservation efforts to compensate for their environmental impacts (Wilkinson, 2009).

Hypothesis Development

Companies can respond to biodiversity loss in various ways. Previous studies (e.g. Boiral et al., 2018) have examined numerous corporate biodiversity protection strategies, however their link with financial returns remains unclear (Salmi et al., 2023).

In this sense, we do believe that biodiversity is a critical factor for sustainability and we acknowledge global efforts are escalating to protect and conserve biodiversity (Winn and Pogutz, 2013). Specifically, investing in biodiversity can boost a firm's stock performance by enhancing regulatory compliance, improving brand reputation, and attracting ESG-focused investors. Such investments help mitigate risks associated with environmental regulations, strengthen public perception, and ensure operational sustainability. In this sense, the recent momentum in biodiversity conservation initiatives, such as the Kunming-Montreal Global Biodiversity Framework, underscores the growing importance of biodiversity considerations. Additionally, the potential positive impact of biodiversity investments on companies' long-term financial performance aligns with the broader understanding of sustainability as a driver of value creation. Moreover, governments and supervisory bodies are introducing stricter environmental regulations, like the new EU Nature Restoration Law, and companies that proactively invest in biodiversity are better positioned to comply with these new norms (Panwar et al., 2023). This reduces the risk of fines and sanctions, providing a more stable investment environment and positively impacting stock performance. Therefore, biodiversity investments help companies manage risks associated with ecosystem degradation, such as resource scarcity and supply chain disruptions. Companies that mitigate these risks through proactive biodiversity investments are likely to experience less volatility in their operations and stock performance (Bioral et al., 2018).

Furthermore, biodiversity investments can differentiate a company from its competitors (Salmi et al., 2023). Consumers are favoring products and services from environmentally

responsible companies more than ever (World Economic Forum, 2024). This preference can lead to higher sales, customer loyalty, and, consequently, improved financial outcomes. Investing in biodiversity can lead to long-term financial benefits as well. Healthy ecosystems support industries by ensuring the availability of resources, such as clean water and fertile soil, which are essential for agriculture, pharmaceuticals, and other sectors. Companies that contribute to maintaining these resources may enjoy lower operational costs and more sustainable supply chains, which translates into better financial performance.

Finally, while biodiversity investments are a subset of ESG investments, they are distinct in their specific focus on preserving the variety of life on Earth. Other ESG investments might address broader issues like carbon emissions, labor practices, or corporate governance. Biodiversity investments instead specifically enhance ecosystem services, which directly support various business operations and contribute to overall ecological stability. This unique contribution to sustaining the natural capital upon which many industries depend can provide additional, distinct financial benefits (World Economic Forum, 2024).

Therefore, based on these considerations, it is reasonable to propose the following hypothesis: **Companies that invest in biodiversity should obtain higher stock performances.**

MATERIALS AND METHODS

Data and Variables

This research utilized the Refinitiv Datastream database, incorporating both market and ESG information. The dataset comprised publicly listed companies in the US, Canada, Japan, the European Union, the UK, and Australia from 2018 to 2023. We focused exclusively on listed data given that sustainability reports are currently available mainly for public companies. To ensure investability, we applied the following criteria: i) market capitalization greater than €500 million; ii) free

float exceeding €20 million; and iii) average daily traded value over the past 52 weeks of at least €5 million. Additionally, only companies with available biodiversity data were included, resulting in a final sample of 962 organizations. The dependent variable used in this study is total return, which account for both stock price returns and dividends. Concerning the biodiversity variables, the following data points were retrieved from Refinitiv (Dyck et al., 2019): biodiversity score (ranging from 0 to 100) and dummy variables indicating that SDG 6, 14, or 15 is included in the company's sustainability plan. The biodiversity score assesses a company's exposure to and management of risks related to biodiversity and land use. Combining several variables, this score: i) evaluates the company's involvement with external groups to address biodiversity impacts; ii) measures the proportion of operations with ecosystem protection programs certified or assured by external bodies; iii) checks if the company has committed to minimizing disturbances to biodiversity, following the mitigation hierarchy of avoid, minimize, restore, and offset; iv) assesses if the company has a policy to reclaim habitats on disturbed land; and v) reviews the extent of operations covered by the company's biodiversity and land reclamation policy, including supply chain and direct operations.

Another useful context for considering investments in biodiversity is provided by the United Nations Sustainable Development Goals (SDGs), which have emerged as a common language for understanding how companies and portfolios are positioned for environmental and social impact. Of the 17 SDGs, the three most directly associated with biodiversity are 6 (clean water and sanitation), 14 (life below water) and 15 (life on land). However, it's important to note that simply referencing a specific SDG does not necessarily mean that a company is actively investing in or implementing initiatives related to that goal. In other words, the mere mention of an SDG in a company's reports or statements may not reflect substantial or genuine efforts toward achieving the targets associated with that particular goal.

Following the recommendations in the literature (Fama and French, 1993), we enhanced the robustness of our results by incorporating control variables related to the Fama and French model. These variables were sourced from the Dartmouth Library.

The descriptive statistics of the variables we used can be found in the next table.

Results show that, on average, companies have a relatively moderate biodiversity score of approximately 60. This despite the fact that most organizations incorporate multiple biodiversity-related SDG into their targets.

TABLE 1 DESCRIPTIVE STATISTICS

Variables	Min	Median	Media	Max
BIODIVERSITY RATING	0.0	78.1	62.3	98.1
SG6	0.0	0.0	1.0	1.0
SDG14	0.0	0.0	1.0	1.0
SDG15	0.0	0.0	1.0	1.0
RI	-80.0	5.8	11.4	600.0
MKT-RF	-7.0	18.6	22.6	28.3
SMB	-6.2	-2.8	-3.4	3.4
HML	-46.7	-4.8	-10.1	25.8
RMW	-5.2	6.2	5.1	26.7
CWA	-20.9	-0.2	-1.5	22.4

Research Design

This study investigates the influence of biodiversity on corporate financial performance by analyzing firm-specific returns in an asset pricing framework using panel data. The Fama-French five-factor model (Fama and French, 1993) is utilized due to its suitability for the dataset and its proven effectiveness in evaluating sector-specific risk in comparison to the overall market.

In this context, the Fama-French factors are employed as control variables, aligning with the approaches endorsed by previous research (Brounen and Marcato, 2018; Mariani et al., 2018).

These control variables are essential for isolating firms' excess returns, which in turn offers a more precise assessment of the impact of biodiversity on financial performance.

Using the Fama-French five-factor model (FF5), several analyses were performed to evaluate the impact of biodiversity factors. Firstly, the total biodiversity score was added to the model to determine its effect. This was implemented in two forms: as a numerical score (Model 1) and by introducing dummy variables for the inclusion of SDG 6 (clean water and sanitation), SDG 14 (life below water), and SDG 15 (life on land)—Sustainable Development Goals associated with biodiversity—in the companies' sustainability plans (Model 2). Additionally, a biodiversity factor (BIO) was developed following the Fama and French methodology, consistent with the approach of Brounen and Marcato (2018) and included in our results as Model 3.

Therefore, our work involves several models to assess the influence of biodiversity factors. In Model 1, we incorporate the total biodiversity score directly into the Fama-French model to evaluate its impact on financial returns. In Model 2, we enhance this approach by including dummy variables for SDGs related to biodiversity (SDG 6, 14, and 15), examining how the integration of these SDGs into companies' sustainability plans affects their financial performance. In Model 3, we develop a dedicated biodiversity factor (BIO) based on the Fama-French methodology, as suggested by Brounen & Marcato (2018). This factor is included to specifically measure the impact of biodiversity considerations on firm returns. All these models are designed to comprehensively investigate the influence of biodiversity on corporate financial performance, ensuring a robust analysis that aligns theoretical expectations with empirical evidence.

The estimated models are therefore:

Model 1:
$$R_{it} - RF_t = a + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + \beta_6 Biodiversity_{it} + \varepsilon_{it}$$
Model 2:
$$R_{it} - RF_t = a + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + \beta_6 SDG6_{it} + \beta_6 SDG14_{it} + \beta_6 SDG15_{it} + \varepsilon_{it}$$

Model 3:
$$R_{it} - RF_t = a + \beta_1 MKT_t + \beta_2\, SMB_t + \beta_3\, HML_t + \beta_4\, RMW_t + \beta_5\, CMA_t + \beta_6 BIO_t + \varepsilon_{it}$$

Where RI is the return of the stock, RF is the risk free rate, and MKT, SMB, HML, RMW, and CMA represent the following factors: MKT is the yearly return of the stock market index minus the risk-free rate; SMB (Small Minus Big) captures the size premium; HML (High Minus Low) reflects the value premium based on book-to-market ratios; RMW (Robust Minus Weak) measures the operating profitability premium; and CMA (Conservative Minus Aggressive) represents the investment premium. Here, *i* denotes the i-th observation, and t refers to the time of the observation.

Regarding Model 1 and Model 2, it is crucial to recognize that while biodiversity is a firm-level variable, examining its impact at the market level is justified (Brounen and Marcato, 2018). First, biodiversity factors can exert systematic effects across various industries and sectors, thereby influencing market-wide risk and return dynamics. Second, as investors increasingly incorporate biodiversity considerations into their portfolio allocation decisions, this results in market-wide adjustments in asset prices based on firms' biodiversity performance.

However, Model 3, which constructs a biodiversity factor (BIO) mimicking the Fama and French methodology, should take precedence over Models 1 and 2. This approach ensures a more robust analysis by better accounting for the systematic influence of biodiversity on financial performance. Nevertheless, caution is warranted in interpreting these biodiversity coefficients, as they may still be correlated with other firm characteristics. This approach enhances the robustness of the analysis by more effectively accounting for the systematic influence of biodiversity on financial performance.

Concerning Model 3, this approach appreciably augments our capacity to thoroughly evaluate the impacts of biodiversity. Simultaneously, we introduce a time series that illustrates the return

disparity between stocks with high and low biodiversity ratings, integrating this variation as the sixth factor (BIO). BIO is derived by computing the difference in excess returns between the top 25% biodiversity-rated portfolios and the bottom 25% biodiversity-rated portfolios. This calculation enables us to gauge the performance gap between stock portfolios with the highest and lowest biodiversity ratings. By including this additional factor, Model 3 offers a more nuanced comprehension of how biodiversity considerations shape financial performance across diverse firms.

To ensure the reliability of our empirical model, we performed a set of diagnostic tests, specifically targeting: i) stationarity, ii) absence of autocorrelation, and iii) normality. Initially, we treated the sample as independently pooled in our analytical process. However, following the Hausman test, it became evident that the fixed effects model is the suitable approach for each scenario. In fact, this model accommodates time-invariant characteristics within the dataset, enhancing the accuracy of our estimates by mitigating the impact of unobserved heterogeneity.

Secondly, as a control model, the random forest, a machine learning approach, was applied. With the technique, devised by Breiman (2001), an algorithm constructs a series of decision trees, and then a subset of characteristics is selected from each node of each tree, following a bagging technique. For a more comprehensive understanding of random forest, a detailed and precise description can be found in Booth et al. (2014). The random forest technique offers several advantages: i) it is robust to outliers; ii) it is robust to missing data; iii) it facilitates ranking in order of importance each variable in the classification results (Jones et al., 2017). To assess the model's performance, we utilized relative variable importance (RVI), which indicates the average number of times a variable is employed in the decision trees of the model (Dallocchio et al., 2023). An RVI greater than 0 signifies that the variable is utilized in the decision trees of the model, expanding its predictive capabilities.

RESULTS

Results related to Models 1, 2 and 3 using fixed effect regressions are shown in the next table.

TABLE 2 FIXED EFFECTS REGRESSION

Dependent Variable		TOTAL RETURN	
Model	1	2	3
Independent Variables			
BIODIVERSITY RATING	-0.0212		
	(0.0203)		
SG6		-2.225	
		(2.179)	
SDG14		3.967*	
		(2.403)	
SDG15		2.792	
		(2.306)	
BIO FACTOR			494.9***
			(171.0)
Control Variables			
(FAMA-FRENCH Factors)	YES	YES	YES
Constant	-18.31***	-19.32***	114.4**
Year FE	YES	YES	YES
Company FE	YES	YES	YES
Sector FE	YES	YES	YES
Observations	5,772	5,772	5,772
R-squared	0.142	0.143	0.142

***, **, and * indicate a statistical significance level of 1%, 5%, and 10%, respectively.

Regarding Model 1, the biodiversity rating is not significant. In contrast, Model 2 findings indicate that SDG 14 exhibits a positive influence on stock performance, whereas the biodiversity score, SDG 6, and SDG 15 do not demonstrate statistical significance. However, when transitioning from individual stock performance to portfolio performance (Model 3), it becomes apparent that the BIO factor is statistically significant at the 1% level, with a positive impact on company performance. Results related to Models 1, 2 and 3 using the random forest technique are shown in the next figure. Similarly, Model 1 does not show any significance for the biodiversity rating, and in this case, in Model

2, none of the SDGs are relevant. Also, the previous findings from Model 3 are reaffirmed, indicating the presence of a market factor associated with biodiversity. This consistency underscores the robustness of the observed relationship between biodiversity and company performance at the market level.

DISCUSSION

The results of our study confirm the hypothesis that there is a statistically significant positive association between companies investing in biodiversity and their stock performance (Goldman Sachs, 2023). This finding suggests the importance of biodiversity considerations for financial outcomes in the market. Moreover, our study identifies the existence of a market factor specifically related to biodiversity, further highlighting the relevance of this variable as a driver of stock performance.

Comparing these results with previous research, we find consistency with some studies while we also offer new insights (Friede et al., 2015). Prior research has explored the relationship between ESG factors, including biodiversity, and financial performance, with mixed findings.

The significant size of the coefficient for biodiversity suggests a strong relationship between biodiversity investments and stock performance, potentially due to several factors. Firstly, investors may perceive companies investing in biodiversity as sustainable and forward-thinking, leading to positive market reactions and higher stock prices (Salmi et al., 2023). Regulatory advantages, such as tax incentives and reduced risk of fines, can also contribute to better financial performance (Panwar et al., 2023). Additionally, biodiversity investments help mitigate operational and reputational risks, driving innovation and operational efficiencies that translate into improved financial outcomes.

Our study contributes to this body of literature by specifically focusing on biodiversity investments and their impact on stock performance. By identifying a market factor related to biodiversity,

we provide empirical evidence of the financial implications of biodiversity considerations for companies and investors. This adds nuance to the understanding of how ESG factors, particularly biodiversity, influence financial outcomes (Martielli et al., 2022). However, noteworthy is the fact that our research primarily reveals a market reaction to biodiversity investments rather than directly testing the effectiveness of biodiversity priorities compared to other ESG factors. Consequently, while our findings highlight the financial import of biodiversity, we can not necessarily conclude that companies prioritizing biodiversity investments are universally outperforming those focusing on other ESG factors.

In our analysis, SDG 6 (clean water and sanitation) and SDG 15 (life on land), do not demonstrate statistical significance. Several factors could explain this. Firstly, the integration of these SDGs into corporate strategies might still be in nascent stages, leading to inconsistent or minimal impact on financial performance. Secondly, the effects of these specific SDGs may take longer to manifest in financial metrics, and as a result may not be immediately apparent in the current dataset. Additionally, there may be industry-specific variations in how these SDGs impact companies, with some industries deriving more immediate benefits from biodiversity investments than others.

Overall, our findings support the growing recognition of biodiversity as a critical aspect of sustainable business practices. Companies that make biodiversity investments not only contribute to environmental conservation but also enhance their

FIGURE 3 RANDOM FOREST
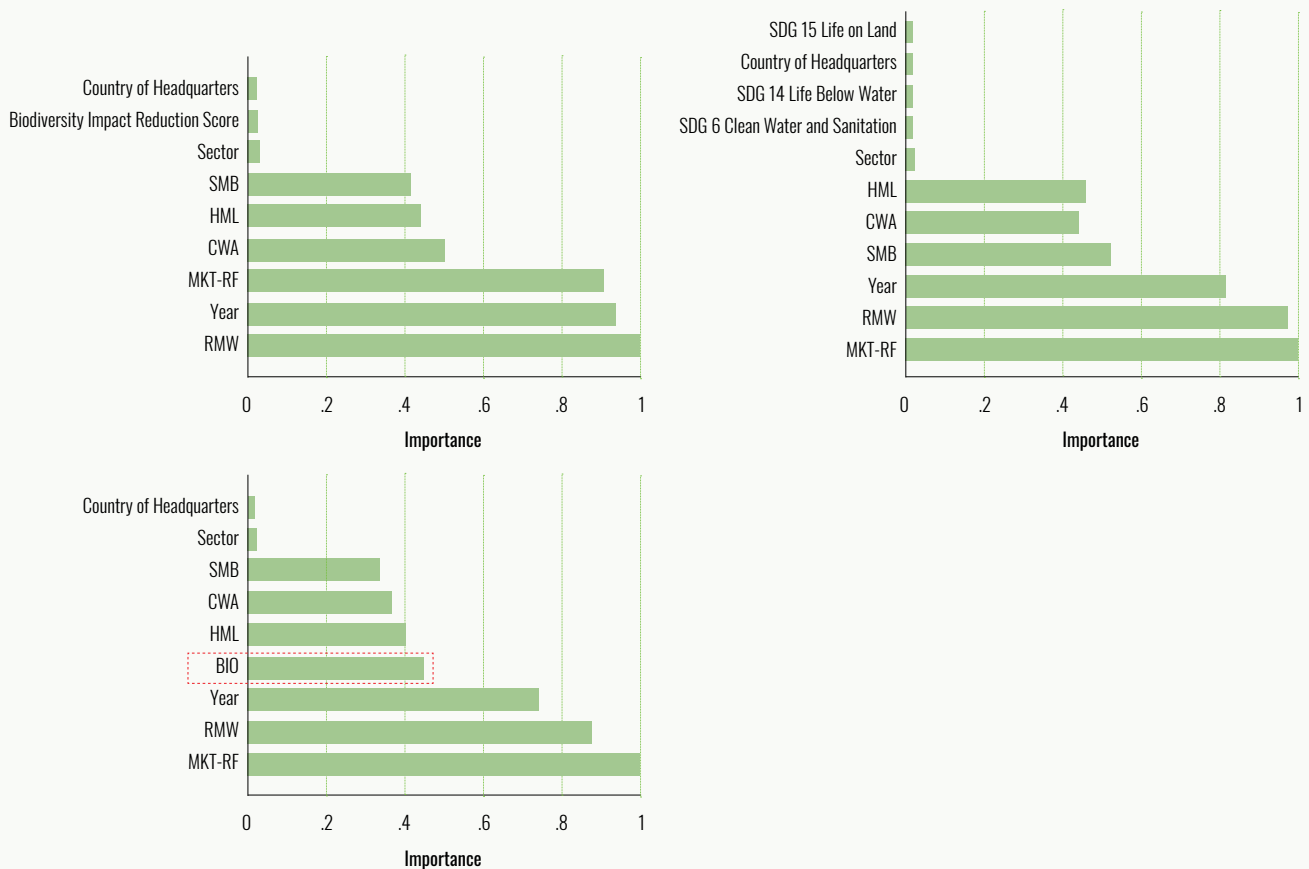
financial performance, aligning with the broader goals of sustainable development. These results have noteworthy implications for investors, policymakers, and businesses, highlighting the importance of integrating biodiversity considerations into investment strategies and corporate decision-making processes.

CONCLUSION

Our study serves as a preliminary exploration of how financial markets recognize biodiversity investments made by firms. The findings establish a foundational baseline for further investigation into this critical area. Our research provides empirical evidence of a positive association between companies investing in biodiversity and their stock performance. This result underscores the growing recognition of biodiversity as a critical component of sustainable business practices and highlights its relevance for financial outcomes in the market. By identifying a market factor specifically related to biodiversity, our research contributes to a deeper understanding of the financial implications of biodiversity considerations for companies and investors.

Biodiversity has emerged as a megatrend—a global force of change with profound implications for economies, societies, and ecosystems. The decline in biodiversity poses serious risks to the stability and resilience of natural systems, which in turn affect human well-being and economic prosperity. However, recent efforts, such as the Kunming-Montreal Global Biodiversity Framework, signal a growing momentum towards biodiversity conservation and restoration on a global scale. This framework sets ambitious targets for biodiversity preservation and calls for more funding and investments in biodiversity-related initiatives.

The recognition of biodiversity as a megatrend stems from its far-reaching impacts across multiple dimensions, including ecological, economic, and social. Biodiversity loss not only threatens the functioning of ecosystems but also undermines the long-term sustainability of businesses and economies. As such, addressing biodiversity challenges has become increasingly imperative for companies, investors, policymakers, and society as a whole.

Practical implications of our findings suggest that companies should integrate biodiversity into their strategic planning and investment decisions to potentially boost their financial performance and contribute to global sustainability goals (Braat and De Groot, 2012). By incorporating a wider range of factors into strategic planning and risk assessment, companies could better align their practices with emerging regulatory standards and societal expectations. This broader perspective could enhance corporate reputation, compliance, and operational resilience (Winn and Pogutz, 2013). Such an approach can also help companies discover new opportunities for sustainable innovation and stakeholder engagement, ultimately contributing to more effective biodiversity management strategies (Salmi et al., 2023).

Investing in biodiversity for companies involves a range of strategic actions that can lead to improved financial performance (Armenteras and Finlayson, 2012). Key initiatives include restoration projects like reforestation and wetland rehabilitation, which shore up ecosystem services and may provide cost savings and new revenue streams through carbon credits and eco-tourism. Conservation efforts, such as protecting natural habitats and implementing sustainable harvesting practices, could bolster corporate reputation, attract environmentally conscious customers and investors, and ensure long-term resource availability. Compensation mechanisms, such as biodiversity offset schemes, help companies maintain regulatory compliance, avoid penalties, and facilitate project approvals, reducing operational risks. Sustainable supply chain management, which involves sourcing from suppliers practicing sustainable agriculture, forestry, and fishing, minimizes supply chain disruptions and meets consumer demand for sustainably produced goods (Salmi et al., 2023). Corporate partnerships with NGOs, governments, and local communities could build credibility, share

resources, and access new markets and funding opportunities. Additionally, investing in research and innovation to develop biodiversity-supporting technologies and products, like biodegradable materials and sustainable packaging, creates new market opportunities and differentiates companies from their competitors. These investments not only contribute to environmental sustainability but may also improve financial performance by reducing risks, enhancing brand value, upgrading operational efficiencies, and opening up new markets and revenue streams.

Despite the insights our findings provide, our study also has limitations that warrant further investigation. The data used in our analysis may not fully capture all aspects of biodiversity investments, and the models employed might overlook other influential factors. Future research should explore the mechanisms through which biodiversity investments influence stock performance, examine differential effects across industries, regions, and market conditions, and assess the long-term implications of biodiversity investments on corporate profitability, resilience, and risk management. Additionally, developing typologies or taxonomies of biodiversity investments by companies and their relative impact on market performance could provide deeper insights into effective biodiversity strategies. Longitudinal research is also crucial to evaluate the long-term implications of biodiversity investments on corporate profitability, resilience, and risk management. Moreover, our research reveals the need for managers to recognize and address biodiversity drivers, such as pollution and overexploitation.

From a managerial perspective, the current framework suggests that organizational priorities are influenced by established managerial attitudes and systems (Ocasio, 1997), which often concentrate on other ESG factors while biodiversity loss remains underappreciated. In this sense, recent regulatory changes, especially in the European Union, are pushing for greater managerial attention to biodiversity. However, material progress is unlikely until biodiversity loss is recognized as an urgent issue rather than a distant concern (Pinkse and Gasbarro, 2019). Therefore, future research must flesh out how management currently perceives the value of biodiversity in relation to corporate goals and financial outcomes. Secondly, it may be beneficial to classify best practices implemented by organizations that have successfully integrated biodiversity into their management frameworks. Finally, understanding the varying impacts of different biodiversity strategies and actions could provide valuable guidance for both companies and regulators.

In conclusion, our study underscores essential nature of biodiversity as a megatrend that is shaping the future of business and finance. By integrating biodiversity considerations into investment decisions and corporate strategies, companies can not only contribute to environmental conservation but also enhance their financial performance and long-term resilience in an increasingly interconnected and uncertain world.

MANAGERIAL IMPACT FACTOR

- **Strategic Planning**: Incorporating biodiversity considerations into strategic planning processes to align business objectives with environmental sustainability goals.

- **Risk Management**: Identifying and mitigating biodiversity-related risks, such as regulatory compliance, reputational damage, and supply chain disruptions.

- **Innovation and Market Differentiation**: Leveraging biodiversity initiatives as drivers of innovation and market differentiation to gain a competitive edge.

- **Stakeholder Engagement**: Engaging with stakeholders, including investors, customers, and communities, to communicate biodiversity initiatives and enhance corporate reputation.

- **Long-term Sustainability**: Integrating biodiversity considerations into long-term sustainability strategies to ensure business resilience and continuity in the face of environmental challenges.

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GINEVRA TESTA

COMMUNICATION TRENDS AND STRATEGIES
CRISIS MANAGEMENT ON SOCIAL MEDIA

The ubiquitous use of social media is forcing organizations to develop dialogic and interactive crisis communication strategies capable of dealing with increasingly systemic and frequent crises. Crisis communication must not only provide information, but also address the emotional needs of the audience, helping to effectively manage fears, concerns and negative emotions. The value of working with local authorities is important, as is identifying opinion leaders who can act as strategic allies in disseminating messages. The study provides useful tools for developing effective crisis communication strategies, strengthening organizational resilience, protecting corporate reputation and maintaining public trust.

SOCIAL MEDIA//COMMUNICATION//STRATEGY//BIBLIOMETRIC ANALYSIS

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INTRODUCTION

Multiple aspects of daily life are now governed by social media. Initially conceived as a tool for cultivating personal relationships, over time functionalities have multiplied, enabling new ways of relating, communicating, and sharing information and opinions (Austin and Jin, 2018). Social media use continues to grow exponentially, now counting 4.76 billion users worldwide, or just under 60 percent of the world's population (We are Social, 2023).

This development has led to a significant acceleration in the global dissemination of information online (Wassler et al., 2022), a particularly critical phenomenon during crises and emergencies. In these contexts, the presence of multiple voices and narratives can amplify

confusion and anxiety in the public (Iannacone, 2021), as demonstrated during the recent Covid-19 pandemic (Wassler et al., 2022). To avoid these negative outcomes, social media must be integrated into corporate communication plans and strategies in order to quickly and effectively address critical situations (Perry et al., 2003; Roy et al., 2020). Indeed, social media is an essential tool in emergency management (Maal and Wilson-North, 2019; Mavrodieva and Shaw, 2021).

The crisis communication landscape has become much more complex than in the past, as social media has made communication between organizations and the public much more dynamic and interactive (Austin and Jin, 2016). These platforms have created new spaces for online discussion and debate, where audiences can freely express their ideas, opinions, and emotions (Arpan and Roskos-Ewoldsen, 2005). In this context, crisis communication links the messages sent by the organization in question and immediate responses from the public (Palen et al., 2007; Wright and Hinson, 2009), which has taken a much more active role in the debate, using social media such as Facebook, X and blogs to communicate during crisis situations (Paul and Das, 2022).

In addition to intensifying public involvement and transforming citizens into active participants, new information and communication technologies (ICTs) have triggered deep interdependence that bridges great distances. This phenomenon is accelerating the spread of the effects of crises and exacerbating vulnerability (Owen, 2015), as evidenced by recent events such as the Covid-19 pandemic, socio-political polarizations, and climate-related concerns (Hafez and Grüne, 2022).

Social media can be used to fulfill multiple needs during a crisis, such as the need to obtain information (Sutton et al., 2008) or the desire to freely express one's ideas and opinions to find emotional support (Cheong and Morrison, 2008; Kaye, 2005; Seltzer and Mitrook, 2007). To meet these needs, organizations must open a dialogue with the public, using a combination of different social media (Romenti et al., 2014). However, while these platforms can prove to be a valuable ally in crisis management, they are also fertile ground for the emergence of crises themselves: events that begin as single incidents can grow exponentially online, fueled by public debate (Austin and Jin, 2018; Queensberry, 2020). This means that in the digital context, preventing, preparing for, and monitoring online conversations by organizations are increasingly important activities to prevent an isolated threat from escalating into a crisis. To sum up, social media can present both new opportunities and new challenges for organizations, depending on how it is managed (Cheng, 2018): it can facilitate interaction with the public and foster the creation of relationships based on transparency and trust (Jin and Liu, 2010), or become a source of misinformation and proliferate online rumors, amplifying the potential negative effects of a crisis (Wigley and Fontenot, 2010).

Studies of social media and crisis communication have evolved over the years to home in on investigating the role they play in managing different types of emergency situations that have occurred over time (Schultz et al., 2011; Utz et al., 2013). As the research in this area is rather fragmented and uneven, our study adopts a bibliometric analysis in order to comprehensively map the existing literature, highlighting the main lines of research and areas for future study. This approach is particularly relevant given the topicality of the issue. The above considerations give rise to the following research questions:

RQ1: What are the main trends in publications on crisis communication and social media?
RQ2: What are the main research strands that are addressed in the literature?

First, our study provides an in-depth overview and assessment of the scientific literature that has been produced on the topic over time. Useful insights and recommendations are also provided for managers and decision makers manage crisis communication in an effective, timely manner, preserving public reputation and trust and

ensuring organizational resilience.

The paper opens with a description of the methodology adopted for data collection and analysis. Next, the results that emerged from the performance analysis and scientific mapping are presented, followed by a discussion. We continue by identifying theoretical queries and future research areas, and offer an overview of managerial implications, finally concluding with a reflection on the limitations of the study.

METHODOLOGY

Data collection

The study adopts bibliometric methodology, a type of analysis that has gradually gained ground in business studies (Donthu et al., 2021; Khan et al., 2021) because it allows for handling substantial quantities of scientific data and producing research of great utility and impact (Donthu et al., 2021). As it is highly objective, this methodology is considered more reliable and unbiased in synthesizing large volumes of information and evaluating performance (Baker et al., 2021b; Nerur et al., 2008); other techniques in comparison are more subjective and as such, more prone to bias (Donthu et al., 2021; Lim and Zhang, 2022).

In addition to mapping the existing literature and assessing its scientific impact, bibliometric analysis is particularly useful in providing an overview of research developments and identifying

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FIGURE 1 SPAR-4-SLR PROTOCOL (PAUL ET AL., 2021)

ASSEMBLING:

Identification
Research Aims: Study Performance and Intellectual Structure of Crisis Communication and Social Media
Domain: Crisis Communication
Source Type: Journals
Source Quality: Scopus

Acquisition
Search Query: *(TITLE-ABS-KEY ("crisis communication") AND TITLE-ABS-KEY("social media"))*

Total Documents returned from the assembling stage: 825 documents

▼

ARRANGING

Organization
Organization Codes: Subject Area, Document Type, and Language

Purification
Subject Area: Social Science; Business, Management, and Accounting; Economics, Econometrics, and Finance; Decisions Sciences.
Document Type: Final Article;
Language: English.

Total Documents retained from arranging stage: 420 documents

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ASSESSING

Total Documents: 420 documents;
Performance Analysis: Analysis of publication and Citation Trend;
Analysis: Bibliographic Coupling and Keyword Co-Occurrence Analysis;
Software: Biblioshiny in R and VOSviewer.

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evolutionary trends and significant gaps (Mukherjee et al., 2022b). With regard to future research trends, bibliometric analysis reveals areas and domains that are still under-explored and of particular interest to the scientific community by analyzing small changes and patterns in the number of publications, collaborations, and citations (Kozlowski et al., 2017; Mukherjee et al., 2022a). In light of these considerations, we adopted this methodology to summarize large amounts of data so as to provide a comprehensive overview of the established intellectual structure and emerging trends on the topic in question (Donthu et al., 2021).

Bibliometric analyses require a rigorous and transparent search protocol (Donthu et al., 2021). In this case, our study followed the Scientific Procedures and Rationales for Systematic Literature Review (SPAR-4-SLR) proposed by Paul et al. (2021), which involves three steps (assembly, organization, and evaluation) to define the corpus of documents to be analyzed, as shown in Figure 1.

In the first stage, assembly, we defined the research objectives and decided on the sources and the reference database, (Scopus). The search query applied on Scopus (TITLE-ABS-KEY ("crisis communication") AND TITLE-ABS-KEY ("social media")) produced an initial sample of 825 documents.

The second stage, devoted to organization, shows how these papers were filtered using various criteria related to subject areas of interest (Social Science; Business, Management, and Accounting; Economics, Econometrics, and Finance; and Decision Sciences), document type (Final Article), and target language (English). By applying these criteria, we were able to reduce the initial sample to 420 papers.

The resulting corpus of articles was then evaluated in the third phase under the protocol through performance evaluation using Biblioshiny in R and VOSviewer software. This step took into account various bibliometric indicators and scholarly mapping analysis, aimed at deepening the intellectual structure of the reference corpus through keyword co-occurrence analysis and bibliographic coupling.

DATA ANALYSIS

The methodological combination of performance analysis and scientific mapping analysis has been utilized in several previous management studies to obtain broader, deeper observations of the literature (Chandra et al., 2022; Lim et al., 2022). Specifically, the first type of analysis involves the use of various bibliometric indicators to examine the contributions of research on a given topic (Broadus, 1987; Paul et al., 2021), identifying the most prolific authors, top journals, and highest impact articles, as well as publication and citation trends over time (Donthu et al., 2021).

The second analysis, scholarly mapping, on the other hand, allows us to examine the possible relationships between different research contributions (Baker et al., 2021a). This analysis explores the intellectual interactions and diverse connections present in the reference corpus using various techniques, including keyword co-occurrence analysis and bibliographic coupling (Andersen, 2021; Donthu et al., 2021). The combined use of these two techniques allows us to triangulate the data we collected (Chandra et al., 2022; Donthu et al., 2021).

RESULTS

Performance Analysis
Our performance analysis carried out on the selected articles enabled us to assess the productivity and relevance of research on the topic in the scientific literature. As shown in Table 1, the total number of publications (TP) included in the sample is 420, while the total number of publications cited (TCP) is 365. These data indicate that 86.9% of the articles on crisis communication and social media in the sample were cited, underscoring the academic relevance of these contributions.

Research on crisis communication and social media, which began around 2011, is still widespread, with a total of about 14 active years

(NAY) and an average publication rate of 6.09 articles per year (PAY). Regarding citation metrics, the total number of citations (TC) is 11,481, with an average of 27.33 citations per publication (TC/TP). As regards co-authorship metrics, the 420 articles we analyzed were produced by 938 authors (NCA), of which 57 were sole authors (NUA).

TABLE 1 PUBLICATION, CITATION AND COAUTHORSHIP METRICS (PERSONAL ELABORATION)

Publication Metrics	
Total Publications (TP)	420
Total Cited Publications (TCP)	365
Number of active years (NAY)	14
Productivity per active year (PAY)	6.09
Citation Metrics	
Total Citations (TC)	11481
Average citations per publication (TC/TP)	27.33
Coauthorship Metrics	
Number of contributing authors (NCA)	938
Number of unique authors (NUA)	57
Authors of co-authored publications (ACA)	363
Single-authored publications (SA)	13.57
Co-authored publications (CA)	86.43
Collaboration Index (CI)	2.23

The collaboration index (CI) is 2.23, suggesting that each author collaborated on average with about 2.23 co-authors, an interesting figure to study the dynamics of collaboration and networks developed around the topic.

Figure 2 shows the time trend of publications in the field of crisis communication and social media, showing a significant increase over the period in question, with a peak of 60 articles published in 2022. In contrast, the number of citations per year shows a decreasing trend, with the highest value recorded in 2011 (about 26.46 citations per article) compared to an overall average of 6.09 citations.

Table 2 shows the most prolific authors in the field of crisis communication and social media. Topping the list in terms of total number of publications (TP) is Jin Y., with 13 articles, followed by Liu B.F., with 12 articles, and Wang Y., with 10 articles. Jin Y. and Liu B.F. are among the pioneers in this field of research, having started publishing in 2011 and 2020, respectively. In terms of average citations, Veil S.R. stands out with an average of 164 citations for 4 publications, surpassing even Jin Y. and Liu B.F.

Considering the most prolific authors, the most productive countries are the United States and China, while those with the most citations

FIGURE 2 TOTAL PUBLICATION AND TOTAL CITATION FOR YEAR (PERSONAL ELABORATION)
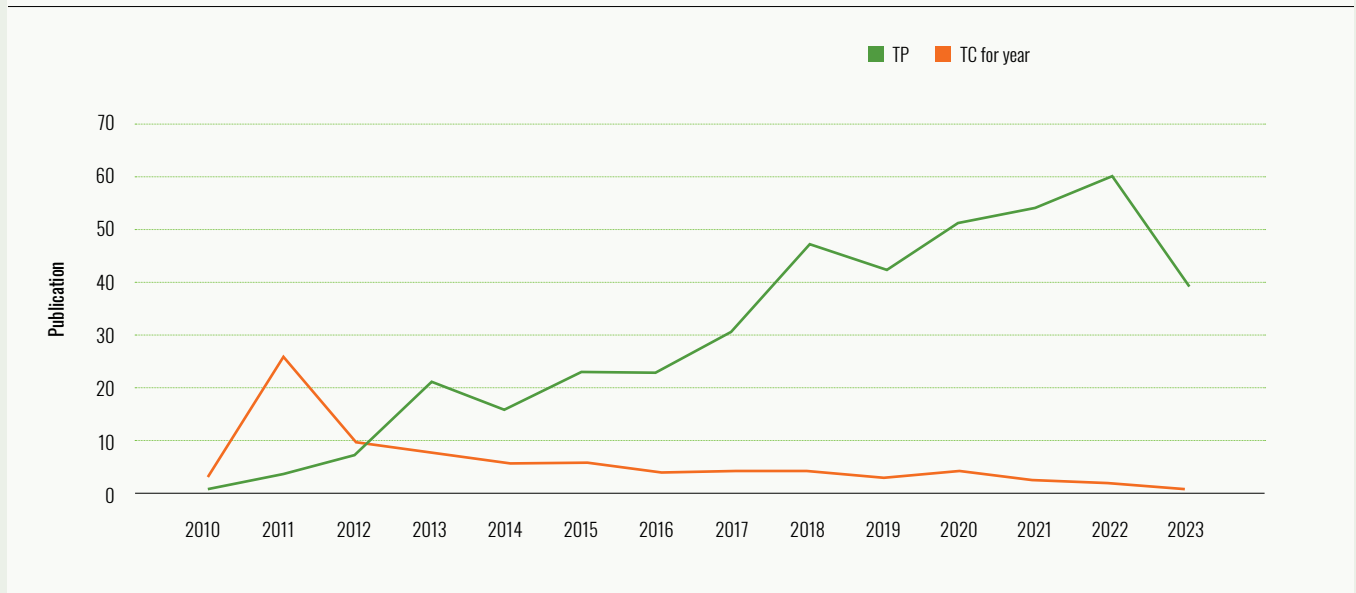
are the United States, the United Kingdom, the Netherlands, China and Australia.

Table 3 shows the most prolific and impactful journals on the topic at hand. One of the most productive journals is Public Relations Review, with a total of 64 published articles (TP), followed by the Journal of Contingencies and Crisis Management, with 21 articles, and the Journal of Communication Management, with 15.

Intellectual structure
Scientific mapping analyses aim to explore the intellectual structure developed around a given topic. For this purpose, keyword co-occurrence analysis and bibliographic coupling analysis were conducted. The former leads to the definition of clusters based on keyword similarity, while the latter groups articles based on the similarity of reference sources (Donthu et al., 2021). The combination of the two allows for triangulation and convergence of the main themes that emerged from the literature (Chandra et al., 2022), underscoring the fixed points in the field of study.

Co-occurrence analysis of keywords on VOSviewer
Keyword co-occurrence analysis studies the intellectual structure of a field by mapping the keywords that each author attributes to publications. This analysis allows the creation of clusters, composed of different keywords, that detect the presence of certain themes within the sample (Lim et al., 2022). Keyword co-occurrence analysis is based on the principle that the simultaneous mention of certain keywords in different papers suggests a close correlation between the underlying concepts, thus helping to define a particular

TABLE 2 MOST PROLIFIC AUTHORS FOR CRISIS COMMUNICATION AND SOCIAL MEDIA (PERSONAL ELABORATION)

Authors	Author Affiliation	TP	TC	TC/TP	h-index	g-index	START PY
Jin Y	University of Georgia, Athens, United States	13	1614	124	12	13	2011
Liu BF	University of Maryland, College Park, College Park, United States	12	1525	127	12	12	2010
Wang Y	Wuhan University, Wuhan, China	10	139	14	6	10	2016
Mirbabaie M	Universität Paderborn, Paderborn, Germany	8	270	34	7	8	2018
Stieglitz S	Universität Potsdam, Potsdam, Germany	8	483	60	7	8	2013
Pennington-Gray L	University of South Carolina, Columbia, United States	7	299	43	7	7	2013
Zhao X	The University of North Carolina at Chapel Hill, Chapel Hill, United States	6	154	26	5	6	2018
Luo Q	Sun Yat-Sen University, Guangzhou, China	5	175	35	4	5	2017
Pang A	Singapore Management University, Singapore City, Singapore	5	72	14	5	5	2015
Zhai X	Sun Yat-Sen University, Guangzhou, China	5	175	35	4	5	2017
Zhao H	Lunds Universitet, Lund, Sweden	5	26	5	3	5	2017
Cheng Y	NC State University, Raleigh, United States	4	174	44	4	4	2018
Ehnis C	The University of Sydney Business School, Sydney, Australia	4	204	51	4	4	2018
Lachlan KA	University of Connecticut, Storrs, United States	4	174	44	3	4	2015
Mohamad B	Universiti Utara Malaysia, Sintok, Malaysia	4	29	7	3	4	2016
Spence PR	University of Central Florida, Orlando, United States	4	185	46	3	4	2015
Tse YK	Cardiff Business School, Cardiff, United Kingdom	4	64	16	4	4	2018
Veil SR	University of Nebraska–Lincoln, Lincoln, United States	4	657	164	4	4	2011
Zhan M	The University of Texas at Arlington, Arlington, United States	4	132	33	4	4	2018
Zhang M	University of Bristol, Bristol, United Kingdom	4	96	24	4	4	2018

research topic (Callon et al., 1983).
Using the Biblioshiny software in R, the sample of articles was filtered to include only those with a minimum of 50 citations (TC), allowing us to focus only on the most influential and impactful articles. A minimum of 6 co-occurrences was set in the VOSviewer software to reduce the density of keywords shown in the graphical display and make the representation clearer and more readable. This process produced a total of 32 keywords, divided into 5 clusters, as shown in Table 4. The distance of the

keywords in the map decreases as their correlation increases, emphasizing where the belong in relation to specific clusters (Andersen, 2021).

For each cluster, Table 4 shows the main keywords, their links, the strength of those links, and the number of co-occurrences. Figure 3 shows the graphical representation of the keyword co-occurrence analysis obtained on VOSviewer and the assignment of a specific label to each cluster, resulting from reading the documents belonging to the individual clusters.

TABLE 3 MOST PROLIFIC JOURNALS (PERSONAL ELABORATION)

Journals	TP	TC	CABS Rating 2021	ABDC Rank 2022	Scopus H-index
Public relations review	64	3729	NA	A	96
Journal of contingencies and crisis management	21	1043	NA	A	61
Journal of communication management	15	377	1	A	46
Corporate communications	11	225	1	A	66
Corporate reputation review	7	64	1	A	69
International journal of disaster risk reduction	7	56	NA	A	70
Tourism management	7	272	4	A	236
International journal of business communication	5	57	NA	A	58
International journal of strategic communication	5	148	NA	NA	30
Journal of applied communication research	5	494	NA	A	65
Journal of emergency management	5	11	NA	NA	15
Journal of public relations research	5	244	NA	A	59
Communication teacher	4	12	NA	A	13
Frontiers in communication	4	37	NA	C	25
International journal of information management	4	146	2	A	152
Journal of business research	4	99	3	A	236
Journal of international crisis and risk communication research	4	51	NA	NA	NA
Public relations inquiry	4	36	NA	A	16
Sustainability (switzerland)	4	30	NA	A	136
Behaviour and information technology	3	72	2	A	88
Communication and society	3	12	NA	NA	22
Communication and sport	3	84	NA	A	26
Communication quarterly	3	172	NA	A	51
International journal of sport communication	3	17	NA	A	11
Journal of risk research	3	27	2	A	74
Journalism studies	3	57	NA	A	75
Malaysian journal of communication	3	23	NA	NA	12
Newspaper research journal	3	14	NA	NA	30
Social media and society	3	67	NA	A	54
Tourism management perspectives	3	33	2	A	69

CLUSTER 1 Role of social media in crisis management and coping mechanisms to improve resilience

During emergencies, traditional communication channels can suffer severe disruptions, exacerbating the overall crisis situation (Kuo, 2013). In such scenarios, social media can help organizations stay in touch with stakeholders impacted by the crisis by providing information and support to the public. In this case, in addition to facilitating information sharing, social media also promotes social cohesion and emotional support (Perez-Lugo, 2004).

The messages conveyed through social media can follow five main coping strategies: (1) making sense of the situation, attributing meaning to the incident; (2) coping with reality and responding to the demands that arise from the external situation; (3) establishing contact with family and friends who can offer support in dealing with the crisis and its aftermath; (4) maintaining a reasonable emotional balance, in an attempt to contend with even the strongest feelings; and, finally, (5) preserving self-image, competence, and situational mastery (Moos and Schaefer, 1986). Adopting these mechanisms helps organizations pursue more effective strategies and build up resilience when future crises strike (Cutter et al., 2008).

TABLE 4 KEYWORD CO-OCCURRENCE ANALYSIS (PERSONAL ELABORATION)

CLUSTER 1 (Red)	Links	Total Link Strength	Occurrences
Crisis	11	25	13
Disaster	12	30	10
Disaster Management	11	20	8
Emergency Management	10	34	12
Framing	10	20	7
Human	19	48	15
Information Dissemination	14	20	7
Organization	14	29	7
Reputation Management	6	10	6
Risk Management	11	24	7
Social Media	31	503	272

CLUSTER 2 (Green)	Links	Total Link Strength	Occurrences
Communication	22	93	31
Crisis Management	25	123	55
Crisis Response Strategies	7	10	6
Internet	12	28	8
Mass Media	12	19	6
Media Role	11	25	7
Reputation	9	19	6
Risk Perception	12	20	6
Social Network	15	33	8
Stakeholder	14	30	10

CLUSTER 3 (Blue)	Links	Total Link Strength	Occurrences
Crisis Communication	31	379	227
Facebook	14	39	12
Government	11	23	6
Public Relations	11	49	28
Twitter	27	130	53

CLUSTER 4 (Yellow)	Links	Total Link Strength	Occurrences
Covid-19	19	102	48
Crisis Response	8	19	8
Tourism	7	17	6

CLUSTER 5 (Purple)	Links	Total Link Strength	Occurrences
Health Communication	10	27	11
Public Health	11	18	7
Risk Communication	11	28	11

CLUSTER 2 Risk communication on social media and the impact on corporate reputation
In the face of a crisis, organizations must be committed to comprehending and listening to public concerns. If the organization is able to deliver the right messages in response to people's needs, this can help manage public perceptions of risk (Barnett et al., 2011). Effective risk communication must therefore be based first and foremost on understanding the public, with the goal of meeting needs and expectations.

Risk communication practices encompass several preparatory processes, including risk analysis, hazard identification, plan development, and public education (Veil et al., 2011). The latter begins with listening to people's needs and concerns in order to minimize the level of stress typical of crisis situations (Coombs, 2007). In addition, maintaining a good relationship with stakeholders enables organizations to safeguard their corporate image and reputation over time (Veil et al., 2011).

FIGURE 3 KEYWORD CO-OCCURRENCE VISUALIZATION (PERSONAL ELABORATION)

CLUSTER 5:
Social media monitoring during health crises.

CLUSTER 3:
Opportunities and challenges of social media crisis communication for governments and organizations.

CLUSTER 2:
Risk communication on social media and its impact on corporate reputation.

CLUSTER 4:
The role of stakeholders' emotions and the need to contain their negative perceptions in the tourism sector.

CLUSTER 1:
Role of social media in disaster management and coping mechanisms to enhance resilience.

CLUSTER 3 Opportunities and challenges of social media crisis communication for governments and organizations

Social media is a source of numerous opportunities and challenges which must be managed. On the one hand, these platforms enable the dissemination of information in a timely manner, improving public awareness of events. On the other, however, they amplify the complexity of the information landscape due to the overlapping of multiple narratives. National and local governments can leverage social media to communicate more easily and directly with the public during a crisis (Graham et al., 2015). But since the social media audience is highly fragmented (Gonzalez-Herrero and Smith, 2008), a combination of different communication channels must be used to reach as many people as possible (Veil et al., 2011).

Although social platforms provide access to vast amounts of information, this abundance can make it more difficult to understand events. Faced with reams content available online, users find themselves engaged in a process of sense-making in an attempt to interpret and attribute meaning to events (Dervin, 1992). This process, however, is greatly hindered by the circulation of incomplete and inaccurate information online. In such a scenario, identifying reliable data and building a clear picture of the event in question is a particularly challenging task. Some social media, including X, helps users in this dynamic and interactive process of data collection and event interpretation (Fraustino et al., 2017; Van der Meer and Verhoeven, 2013). Nonetheless, discrepancies between different interpretative frameworks of an event can generate confusion, distrust, and negative perceptions in the public. To counter these effects, organizational efforts to align interpretative frameworks can help mitigate potential reputational damage and promote faster business recovery (Liu et al., 2011).

CLUSTER 4 The role of stakeholder emotions and the need to curb negative perceptions in the tourism industry

A salient aspect for organizations is to ensure public satisfaction in order to minimize the risk of negative behaviors toward the company, such as boycotts or critical word of mouth (Herrera and Hoagland, 2006; Parsons and Draheim, 2009). This can occur in a variety of industries, with a particularly intense impact on the tourism and hospitality sectors, where high media coverage fuels online debates and conversations. Therefore, organizations should engage in an ongoing dialogue with the public so as to identify potential negative perceptions and emotions in time to prevent adverse behaviors. Remaining silent in extreme situations can exacerbate the crisis, with severe repercussions in terms of corporate credibility and reputation (Seeger, 2006).

CLUSTER 5 Monitoring social media during health crises

In the context of health crises, which have always been characterized by profound misinformation, confusion, and uncertainty, social media conversations must be monitored by organizations to understand the public's key fears and concerns. Such fears could hinder the adoption of safety protocols and measures recommended by governments and institutions to mitigate the effects of the crisis (Hadi and Fleshler, 2016). Therefore, reducing the uncertainty typical of a health crisis requires building and maintaining public trust over time through the dissemination of accurate, timely information at all stages of the emergency (Avery, 2017; Holmes et al., 2009). In addition, it is important to promote two-way communication capable of responding to the multiple needs of the public (Holmes, 2008). Indeed, symmetrical bi-directional communication helps to establish and consolidate lasting, mutually beneficial relationships between the parties (Dalrymple et al., 2016).

Bibliographic Coupling on VOSviewer

Bibliographic coupling enables us to analyze semantic associations between publications to uncover latent topics and potential future research directions (Donthu et al., 2021). In this case, clustering occurs for similar publications. In the graphical representation, each node corresponds to a document, which can be identified by the name of the authors (Verma and Yadav, 2021). The proximity between nodes and their density underscores a certain homogeneity among publications. Figure 4 illustrates the graphical visualization obtained on VOSviewer by analyzing a corpus of 68 papers, which were subsequently divided into 7 clusters. Each cluster was assigned a label corresponding to the main themes that emerged from reading the different documents.

Table 5 presents a summary of the papers included in each cluster, indicating for each publication the year of release and the number of citations, evidencing the most influential and impactful papers within each cluster.

FIGURE 4 BIBLIOGRAPHIC COUPLING (PERSONAL ELABORATION)
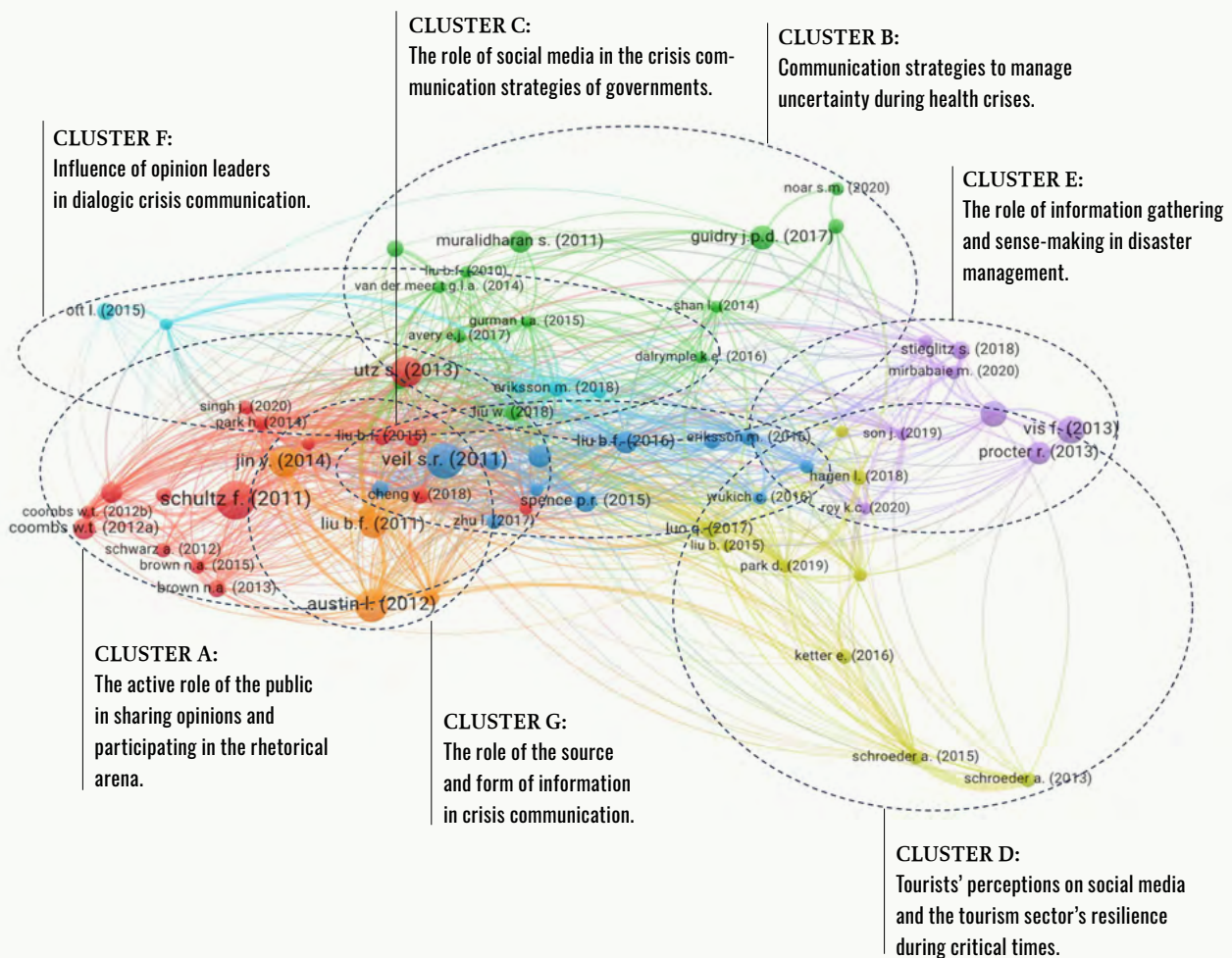
TABLE 5 BIBLIOGRAPHIC COUPLING – CLUSTER DETAILS (PERSONAL ELABORATION)

CLUSTER A (Red)	N. Articles	Authors	Year
The active role of the public in sharing opinions and participating in the rhetorical arena.	1	Brown, N. A., & Billings, A. C.	2013
	2	Brown, N. A., Brown, K. A., & Billings, A. C.	2015
	3	Brummette, J., & Sisco, H. F.	2015
	4	Cheng, Y.	2018
	5	Coombs W.T., & Holladay J.S.	2012
	6	Coombs W.T., & Holladay J.S.	2012
	7	Coombs W.T., & Holladay J.S.	2014
	8	Liu, B. F., Fraustino, J. D., & Jin, Y.	2014
	9	Park, H., & Cameron, G. T.	2014
	10	Schultz, F., Utz, S., & Göritz, A.	2011
	11	Schwarz, A.	2012
	12	Singh, J., Crisafulli, B., & Xue, M. T.	2020
	13	Utz, S., Schultz, F., & Glocka, S.	2013
	14	Van Zoonen, W., & Van Der Meer, T.	2015
	15	Veil, S. R., Sellnow, T. L., & Petrun, E. L.	2012
	16	Zheng, B., Liu, H., & Davison, R. M.	2018

CLUSTER B (Green)	N. Articles	Authors	Year
Communication strategies to manage uncertainty during health crises.	1	Avery, E.J.	2017
	2	Dalrymple, K. E., Young, R., & Tully, M.	2016
	3	Guidry, J. P., Jin, Y., Orr, C. A., Messner, M., & Meganck, S.	2017
	4	Gurman, T. A., & Ellenberger, N.	2015
	5	Liu, B.F.	2010
	6	Liu, W., Lai, C. H., & Xu, W. W.	2018
	7	Muralidharan, S., Rasmussen, L., Patterson, D., & Shin, J. H.	2011
	8	Noar, S. M., & Austin, L.	2020
	9	Romenti, S., Murtarelli, G., & Valentini, C.	2014
	10	Rutsaert, P., Pieniak, Z., Regan, Á., McConnon, Á., Kuttschreuter, M., Lores, M., ... & Verbeke, W.	2014
	11	Shan, L., Regan, Á., De Brún, A., Barnett, J., Van der Sanden, M. C., Wall, P., & McConnon, Á.	2014
	12	Van der Meer, T. G., & Verhoeven, P.	2013
	13	Van der Meer, T. G., Verhoeven, P., Beentjes, H., & Vliegenthart, R.	2014

CLUSTER C (Blue)	N. Articles	Authors	Year
The role of social media in the crisis communication strategies of governments.	1	Cho, S. E., Jung, K., & Park, H. W.	2013
	2	Eriksson, M., & Olsson, E. K.	2016
	3	Freberg, K.	2012
	4	Freberg, K., Saling, K., Vidoloff, K. G., & Eosco, G.	2013
	5	Freberg, K., Palenchar, M. J., & Veil, S. R.	2013
	6	Graham, M. W., Avery, E. J., & Park, S.	2015
	7	Liu, B. F., Fraustino, J. D., & Jin, Y.	2016
	8	Spence, P. R., Lachlan, K. A., Lin, X., & Del Greco, M.	2015
	9	Tandoc Jr, E. C., & Takahashi, B.	2017
	10	Veil, S. R., Buehner, T., & Palenchar, M. J.	2011
	11	Wukich, C.	2016
	12	Zhu, L., Anagondahalli, D., & Zhang, A.	2017

Publication Title	TC	C/Y	Links	Total Link Strength
Sports fans as crisis communicators on social media websites	101	9.18	34	13.00
"May No Act of Ours Bring Shame": Fan-Enacted Crisis Communication Surrounding the Penn State Sex Abuse Scandal	76	8.44	50	21.00
Using Twitter as a means of coping with emotions and uncontrollable crises	60	6.67	49	23.00
How Social Media Is Changing Crisis Communication Strategies: Evidence from the Updated Literature	97	16.17	50	33.00
The paracrisis: The challenges created by publicly managing crisis prevention	162	13.50	17	11.00
Amazon.com's Orwellian nightmare: exploring apology in an online environment	59	4.92	30	23.00
How publics react to crisis communication efforts : Comparing crisis response reactions across sub-arenas	154	15.40	41	25.00
How Disaster Information Form, Source, Type, and Prior Disaster Exposure Affect Public Outcomes: Jumping on the Social Media Bandwagon?	98	10.89	49	21.00
Keeping It Real: Exploring the Roles of Conversational Human Voice and Source Credibility in Crisis Communication via Blogs	75	7.50	42	27.00
Is the medium the message? Perceptions of and reactions to crisis communication via twitter, blogs and traditional media	520	40.00	35	23.00
How publics use social media to respond to blame games in crisis communication: The Love Parade tragedy in Duisburg 2010	73	6.08	19	7.00
'To trust or not to trust': The impact of social media influencers on the reputation of corporate brands in crisis	68	17.00	32	11.00
Crisis communication online: How medium, crisis type and emotions affected public reactions in the Fukushima Daiichi nuclear disaster	335	30.45	47	17.00
The Importance of Source and Credibility Perception in Times of Crisis: Crisis Communication in a Socially Mediated Era	72	8.00	50	22.00
Hoaxes and the Paradoxical Challenges of Restoring Legitimacy: Dominos' Response to Its YouTube Crisis	77	6.42	17	6.00
Exploring the relationship between corporate reputation and the public's crisis communication on social media	56	9.33	42	21.00

Publication Title	TC	C/Y	Links	Total Link Strength
Public information officers' social media monitoring during the Zika virus crisis, a global health threat surrounded by public uncertainty	65	9.29	34	8.00
"Facts, not fear": negotiating uncertainty on social media during the 2014 ebola crisis	52	6.50	37	13.00
Ebola on Instagram and Twitter: How health organizations address the health crisis in their social media engagement	201	28.71	19	9.00
"Reaching the global community during disasters: findings from a content analysis of the organizational use of Twitter after the 2010 Haiti eartquake	49	5.44	47	20.00
Distinguish how elite newspapers and a-list blogs cover crises: insights for managing crisises online	47	3.36	26	11.00
Tweeting about emergency: A semantic network analysis of government organizations' social media messaging during Hurricane Harvey	84	14.00	52	29.00
Hope for Haiti: An analysis of Facebook and Twitter usage during the earthquake relief efforts	173	13.31	8	4.00
(Mis)communicating about COVID-19: Insights from Health and Crisis Communication	63	15.75	2	2.00
Organizations' conversations in social media: applying dialogue strategies in times of crises	53	5.30	42	21.00
Social media as a useful tool in food risk and benefit communication? A strategic orientation approach	81	8.10	31	8.00
Food crisis coverage by social and traditional media: a case study of the 2008 irish dioxin crises	51	5.10	44	16.00
Public framing organizational crisis situations: Social media versus news media	93	8.45	24	6.00
When frames align: the interplay between pr, news media, and the public in times of crisis	54	5.40	41	19.00

Publication Title	TC	C/Y	Links	Total Link Strength
Social Media Use during Japan's 2011 Earthquake: How Twitter Transforms the Locus of Crisis Communication	85	7.73	15	5.00
Facebook and Twitter in Crisis Communication: A Comparative Study of Crisis Communication Professionals and Citizens	85	10.63	51	27.00
Intention to comply with crisis messages communicated via social media	113	9.42	33	7.00
Using value modeling to evaluate social media messages: The case of Hurricane Irene	61	5.55	51	21.00
Managing and sharing H1N1 crisis information using social media bookmarking services	92	8.36	30	12.00
The role of social media in local government crisis communications	176	19.56	53	17.00
Social Media Use During Disasters: How Information Form and Source Influence Intended Behavioral Responses	171	21.38	54	24.00
Variability in Twitter Content Across the Stages of a Natural Disaster: Implications for Crisis Communication	154	17.11	42	19.00
Log in if you survived: Collective coping on social media in the aftermath of Typhoon Haiyan in the Philippines	66	9.43	33	14.00
A Work-In-Process Literature Review: Incorporating Social Media in Risk and Crisis Communication	449	34.54	36	17.00
Government Social Media Messages across Disaster Phases	63	7.88	26	13.00
Social media and culture in crisis communication: McDonald's and KFC crises management in China	76	10.86	43	8.00

CLUSTER D (Yellow)	N. Articles	Authors	Year
Tourists' perceptions on social media and the tourism sector's resilience during critical times.	1	Hagen, L., Keller, T., Neely, S., DePaula, N., & Robert-Cooperman, C.	2018
	2	Ketter, E.	2016
	3	Liu, B., Kim, H., & Pennington-Gray, L.	2015
	4	Luo, Q., & Zhai, X.	2017
	5	Madianiu, M.	2015
	6	Möller, C., Wang, J., & Nguyen, H. T.	2018
	7	Park, D., Kim, W. G., & Choi, S.	2019
	8	Schroeder, A., Pennington-Gray, L., Donohoe, H., & Kiousis, S.	2013
	9	Schroeder, A., & Pennington-Gray, L.	2015

CLUSTER E (Purple)	N. Articles	Authors	Year
The role of information gathering and sense-making in disaster management.	1	Bruns, A., & Stieglitz, S.	2013
	2	Gaspar, R., Gorjão, S., Seibt, B., Lima, L., Barnett, J., Moss, A., & Wills, J.	2014
	3	Mirbabaie, M., Bunker, D., Stieglitz, S., Marx, J., & Ehnis, C.	2020
	4	Procter, R., Vis, F., & Voss, A.	2013
	5	Roy, K. C., Hasan, S., Sadri, A. M., & Cebrian, M.	2020
	6	Son, J., Lee, H. K., Jin, S., & Lee, J.	2019
	7	Stieglitz, S., Bunker, D., Mirbabaie, M., & Ehnis, C.	2018
	8	Vis, F.	2013

CLUSTER F (Light Blue)	N. Articles	Authors	Year
Influence of opinion leaders in dialogic crisis communication.	1	Eriksson, M.	2018
	2	Kim, S., Zhang, X. A., & Zhang, B. W.	2016
	3	Ott, L., & Theunissen, P.	2015
	4	Smith, B. G., Smith, S. B., & Knighton, D.	2018
	5	Zhao, X., Zhan, M., & Liu, B. F.	2018

CLUSTER G (Orange)	N. Articles	Authors	Year
The role of the source and form of information in crisis communication.	1	Austin, L., Fisher Liu, B., & Jin, Y.	2012
	2	Jin, Y., Liu, B. F., & Austin, L. L.	2014
	3	Kim, S., & Liu, B. F.	2012
	4	Liu, B. F., Austin, L., & Jin, Y.	2011
	5	Liu, B. F., Jin, Y., & Austin, L. L.	2013

Publication Title	TC	C/Y	Links	Total Link Strength
Crisis Communications in the Age of Social Media: A Network Analysis of Zika-Related Tweets	78	13.00	27	19.00
Destination image restoration on facebook: The case study of Nepal's Gurkha Earthquake	74	9.25	16	7.00
Responding to the bed bug crisis in social media	48	5.33	32	10.00
"I will never go to Hong Kong again!" How the secondary crisis communication of "Occupy Central" on Weibo shifted to a tourism boycott	112	16.00	43	23.00
Digital Inequality and second-order disasters: social media in the typhoon haiyan recovery	52	5.78	14	6.00
#strongerthanwinston: tourism and crisis communication through facebook following tropical cyclones in fiji	56	9.33	32	18.00
Application of social media analytics in tourism crisis communication	57	11.40	44	25.00
Using Social Media in Times of Crisis	78	7.09	13	24.00
The Role of Social Media in International Tourist's Decision Making	72	8.00	42	32.00

Publication Title	TC	C/Y	Links	Total Link Strength
Towards more systematic Twitter analysis: metrics for tweeting activities	228	20.73	21	11.00
Tweeting during food crises: A psychosocial analysis of threat coping expressions in Spain, during the 2011 European EHEC outbreak	60	6.00	17	11.00
Social media in times of crisis: Learning from Hurricane Harvey for the coronavirus disease 2019 pandemic response	70	17.50	20	17.00
Reading the riots on Twitter: methodological innovation for the analysis of big data	180	16.36	12	8.00
Understanding the efficiency of social media based crisis communication during hurricane Sandy	49	12.25	26	13.00
Content features of tweets for effective communication during disasters: a media synchronicity theory perspective	57	11.40	24	20.00
Sense-making in social media during extreme events	107	17.83	15	15.00
Twitter as a reporting tool for breaking news	263	23.91	9	6.00

Publication Title	TC	C/Y	Links	Total Link Strength
Lessons for Crisis Communication on Social Media: A Systematic Review of What Research Tells the Practice	90	15.00	46	36.00
Self-mocking crisis strategy on social media: focusing on alibaba chairman jack ma in China	50	6.25	30	13.00
Reputations at risk: Engagement during social media crises	105	11.67	15	3.00
Social media dialogues in a crisis: a mixed-methods approach to identifyng pubblics on social media	54	9.00	31	11.00
Disentangling social media influence in crises: testing a four-factor model of social media influence with large data	54	9.00	43	14.00

Publication Title	TC	C/Y	Links	Total Link Strength
How Audiences Seek Out Crisis Information: Exploring the Social-Mediated Crisis Communication Model	374	31.17	50	41.00
Examining the Role of Social Media in Effective Crisis Management: The Effects of Crisis Origin, Information Form, and Source on Publics' Crisis Responses	309	30.90	47	34.00
Are All Crises Opportunities? A Comparison of How Corporate and Government Organizations Responded to the 2009 Flu Pandemic	91	7.58	36	24.00
How publics respond to crisis communication strategies: The interplay of information form and source	234	18.00	48	40.00
The Tendency To Tell: Understanding Publics' Communicative Responses To Crisis Information Form and Source	81	7.36	49	44.00

CLUSTER A The audience's active role in opinion sharing and participation in the rhetorical arena

The first theme that emerged from the bibliographic coupling concerns the increasingly active role of the public in the communication process. Through social media, the public can share opinions with other users and participate in the rhetorical arena along with the organization. This represents a radical change from the past. Indeed, from passive recipient, the audience has become an active contributor, capable of sharing opinions and creating content (Shi et al., 2014; Utz et al., 2013). Social media, therefore, facilitates a higher level of audience engagement in the process of communicating with organizations (Schultz et al., 2011) and fosters a multi-vocal approach to crisis communication (Frandsen and Johansen, 2010). Consequently, organizations must monitor online conversations, as they are a key information resource for assessing the effectiveness of communication strategies and, if necessary, implementing corrective actions if audiences are not adequately satisfied (Bakshy et al., 2011; Coombs and Holladay, 2012).

CLUSTER B Communication strategies for managing uncertainty during health crises

Fear, uncertainty and vulnerability, typical during health crises, pose great challenges in crisis management. In ambiguous, high-risk contexts, there is a certain level of uncertainty that organizations must learn to manage (Brashers, 2001). To meet this challenge, it is essential to invest in disseminating information, building trust, and developing two-way communication (Renn, 2009; Seeger et al., 2009). Indeed, trust must be nurtured by conveying accurate, truthful, and timely information that helps the public adopt appropriate behaviors. Symmetrical, two-way communication leads to beneficial relationships in the long run, strengthening trust between the organization and the public. An organization's past reputation also influences public trust during a crisis (Dalrymple et al., 2016).

CLUSTER C The role of social media in governments' crisis communication strategies

Social media offers governments innovative tools for interacting with the public. Indeed, the dialogic nature of social media makes it possible to overcome many of the barriers traditionally imposed by conventional media, opening up new channels of communication with citizens (Jarger and Bertot, 2010). The main benefits of using social media in the public administration include increased transparency, more active citizen engagement, and strong improvement in terms of trust (Graham et al., 2015; Kuzma, 2010). But despite the many benefits, local governments still have insufficient expertise to fully exploit the potential of these tools (Graham, 2013). Moreover, many public bodies have yet to cultivate specific skills and implement an organizational culture that is effectively suited to the pervasive use of these communication channels to improve interactions with the public (Reddick and Norris, 2013).

CLUSTER D Tourists' perceptions of social media and the resilience of the tourism industry at critical times

The advance of social media has confronted organizations with new critical issues, requiring careful management of the potential risks associated with miscommunication or communication that is not well-received by the public. Particularly when dealing with controversial or unpopular issues, inappropriate communication could trigger strongly negative reactions toward the organization, such as boycotts. For this reason, monitoring public opinion is crucial, especially in certain sectors such as tourism and hospitality, to determine which mitigation actions to implement to protect oneself. By properly assessing and managing public perceptions, organizations can improve their resilience (Bruneau et al., 2003; Luthe and Wyss, 2014). In fact, there is a direct link between resilient organizations and the use of social media: these tools are particularly effective in times of turbulence, as they allow the public to be informed in real time about developments in the

situation, enabling users to take mitigation actions based on their perceptions and emotions (Hays et al., 2013).

Cluster E The role of information gathering and sense-making in disaster management

Every crisis produces a strong need for information and for a collective understanding of the event. Information availability supports the preparedness, response, and recovery phases, each of which has different information needs (Sheppard et al., 2012). In the response phase, information must be concise and specific to facilitate protective actions. In contrast, in the preparedness and recovery phases, more detailed, in-depth information must be provided to increase situational awareness and minimize adverse effects (Sheppard et al., 2012). The availability and timeliness of information, beyond improving preparedness, response, and recovery operations, can also streamline coordination among the organizations involved (Comfort et al., 2005).

The response phase is closely related to crisis communication, while the preparedness and recovery phases must center on risk communication. As regards the latter, before the event occurs, the main objective is to gather as much information about the emergency and the broader context as possible. In crisis communication, on the other hand, information is shared to arrive at an understanding of the different hazards (Son et al., 2019). In addition to information gathering, the process of sense-making is also crucial, which aims to build a collective understanding of the phenomenon to help individuals give meaning to the chaotic situation generated by the crisis (Dervin, 2003).

Cluster F Influence of opinion leaders in dialogic crisis communication

In the digital context, where the public takes a much more active role, a prominent figure emerges: the opinion leader, who is capable of shaping public conversations and perceptions. With the evolution of the web, crisis communication has transformed into a highly dialogic process that requires reciprocity, empathy and involvement (Taylor and Kent, 2014). Underlying dialogic communication is the proactive role of the audience in creating and sharing content. Digital tools have shifted the focus from one-to-one interactions between organizations and audiences to a series of multilateral relationships between different audience groups (Capriotti and Pardo Kuklinski, 2012). In this communicative context, it is vital to focus on the role of opinion leaders, those who pay special attention to an issue, discuss it openly with the public, and seek to influence public opinion (Katz and Lazarsfeld, 1955). One way to do this, and to disseminate information in general, is by participating in online discussions. Identifying the biggest influencers on social media allows organizations to earmark their financial resources for these individuals, potentially valuable allies who can help minimize potential negative fallout in terms of corporate reputation (Jin and Liu, 2010).

Cluster G The role of type and source of information in crisis communication

Also noteworthy is the role of the type of communication and information sources. The choice relative to these aspects, as well as the selection of the medium used to convey the message, greatly influence the effectiveness of the strategy and the audience's response. The type of communication is the mode in which the message is conveyed, while the source concerns the party sending the message (Procopio and Procopio, 2007). Schultz et al. (2011) argue that the medium of communication may even be more important than the message itself. Depending on the type of communication and the source of the message, people will be more or less likely to accept the crisis response implemented by the organization.

In the early stages of a crisis, traditional media and word of mouth are still the most effective modes of crisis communication for an organization because they enjoy greater credibility due to their association with journalistic practice and interpersonal familiarity. Social media tend to

play an emotional support role when the crisis has already hit and the public is already aware of the situation. Consequently, these platforms assume a more relevant function in the later stages of a crisis (Liu et al., 2011).
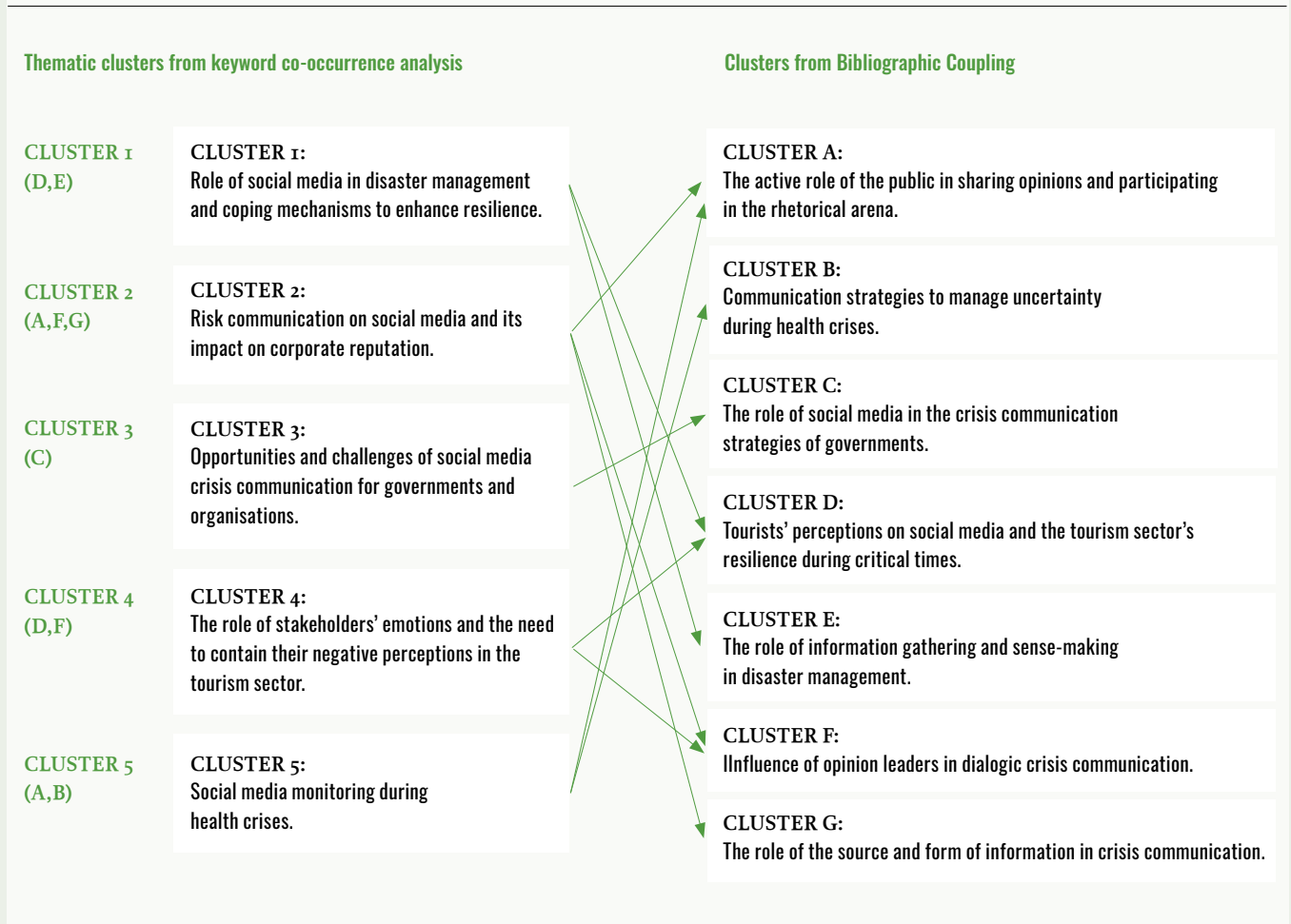
Bibliographic coupling, keyword co-occurrence analysis, and data triangulation

The implementation of keyword co-occurrence analysis and bibliographic coupling enables us to triangulate our data and come to a rigorous understanding of the main research strands emerging from the literature (Chandra et al., 2022; Donthu et al., 2021). Thematic clusters obtained from keyword co-occurrence analysis are labeled from 1 to 5, while those derived from bibliographic coupling are labeled A to G. The thematic clusters that emerged from the two analyses show some convergence, and the effective triangulation of data reveals some particularly relevant moments for crisis communication in the social media landscape (Chandra et al., 2022).

Figure 5 shows that the clusters resulting from the keyword co-occurrence analysis are larger than those obtained using bibliographic coupling, which deals with more specific topics. Specifically, Cluster 1 refers to Clusters D and E; Cluster 2 to Clusters A, F, and G; Cluster 3 to Cluster C; Cluster 4 to Clusters D and F; and Cluster 5 to Clusters A and B. From this triangulation of data, we can summarize the factors that make certain crisis communication messages more effective than others.

FIGURE 5 DATA TRIANGULATION (PERSONAL ELABORATION)

Thematic clusters from keyword co-occurrence analysis

CLUSTER 1 (D,E)
CLUSTER 1: Role of social media in disaster management and coping mechanisms to enhance resilience.

CLUSTER 2 (A,F,G)
CLUSTER 2: Risk communication on social media and its impact on corporate reputation.

CLUSTER 3 (C)
CLUSTER 3: Opportunities and challenges of social media crisis communication for governments and organisations.

CLUSTER 4 (D,F)
CLUSTER 4: The role of stakeholders' emotions and the need to contain their negative perceptions in the tourism sector.

CLUSTER 5 (A,B)
CLUSTER 5: Social media monitoring during health crises.

Clusters from Bibliographic Coupling

CLUSTER A: The active role of the public in sharing opinions and participating in the rhetorical arena.

CLUSTER B: Communication strategies to manage uncertainty during health crises.

CLUSTER C: The role of social media in the crisis communication strategies of governments.

CLUSTER D: Tourists' perceptions on social media and the tourism sector's resilience during critical times.

CLUSTER E: The role of information gathering and sense-making in disaster management.

CLUSTER F: IInfluence of opinion leaders in dialogic crisis communication.

CLUSTER G: The role of the source and form of information in crisis communication.

DISCUSSION

Scholarly output on crisis communication and social media has increased over time, demonstrating growing research interest in the topic especially in recent years. Since 2020, the number of publications has exceeded fifty articles per year, a trend that reflects the proliferation of crises of various kinds in different sectors around the world, such as the Covid-19 pandemic. This has fueled strong interest in the role of social media in information dissemination and crisis management (Paul and Das, 2023). However, the upsurge in scientific output has not been accompanied by a corresponding improvement in research quality: Figure 2 shows an opposite trend in the number of citations, while Table 3 reveals the limited number of publications in journals included in ABS rankings. Considering the relevance and topicality of the issue, it is therefore necessary to promote higher quality research aimed at strengthening organizational resilience to external shocks, that is, the ability of companies to respond to adverse situations. Such resilience should not only be cultivated to handle more traditional crises, such as financial ones (Barbera et al., 2016), but also new emerging challenges.

Our bibliometric analysis also offers perspective on the evolving nuances of the topic under consideration. In the body of articles we analyzed, the growing prominence of the role of stakeholders and information management clearly emerges. From 2020 onward, with the Covid-19 pandemic emergency, there has been a substantial rise in the number of publications on the topic of managing risks from disasters and emergencies, with the goal of understanding how to ensure public safety and greater resilience among the organizations that are impacted (Duchek, 2019). This field of research shows strong collaboration among authors, as can be seen in Table 1, which reports significantly more co-authored publications than single-authored publications. Moreover, the most prolific authors work at universities in countries such as the United States and China, with a particularly evolved culture in preventive preparedness and disaster management (Tierney, 2020).

Through scholarly mapping, and in particular the triangulation of clusters that emerged from keyword co-occurrence and bibliographic coupling, it was possible to draw the "big picture" of crisis communication in social media, the different nuances in the various topics, and the relationships between topics (Lim and Kumar, 2023; Mukherjee et al., 2022a). Some relevant aspects that emerge from the triangulation of the main strands of literature include:

- the role of stakeholders, who are more and more active, and need not only informational but also emotional support during a crisis (Perez-Lugo, 2004);
- the necessity to reduce negative emotions, concerns and fears of the public as much as possible by monitoring the online debate in order to contain the adverse impact of critical word of mouth or harmful behaviors such as boycotts (Herrera and Hoagland, 2006; Parson and Draheim, 2009);
- the role of the different actors involved, including national governments and local authorities, in defining procedures and facilitating a collective understanding of events (Graham et al., 2015).

These nuances offer valuable insights into how to communicate with the public in a transparent, appropriate, and timely manner (Dalrymple et al., 2016), preserving the company's credibility and reputation and strengthening public trust (Avery, 2017). Indeed, the latter is a particularly valuable resource, especially in crisis situations when the public does not have all the information it needs to make informed decisions. Maintaining public trust offers several benefits, including positive word-of-mouth and favorable behaviors toward the organization involved (Castaldo & Grosso, 2015; Castaldo, 2024). Therefore, crisis communication strategies that address the needs and concerns of the public can strengthen the resilience of organizations, enabling them to deal with future crisis situations as well (Fearn-Banks, 2016; Jin et al., 2014). Conversely, ineffective strategies that fail to meet these needs can damage the organization's reputation, erode

public trust, and undermine business performance indicators such as market share, profitability, and customer satisfaction (Ulmer et al., 2020). The main themes that emerged from the bibliometric analysis thus provide valuable insights into the necessity to monitor debate in the rhetorical arena and to engage influential stakeholders, aspects that taken together make crisis communication much more complex to manage than in the past (Rodin et al., 2018).

In addition to the more active role of the public in communication, the scope and effects of recent crises also challenge the theoretical model widely adopted in the literature, namely the Situational Crisis Communication Theory (Coombs, 2007; 2022). This calls for organizations to shift from more defensive communication strategies to more accommodating, constructive ones, although the latter are costlier. In addition, the number of external shocks that organizations face in the course of their existence is augmenting, both in frequency and magnitude. This requires them to intensify their crisis management and communication efforts to respond effectively to the uncertainty and vulnerability of the competitive environment (Pirotti and Venzin, 2014).

THEORETICAL IMPLICATIONS AND DIRECTIONS FOR FUTURE RESEARCH

Through bibliometric analysis, our study contributes to theoretical consolidation by providing an in-depth overview of the existing literature on the topic at hand. In particular, the most widely discussed theory in the sample is the Situational Crisis Communication Theory (Coombs, 2007; 2022), which has been challenged by the most recent crises and the increasingly active role of the public. As a result, new variables must be considered in defining current systemic crises. In any case, bibliometric analysis not only provides an accurate snapshot of the research on the topic to date, but also opens new horizons for research paths (Donthu et al., 2021; Verma and Gustafsson, 2020).

Future research on the topic could explore cooperation and collaboration among different stakeholders, such as agencies and legislators, who protect public safety during crises by establishing protocols and regulations. Greater coordination efforts with these entities would enable organizations to respond to crises in a timelier manner and better manage public feelings of uncertainty and fear (Williams et al., 2021). In addition to the synergies and the network effect among these entities, in the digital ecosystem it is crucial to create synergies among the different communication channels (Baggio and Del Chiappa, 2013; Bregoli and Del Chiappa, 2013; Del Chiappa, 2004). However, in crisis contexts, traditional media such as newspapers and TV continue to be essential tools for disseminating information and therefore need to be properly integrated with social media, which should then act as complementary communication (Austin et al., 2012).

Most of the articles analyzed in the sample consider only one social media platform, which is why future studies on the topic should focus on comparing the effectiveness of crisis communication by analyzing multiple platforms. In addition to the channel used, the type of communication (text only, images, video) can also influence the effectiveness of the message, varying by audience age and country of residence. This aspect deserves further investigation in future research, as crisis communication has mainly focused on text content, while other formats, such as video (now one of the most popular content types) have been explored far less (Campbell and Rudan, 2020).

Finally, the availability of big data and advanced predictive analytics tools offers organizations the opportunity to monitor the external environment more closely, gather signals and, as a result, predict potential threats. The ability to identify, assess and manage risks and threats has always been critical to ensuring the continuity of organizations over time. This capability is particularly useful in responding to diverse competitive dynamics and increasingly complex relationships with multiple stakeholders (Tarantola, 2012). Access to a greater volume of information can also facilitate the personalization of messages aimed at different targets. In particular,

artificial intelligence can help create and refine these messages to generate a more timely and targeted response to users' needs. Questions persist, however, about the ethics of using these technologies, especially when they are applied to manage particularly sensitive situations, such as crises involving victims.

MANAGERIAL IMPLICATIONS

The study has several managerial implications. First, managers should strive to create crisis communication strategies that not only address the public's need for knowledge and information, but also foster social cohesion and emotional support. In other words, organizations should formulate messages that can minimize public fears by addressing key concerns (Wassler et al., 2022), allaying negative emotions and stimulating positive ones such as anticipation (i.e., the public's desire for a return to normalcy), and incentivizing of future intentions (Fedeli et al., 2022; Kim and Cameron, 2011). In this way, communication can guide the organization in supporting the public through the different stages of a crisis, containing the damage and promoting faster recovery (Perez-Lugo, 2004).

Second, in today's landscape, where the public is much more actively involved in communication, organizations must strive to maintain two-way, dialogic, engaging, and empathetic communication to meet the needs of the public and create beneficial, lasting relationships based on transparency and mutual trust (Nicholls, 2012; Tandoc and Takahashi, 2017). Audience satisfaction is an essential element that organizations must track closely, effectively monitoring online conversations and actively listening to their requests, concerns, and fears. By actively monitoring and listening, organizations can identify any critical issues and proactively address them before the public reacts negatively with behaviors such as boycotting, for example (Herrera and Hoagland, 2006; Parsons and Draheim, 2009). Once managers understand online dynamics, they can also identify particularly influential opinion

leaders and try to turn them into valuable allies, leveraging their media influence to the benefit of the organization (Schultz et al., 2011). Therefore, considering the increasingly active role of some users in various communication arenas (Siah Ann Mei et al., 2010; Whelan et al., 2013), organizations must learn how to properly deal with opinion leaders to transform them into strategic allies within the context of the corporate communication flow (Johansen et al., 2016).

Finally, the speed of information dissemination dictated by social media requires organizations to respond to crises in a timely manner; this can be done by putting communication plans in place ahead of time, allowing correct, effective messaging to be conveyed immediately (Schultz et al., 2011; Veil et al., 2011). A further advantage to advanced planning may be to enhance organizational resilience in the face of future crisis situations (Cutter et al., 2008). In this sense, the implementation of new technologies such as AI can enable organizations to deliver automated messages and responses, increasing the timeliness of responses and public satisfaction by delivering the information that people need. In addition, policymakers must implement initiatives and strategies that facilitate coordination and cooperation among agencies and organizations in times of crisis to reduce recovery time and foster valuable synergies among the various actors involved.

CONCLUDING REMARKS AND LIMITATIONS

Since 2010, research on crisis communication and social media has greatly expanded, partly in response to the growing difficulties organizations contend with in managing increasingly complex crises and the proliferation of multiple narratives on online platforms. Using a bibliometric approach, we provide insight into fragmented literature, highlighting major themes and publication dynamics. Our findings make a noteworthy contribution to the existing literature, offering useful takeaways for future action and areas of

research that explore the development of crisis communication in relation to new technologies and the expanding scope and frequency of the crises facing organizations today.

The study, however, is not without its limitations. Although bibliometric analysis is a useful tool for measuring and evaluating scientific activity, it has some drawbacks. For example, in our case, there is possible bias in the selection of the reference sample in relation to the Scopus database. In fact, the database may not cover all existing publications on the topic. Also, performance analysis based on bibliometric indicators such as the number of citations does not always correctly reflect the quality and scientific relevance of some papers. For an accurate, comprehensive assessment of the literature on a given topic, it is therefore essential to combine the bibliometric approach with other forms of evaluation. This is especially true for in-depth analyses of complex topics, such as crisis communication, which present multidisciplinary perspectives and involve multiple actors.

MANAGERIAL IMPACT FACTOR

- Crisis communication strategies should satisfy the public's need for information, but at the same time allow for social cohesion and emotional support during the different stages of a crisis.

- Communication must be two-way, dialogic, timely, engaging and empathetic to an increasingly active and participatory audience.

- Organizations must engage in continuous monitoring of online conversations and active listening to public concerns; the aim here is to identify potential critical issues and curb undesirable behaviors, critical word of mouth, and negative emotions.

- Influential opinion leaders among the public must be identified and turned into valuable allies in the crisis communication process.

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Beyond the Agile Model: Overcoming Instability with Resilience

In a context defined as permacrisis, a company's ability to consciously manage instability and discontinuity becomes central and strategic to its survival. Organizations that invest exclusively in "agile" value-added processes may prove to be "fragile," forced to frequently interrupt operations and reorganize resources in the face of a succession of unforeseen events. In contrast, companies that not only focus on agility but also develop broad resilience capabilities perform better, demonstrating dexterity in adapting and recovering in the face of catastrophic events, and creating a "new normal" that ensures business continuity and long-term health.

AGILE//RESILIENCE//SUPPLY CHAIN//ORGANIZATION//CHANGE MANAGEMENT

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Shifting to an agile operating model, optimizing sources of supply in distant, lower-cost economies, relocating production systems, decreasing unit costs, and maintaining or bolstering a competitive position in the marketplace: these are some of the strategies implemented by companies to meet the challenges posed by globalization. Statistical evidence shows that the globalization of trade and productive investment has soared from 39% of global GDP in 1990 to 59% in 2019 (European Central Bank, 2021). However, managing the global interdependencies that have developed over the past three decades in production processes and supply chains has proven more problematic recently, especially for companies that have built global value chains over time (*Centro Studi Confindustria*, 2023).

In recent years, a state of permacrisis,[1] characterized by a succession of unexpected geopolitical, economic, social, and climatic events, has transformed the habitat in which we live. This constant co-occurrence of emergencies has transformed the concept of crisis from a temporary rupture into a permanent state of contextual instability.

How many companies have equipped themselves with the necessary flexibility to reduce their dependence on imported strategic resources? Which production systems have had the foresight to assemble an organizational and strategic structure capable of ensuring a timely response to emergencies and a rapid reallocation of resources (skills, technology, infrastructure, and production capacity)?

An organization's ability to cope with such discontinuities plays an increasingly central and strategic role in its survival. In light of the recent advances, studies on organizational resilience could provide a valuable framework for reinterpreting agility as an operating model capable of equipping a company with the levels of adaptation and responsiveness needed to reduce system vulnerability. Confirmation of this hypothesis, described by Holbeche (2018) as the resiliently agile model, could be the key to finally achieving the profound paradigm shift that has been discussed for more than fifty years: the transition from a mechanical to an organic model. This article therefore aims to help managers to deepen their understanding of the organizational attributes of agility and resilience, highlighting their distinctive features.

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The resiliently agile model could be the key to achieving the transition from a mechanical to an organic model.

THE AGILE ORGANIZATION

Agile organizations have an operating model that balances the need for stability and for dynamism. This allows them to quickly and efficiently reconfigure strategy, structure, processes, human resources, and technology, so they can continuously optimize and protect the value chain over time, overcoming certain rigidities of previous lean approaches (Cegarra-Navarro et al., 2015). Organizational agility, then, refers to a company's ability to make rapid changes in production processes and achieve operational flexibility in response to stresses in the external environment, and to seize immediate opportunities. Agility provides the organization with a constant, enduring capacity for adaptation, flexibility, and responsiveness (Teece et al., 2016).

Several working frameworks, especially in the areas of product development and technological innovations, can be traced back to the 2001 Agile Manifesto.

Subsequent analysis of successful experiences and available research (Salo, 2017) has identified some intrinsic factors that characterize the operating model of an agile organization: a network of self-regulated teams united by an orientation towards co-creating value for stakeholders, supported by effective organizational learning mechanisms, very fast decision-making cycles, and the widespread use of enabling technologies, all in a strongly people-centered cultural context.

According to a number of international surveys, the majority of a large panel of leading companies claim to have very ambitious programs in this direction. Specifically, three-quarters of the companies surveyed ranked the adoption of agile-oriented organizational models among their top three corporate priorities (Aghina et al., 2018).

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1 In 2016, former European Commission President Jean-Claude Juncker and former International Monetary Fund Operations Director Christine Lagarde spoke of a permanent state of crisis, which they referred to as a "permacrisis," borrowing a term from complexity theorist Edgar Morin (1993).

THE RESILIENT ORGANIZATION

Resilience refers to the ability of individuals, and consequently social-organizational systems, to anticipate, cope with, and recover from unforeseen and unexpected events, disasters, and emergencies that disrupt normal routines. At the same time, resilience in a company is driven by the intent to protect the interests of stakeholders, ensure the well-being of the community, and boost organizational productivity during vulnerable situations due to crises or emergencies. In a resilient context, external threats are not just a source of anxiety and fear but serve as a stimulus to consider new options, i.e., to create conditions of renewed normalcy that can ensure the continued growth of the organization.

A number of studies in the field of *organizational resilience* (Giustiniano et al., 2018) identify an interpretive model that reveals two components underlying people's behavior: an adaptive component that resists shocks, and a reactive component that, conversely, focuses on learning from shocks. The adaptive part is characterized by the sense of intentionality and determination, accompanied by planning and protective initiatives for the company and all its stakeholders, and efforts aimed at improving the existing organization. The reactive component, on the other hand, is oriented towards rethinking the organization, valuing lessons learned and connecting the various internal components. This dimension promotes integration and encourages the search for solutions, creating fertile ground for the development of new hypotheses, even in areas that are not perfectly known.

Among the components observed in the dialectical relationship between adaptability and responsiveness, scholars include improvisation; understood as the ability to interpret one's role with ingenuity and craftsmanship (Sparti, 2019); strategic and creative problem solving; and the activation of virtuous mechanisms of collective learning. The need for resilience in organizations has become so important that the International Organization for Standardization (ISO) has issued ISO 22316, which is dedicated to this topic.

FRAGILITY ARISES FROM CONTRADICTIONS

In the current context, it is essential to define "timeliness of response" and "change" more precisely. How fast should the response be to sudden, unexpected, and frequent events that characterize the external environment? Is the goal of change to restore pre-existing circumstances, or to adapt time and time again and create new conditions of normality? How much of this change can be planned and predicted, and how much instead takes the form of progressive shaping?

The absence of a conscious answer to these questions in an agile organizational setup can lead to fragility and undermine resilience (Holbeche, 2018). In fact, focusing solely on agile operating models can create an exposure that cannot withstand unexpected and sudden shocks (*frAgility*), leading to changes that could have negative repercussions in the long run. On the other hand, the need to express resilience capabilities could be detrimental to efficiency, costs, and margins in the short term. The necessity of responding proactively and in a timely manner can even lead to "anti-lean" decisions, with the risk of creating organizational redundancies that damage the value chain. In economic and production systems, this often translates into economic costs associated with process disruptions and the consequent reorganization of resources. Unexpected and unforeseen is by definition the opposite of predictable, and it is not enough to respond with the suspension of normality typical of a state of emergency. Reducing the vulnerability of the system requires repositioning it whenever the need arises, with appropriate strategies, by moving towards conditions of different normality (Nunziata, 2024).

In recent years, geopolitical imbalances, global pandemics, extreme weather events, cyber-attacks, and other disasters have exposed the fragility of global production and supply chains, This issue is being debated not only by academics and

institutions, but also by businesses and the public. Managing the global production (and thus supply) interdependencies that have developed over the past three decades has proven more problematic in the past three years. This is especially true for the types of companies that "have developed a 'tight' global value chain over time, with minimal supplier redundancy, aimed at the efficient use of different competitive advantages, and have adopted production systems characterized by predominantly financial inventory management (such as just-in-time practices). The international organization of production, encompassing supply chains, conceals a potential cost to be taken into account, related to its possible blockage" (*Centro Studi Confindustria*, 2023). These considerations bring to mind subjects such as transaction cost analysis, make-or-buy, and the lean economy.

An overemphasis on the agile and lean paradigm has exposed manufacturing systems to significant vulnerabilities. By prioritizing cutting costs and maximizing margins, companies have lost sight of the need to cultivate resilience capabilities. To be resilient, they must have robust supply networks that can quickly recover from shocks caused by abnormal and/or unexpected events. To this end, the following practices are essential: (1) detecting weak signals from the external environment early to enable response and recovery from disruptive conditions; (2) effectively managing the supply chain end-to-end, supported by data governance that enables full traceability from raw materials to finished product, covering subcontractors, suppliers, and end customers; (3) monitoring demand, also counting contingency stocks, and assessing diversification of supply sources, including local sources; (4) investing in digitization to improve remote control of supply chains, and in automation to lower costs and offset processing in high-cost countries.

The phenomena of reshoring (moving production back to the country of origin), nearshoring (moving production to suppliers in geographically closer countries), and backshoring (moving part of the supply chain back to the country of origin) are receiving growing attention in both the economic literature and the policy debate. In addition, the context of rising geopolitical tensions has encouraged the adoption of a new approach called "friendshoring," in which firms choose to shift production to politically allied countries that are considered friendly (*Fondazione Nord Est*, 2022). Two recent surveys conducted by *Fondazione Nord Est* (2022) and the *Centro Studi Confindustria* (2023), provide interesting data on the relocation of supply chains by Italian manufacturing firms. These studies point to an increased exposure of Italian companies to foreign sourcing: almost 73% of respondents source the materials they need for production abroad. In contrast to this heavy reliance on foreign sourcing, between 2016 and 2020, 21% of companies carried out full or partial backshoring operations.

To cope with sudden events, many companies have turned to redundancy strategies, augmenting the amount of available inventory to avoid disruptions. Over the past two years, nearly two out of three companies (or 65.8%, a percentage that rises to 81.2% for companies with more than 250 employees) have stocked up on their inventories to prevent supply problems. This change in approach can be summarized by the phrase "from *just-in-time* to *just-in-case*," which describes the shift from a model focused on efficiency and minimizing waste to one that prioritizes securing supply lines (*Fondazione Nord Est*, 2022).
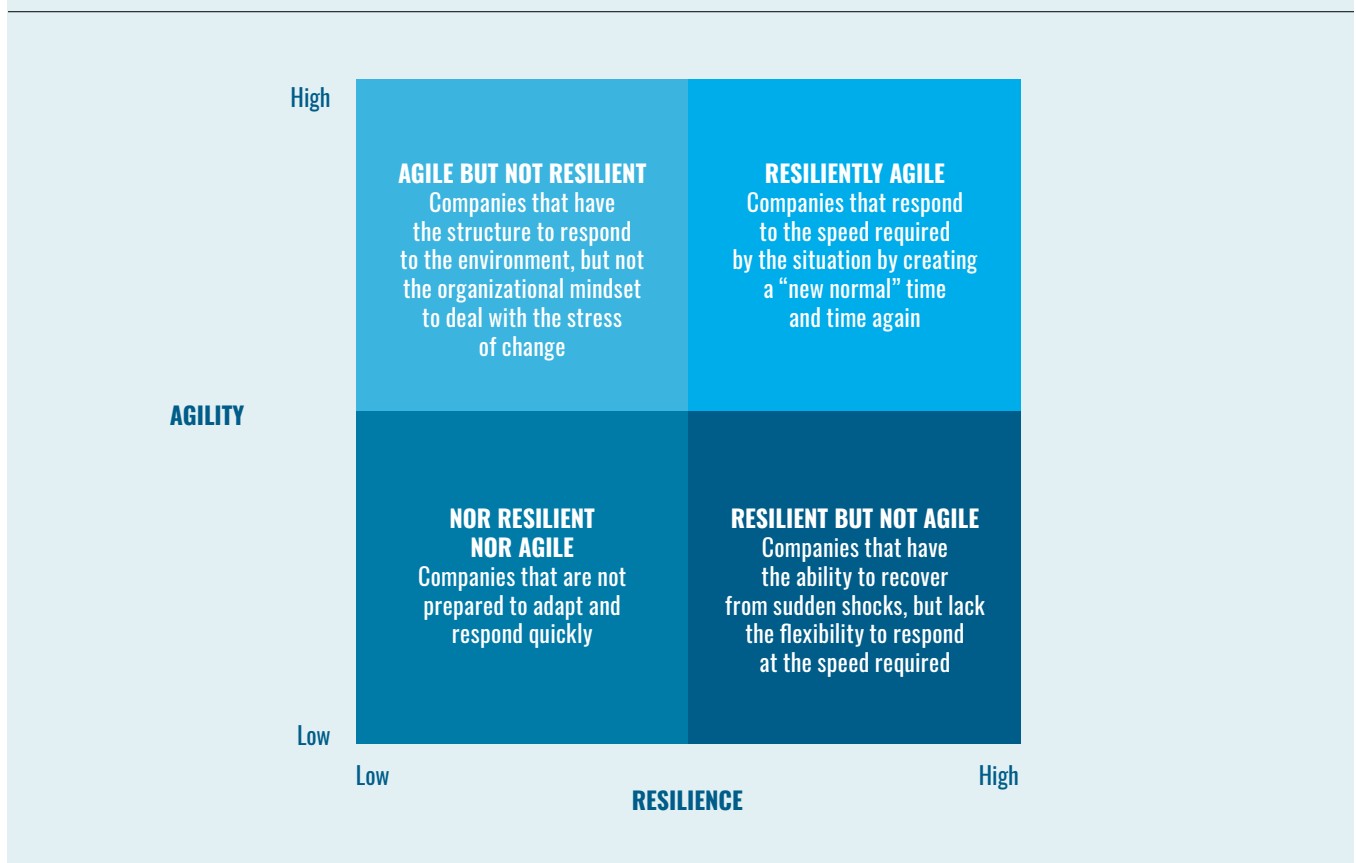
However, the prospect of widespread backshoring is neither practical nor desirable. On the one hand, some materials (especially raw materials) are only found in certain areas of the world; on the other hand, abandoning global value chains would mean giving up the benefits of production specialization and economies of scale. This said, the May 2023 World Economic Forum predicted that supply chains will become shorter over the next three years. Confirming this trend, an *Economist* survey (2023) of a sample of 3,000 senior executives worldwide showed an upsurge in the adoption of nearshoring (from 12% in 2021 to 20% in 2022) and backshoring (from 5% to 15%).

GOVERNING ORGANIZATIONAL CHANGE

Resilience and agility are two highly complementary paradigms that are essential for an organization that wants to be able to adapt to sudden shocks. However, these concepts have specific characteristics that clearly differentiate them. Failure to appreciate these dissimilarities can lead to minor organizational inconsistencies in practice. Instead, understanding the differences and complementarities between resilience and agility helps leaders consider all salient factors in order to manage change in their organization and prepare for an uncertain future. If we define resilience as the ability to withstand, absorb, and respond to sudden changes, and agility as the ability to move in a decisive but flexible manner, then an organization can exhibit different combinations of these two characteristics (Figure 1).

The considerations discussed so far would lead to the assertion that the complementarity between agility and resilience lies in their different scopes of application. While the former is related to the way the organization and its operations function in terms of value production processes, the latter is associated with behaviors and cultural settings, which means it concerns people, communities, and the organization understood as a social system. In other words, resilience is a way of being that characterizes the DNA of an organization; it should be a prerequisite for agility. Moreover, resilience works in both the short and long term, allowing companies to balance the need to respond immediately to sudden crises and disasters with the ability to identify and capitalize on long-term opportunities that may arise from critical situations. From an agile perspective, change is

FIGURE 1 DISTINCTIVE CHARACTERISTICS OF AN ORGANIZATION

AGILE BUT NOT RESILIENT
Companies that have the structure to respond to the environment, but not the organizational mindset to deal with the stress of change

RESILIENTLY AGILE
Companies that respond to the speed required by the situation by creating a "new normal" time and time again

NOR RESILIENT NOR AGILE
Companies that are not prepared to adapt and respond quickly

RESILIENT BUT NOT AGILE
Companies that have the ability to recover from sudden shocks, but lack the flexibility to respond at the speed required

AGILITY — High / Low

RESILIENCE — Low / High

conceived as a path that must be planned and managed step by step, while from a resilience perspective, change means continuous design, driven by the need to create a "new normal" time and time again in response to contextual challenges.

Organizations can be designed to express agility, but resilience depends fundamentally on the people who run them. In fact, people with appropriate training and organizational mindsets can become accustomed to operating in a constantly changing, agile organizational environment. However, to express resilience and adaptability in an environment that is constantly subject to unforeseen events, it is important to possess strategic sensitivity and individual maturity. These traits enable people to understand the larger context in which they operate, to anticipate the possible consequences of their actions, and to make informed decisions even in situations of uncertainty.

MANAGERIAL IMPACT FACTOR

- **Synergy between agility and resilience:** By integrating agility into production processes and resilience into the organizational culture, companies can respond quickly to crises while maintaining a long-term strategic vision.
- **Strengthening the supply chain**: Resilience requires dynamic supply chain management focusing on diversifying sources, continuous monitoring, and adopting a strategic approach that shifts from a just-in-time model to a just-in-case model.
- **Adaptation and organizational innovation**: Resilient companies integrate an adaptive approach with a reactive one, with the aim of learning from experience and innovating through creative improvisation and strategic problem solving.
- **Improving human resources**: Resilience is based on strategic skills, decision-making maturity and contextual vision, while agility is fostered by autonomous teams that are continuously learning.
- **Moving toward resilient governance**: The adoption of digital technologies and advanced tracking and control systems enhances the ability to anticipate risks, ensure business continuity, and proactively address challenges.

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MATTEO VIZZACCARO

How Title Insurance Revitalized the Italian Housing Market

Title insurance is a type of policy that protects buyers and lenders from legal risks associated with real estate, particularly in contexts with less reliable cadastral systems. First widely used in the United States, it was later adopted in Europe to address issues related to donated properties or properties with uncertain provenance. In Italy, a policy called *Donazione Sicura* (Secure Donation) helped revitalize the market for donated properties by guaranteeing purchases and sales and facilitating access to credit. Ten years after the first title policy was issued in Italy, donated properties are circulating freely in the market and generating substantial economic value.

REAL ESTATE//FINANCIAL INTERMEDIARIES//REAL ESTATE MARKET//TITLE INSURANCE

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Title insurance is a tool designed to protect real estate buyers and mortgage providers from legal risks associated with the transfer of titles, rights of possession, and financing for the purchase of real estate. Such policies also address a variety of additional issues that might otherwise obstruct, delay, or even halt the closing of a property transaction. Depending on applicable laws, markets may require title insurance to cover risks not captured in due diligence, in addition to known legal risks. (For instance, if the property in question was the subject of a foreclosure in the past, specific coverage for that risk should be required.)

This type of policy originated in the United States where, unlike many European countries, there is no sophisticated, reliable cadastral registration system nor the figure of the notary, as in the Italian system. Although the laws vary considerably from

state to state, generally speaking, in the US the absence of a European-style cadastral system means that the title is often guaranteed by the seller's representations, at least in part. So, it's not surprising that title insurance was circulating in the US market as early as the mid-1950s. Today, such policies are indispensable when it comes to buying and selling real estate and granting mortgages, so much so that the databases of the major American insurance companies in the industry are more comprehensive than state or county records.

Title insurance first came to the Old Continent to meet the needs of Eastern European countries (primarily Poland and Romania) after the collapse of the Soviet bloc. In the 1990s, in fact, many assets confiscated by communist governments in previous decades were put back on the market, often with incomplete records and uncertain provenance. In many cases, state institutions had difficulty selling these assets because buyers were concerned about possible claims by the heirs of the original owners. In other cases, the owners who regained possession of their properties were unable to liquidate them because of gaps in the official records. It was in this context that title insurance began to proliferate, eventually spreading to Western Europe (France, Germany, Italy), with the aim of insuring specific risks identified by the due diligence of notaries and lawyers. Not surprisingly, the first requests for title insurance in Europe came from foreign investors, particularly from the US, eager to have the same insurance coverage abroad as they would in domestic real estate transactions.

In recent years, the demands of the retail market have also contributed to the increasing use of title policies, even in the case of purchases and sales between individuals. An example of this trend is the experience of donation policies in Italy, which illustrates the relevance of these insurance solutions. But surprisingly, there is a bibliographic gap in the specialist literature on the theme. The partnership between SDA Bocconi and Aon, a leading consulting firm for risk management and insurance programs, aims to fill this gap.

THE MARKET FOR DONATED REAL ESTATE

In 2014, recognizing the needs of real estate market stakeholders such as banks, notaries, brokers, and investors, Aon launched Lloyd's *Donazione Sicura* policy in Italy, the first insurance coverage designed to facilitate the buying and selling of donated real estate. Ten years on, it is clear that this title insurance has solved a social problem that had not been previously addressed to the satisfaction of all parties involved. If we want to study this phenomenon in depth, we need to quantify its dimensions.

In today's social context, older people are living longer, on average, and young people are having a harder time "launching" (i.e. becoming autonomous). As a result, the transfer of wealth from one generation to the next has become a crucial node for Italian families. Gifting property, quite customary in Italy, is one of the most common forms of wealth transfer.

While Italians have historically viewed brick and mortar as a safe investment, the concentration of multiple properties in the name of one person carries significant tax disadvantages (e.g., property tax on second homes). For these and other reasons that warrant further study, donated assets are an important part of the Italian real estate market.

According to data published by the National Council of Notaries,[1] the number of real estate donations climbed steadily over the past decade until 2020, when there was a downturn due to the Covid-19 pandemic, and then rose again in 2021. In 2022 and 2023, this figure decreased slightly compared to previous years but remained above pre-pandemic levels.

This trend has opened up a new horizon for the real estate market. In fact, the protection provided by insurance products has eliminated many obstacles related to selling donated properties, freeing up a valuable segment of the Italian real estate market.

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1. Notary Statistics Data: 2016, 2017, 2018, 2019, 2020, 2021, 2022.

THE NEW GOLD STANDARD IN THE HOUSING MARKET

The purchase and sale of donated real estate has historically been a complicated, uncertain undertaking, made no less so by half-hearted regulatory interventions and an attempt to engage in practices that are not always unanimously considered appropriate (such as the termination of the donation). In this context, insurance programs have quickly been established as the gold standard of the market, guaranteeing objective benefits to all parties involved in transactions of donated real estate: from donees to buyers, from legitimate heirs to banking institutions that agree to grant loans.

Today, this insurance solution is universally recognized as the best possible option thanks to the comprehensive guarantees it offers, as well as the relative speed and cost effectiveness. Title insurance policies provide buyers with protection in the event that a forced heir takes legal action against a third-party purchaser (e.g. pursuant to Article 563 of the Civil Code, "Action against successors of donees subject to reduction"). To clarify, a forced heir is a family member of the deceased (spouse or child) who cannot legally be disowned, and therefore has an indefeasible right to inherit, according to Italian inheritance law. This person could potentially sue the buyer to obtain the return of the property or monetary compensation for the contested share of the property value. In this case, the insurer would pay the policy holder (the buyer) the amount demanded by the forced heir. The cost of this coverage consists of a small premium (less than €1,000 for the purchase of a property worth €300,000) in the form of a one-time payment. The guarantee is valid for an indefinite period of time, i.e. as long as any forced heir (whether known, unknown or contingent) has the right to take action against the property purchaser.

This policy allows the buyer to retain the right of ownership of the property and, consequently, the bank to secure the loan to guarantee the mortgage (if there is one). As a highly innovative solution, in recent years title insurance has contributed decisively to the increase in real estate transactions involving donated property, finally eliminating inherent risks and uncertainties, without in any way affecting the rights of the heirs, as sanctioned in the Italian Civil Code.

THE PURCHASE AND SALE OF DONATED REAL ESTATE: THE NUMBERS

Now we'll look at a series of statistics that show how the growth and consolidation of insurance solutions have led to the development of the donated property real estate segment. If we examine the data provided by the Real Estate Market Observatory of the Italian Revenue Agency (Italy's IRS) and the National Council of Notaries and compare these numbers with the information on the insurance sector provided by Aon, we find that there are no structural barriers to the purchase and sale of donated real estate. More importantly, insurance has served as a powerful driver of real estate deals.

The stock of real estate and the number of sales and purchases in Italy

At the quantitative level, the stock of Italian real estate has followed a trend of moderate but steady growth in recent years. Here we refer to the cadastral categories most frequently bought and sold between private individuals (specifically, category A, which includes private dwellings and offices, and category C, private commercial or artisanal activities). As evidenced by data from the Real Estate Market Observatory (or OMI in Italian),[2] this stock increased by about two million over the period 2016-2023. Specifically, as reported in Table 1, the total number of dwellings rose from about 62.5 million in 2016 to just over 65 million in 2022 and then slightly below 66 million in 2023 (Ministry of Economy and Finance, 2023).

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2. *Osservatorio del Mercato Immobiliare* (OMI) data - Cadastral statistics 2016, 2017, 2018, 2019, 2020, 2021, 2022

Real estate purchases and sales

Focusing on real estate transactions,[3] clearly these data are highly volatile and closely linked to economic contingencies. In times of crisis, for example, there is a decrease in house purchases, but not in the total stock of real estate. This dynamic is also confirmed in the 2022-2023 biennium, which was marked by geopolitical conflicts, the return of inflation, rising mortgage rates and higher energy prices. In 2023, the number of properties bought and sold was 709,591. Compared to 2022, this is 9.7% less. Therefore, as we already mentioned, there was a reversal of the growth trend in the volume of transactions, which had been steady since 2014 and was previously interrupted only by the sharp decline in 2020 (-7.7%) induced by the pandemic crisis.

Some data on real estate donations in Italy

Each year the National Council of Notaries publishes a study of notarial statistics,[4] which we can delve into to explore the subject of donations. Looking at the period between 2016 and 2022, this report shows that an average of 254,279 deeds of donation were concluded each year in Italy. As we can see in Table 1, the annual number of donations appears to be constant over the time frame in question, with the exception of 2020, when there is a drop due to the effects of the Covid-19 emergency, followed by a great leap forward in 2021, above the pre-pandemic level.

Looking at the types of donations made between 2016 and 2022,[5] we note that, on average, 75% of donations involved real estate (housing and buildings), with an average annual value of around €142,000. By comparison, the average value of donations of personal property over the same period is €47,574.

An additional element to consider in this preliminary analysis is the statute of limitations granted to the beneficiaries, in other words, how long they have to take action if a donation has violated their rights. By cross-referencing and weighing data on the average age of donors at the time of donation with the remaining life expectancy, we estimate that the average statute of limitations for the rights of legitimate heirs is around 21 years.

TABLE 1 STOCK OF ITALIAN REAL ESTATE AND NUMBER OF ANNUAL PURCHASES AND SALES (2014-2023)

Year	Stock of Italian real estate	Housing purchases and sales	Number of individual donors of personal property and real estate	Number of individual of real estate	Estimated number of title insurance policies
2014	62,011,709	421,336	-	-	367
2015	62,279,825	448,893	-	-	2,222
2016	62,552,568	533,741	248,403	134,412	5,556
2017	62,966,899	542,480	241,697	132,366	12,222
2018	63,282,284	578,647	249,429	136,905	16,667
2019	63,571,890	603,541	256,451	143,052	18,222
2020	63,912,350	557,926	224,196	125,255	17,778
2021	64,448,013	748,523	284,972	163,513	22,222
2022	65,010,242	748,486	274,802	157,952	22,822
2023	66,000,000	709,591	-	-	21,100
Average 2016-2023	**64,005,855**	**589,316**	**254,279**	**141,922**	

3. *Osservatorio del Mercato Immobiliare* (OMI) Real Estate Report - Residential Sector 2017, 2018, 2019, 2020, 2021, 2022, 2023.
4. Notary Statistics Data: 2016, 2017, 2018, 2019, 2020, 2021, 2022.
3. Notary Statistical Data Portal 2016- 2022.

Relationship between stock, donated property and insurance

First, we need to quantify the stock of donated property in Italy. As reported in Table 1, the number of donations per year is almost constant and does not show any significant variation over time. This means we can make a solid estimate by multiplying the approximately 142,000 residential properties donated on average each year by the average time it takes to establish the rights of the heirs (21 years). From this calculation, we estimate that there are just under 3 million donated properties in the country. If this figure is parameterized in relation to the total number of residential properties in Italy (about 65 million), we find that about 4.6% of all real estate consists of donated properties.

This percentage can also be used to assess the weight of donated properties in real estate purchases and sales. According to OMI data (Table 1), an average of about 616,000 properties are bought and sold each year. Applying the ratio of 4.6% to the average number of annual real estate transactions, it's possible to project that if donated properties were actually free to circulate on the market, approximately 28,300 deals involving such assets could be expected each year. (This calculation is based on consolidated data for 2022.)

Another element in our analysis emerges from the number of insurance policies taken out annually to protect buyers of donated properties. Table 2 shows that, since 2014, the insurance institution has become firmly established on the Italian market, and its popularity has grown exponentially, with over 22,800 policies in 2022. This growth, and the consequent consolidation of title insurance, has been instrumental in developing the segment of the market that includes donated properties. Given that each policy can cover multiple properties, it is plausible to assume that there is an almost direct correlation between the number of policies issued and the number of donated properties bought and sold annually. Cross-referencing the data, it appears that the approximately 22,800 policies correspond almost

perfectly to the 28,300 annual transactions calculated above, and account for nearly the entirety of the market.

TABLE 2 INSURANCE POLICIES TAKEN OUT PER YEAR (2014-2023)

Year	Total policies
2014	367
2015	2,222
2016	5,556
2017	12,222
2018	16,667
2019	18,222
2020	17,778
2021	22,222
2022	22,822
2023	21,100

BANKS THAT USE INSURANCE POLICIES

The usefulness of title insurance is also corroborated by the number of banking institutions that accept this type of policy as a means of guaranteeing a mortgage for the purchase of a donated property. In the last year alone, insurance policies have been utilized by almost all credit institutions to grant mortgages.

TAXATION

Calculating the exact fiscal scope of the market for donated real estate that has opened up is extremely complex, as there are many stakeholders involved. As a rough approximation, for the sole purpose of providing an order of magnitude, we can assert the following:

- Just over 66,000 donation contracts have been brokered between 2021 to 2023.
- With an average property price in Italy of €140,000, the total value of donated properties

bought and sold with title insurance policies between 2021 to 2023 was €9.24 billion.

- Of these transactions, 60% were made with a mortgage loan. Assuming an average loan-to-value (LTV) of 80%, banks disbursed at least €4.4 billion in loans from 2021 to 2023.
- The average premium for a donation policy is around €1,000. With a tax rate of 21.25%, insurers alone paid more than €14 million in taxes to the State over the three-year period. Added to this sum is about €6 million paid by insurance brokers in corporate income tax.
- Considering that €9.24 billion worth of assets were bought and sold through real estate agents in the three-year period, and assuming an average commission of 4%, we estimate that nearly €37 million in real estate agent commissions were taxable.
- Added to this are notary fees, which could easily exceed €300 million, plus the related taxes paid by notaries on these fees.

WHAT ARE THE OUTSTANDING ISSUES?

Approximately 81% of bequests are now made with insurance policies, which have become the most popular solution among practitioners. This instrument has been widely accepted by the market because it responds in a flexible and cost-effective way to the needs of all parties involved (sellers, purchasers, legitimate heirs, and third-party beneficiaries).

However, there is still the unknown of the approximately 4,500 annual transactions estimated in the previous forecast that are not covered by insurance policies.

Should we conclude that there is a problem of non-marketability for this real estate segment? Our analysis suggests the answer is no. In fact, assuming that insurance companies would like to extend their coverage to 100% of the stock, there are alternatives to avoiding (or living with) the risk associated with the purchase of a donated property, including:

- Terminating the gift by mutual dissent: This procedure, which cancels out the gift, is available but rarely used due to the lack of established legal precedent and the often significantly higher cost compared to insurance.
- Taking out a second mortgage on another property: Although this is a practical solution, it can lead to potential economic losses for the third-party buyer, which makes this option less attractive.
- Waiving protection in transactions between individuals without a mortgage: In some cases, with a purchase between individuals in which the buyer doesn't need financing, the parties may decide not to take any protective measures.
- Lack of awareness of the benefits of insurance: Part of the market may not be fully aware of the possibilities offered by the insurance instrument, which limits its widespread use.

TABLE 3 SAMPLE OF BANKS PROVIDING MORTGAGES FOR THE PURCHASE OF DONATED PROPERTY SECURED BY A DONATION POLICY

Intesa San Paolo	Bcc Rome	Lazio Center Bank	Bcc Imolese e Ravvenate
Unicredit	Ubi Bank	Credito Valtellinese Bank	Mediolanum Bank
Bper Bank	Bank of Caraglio	Bank of Cambiano	Banca Veronese Banca Pop. di Sondrio
Monte dei Paschi di Siena	Widiba Bank	Banca Popolare del Frusinate	Passadore Bank
National Labor Bank	Banca Alta Toscana	Medioinsurance	Prealpi Bank Sabiagio
Banca Popolare di Bari Banco Pop.	Credit Agricole	Cassa Padana Bank Maritime Alps	Bank Pop. St. Angelo
Apulia and Basilicata	Centroveneto Bassano Bank	Volksbank	Carige
Banco Bpm - Webank Credem	Piedmont Bank	Bank Pop. Ragusa	Bank of Sardinia

In particular with regard to this last point, it could be useful to promote specific actions to disseminate information and raise awareness of the advantages of title insurance in providing guarantees to the parties involved in buying and selling a donated property.

FINAL CONSIDERATIONS

This case is an emblematic example of how private entrepreneurship can provide effective solutions to social problems, helping to revitalize an otherwise stagnant economic sector. Moreover, legislative caution in this sphere is entirely understandable, as intervention in the current inheritance system could lead to serious imbalances in the fabric of society. The institution of forced heirship is a foundational norm of Italian inheritance law, which serves to preserve and transfer family wealth, preventing it from being dispersed. In this context, title insurance takes on an even greater value: on the one hand, it allows the free circulation of bequests on the market for a negligible fee; on the other hand, it gives much-needed flexibility to a regulatory framework that protects and preserves family wealth.

Ten years after the first title insurance policy was issued in Italy, donated property is now circulating unencumbered on the market and generating wealth. Moreover, thanks to this insurance solution, the rights of legitimate owners remain intact. The latter is perhaps the most interesting aspect of this phenomenon: without changing any existing legislation and without impinging on anyone's rights, a new impetus has been given to an industry that had been stagnating for years.

MANAGERIAL IMPACT FACTOR

- **Risk management and investment protection**: Title insurance provides a mechanism to protect against the legal risks associated with real estate transactions, particularly in contexts where title is uncertain or disputed.

- **Integration with banking operations**: Title policies are accepted by many banks as a guarantee for a mortgage, allowing them to operate more securely and facilitating access to credit for the purchase of donated property.

- **Expansion and innovation in the real estate market**: The introduction of title insurance has helped open up segments of the market that were previously considered problematic, such as donated properties.

- **Improved liquidity in the real estate market**: Title insurance policies on donated property have facilitated transactions that would otherwise have stalled due to legal uncertainty.

- **Fiscal and stakeholder benefits**: The proliferation of title insurance policies creates new income opportunities and strengthens economic flows associated with real estate transactions.

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The Changing Roles of Salespeople and Managers in Fashion Retail

The role of sales associates and store managers in the fashion and design industry continues to evolve. To cultivate lasting relationships with customers, retail professionals today must possess strong storytelling and advisory skills, as well as a keen entrepreneurial mindset. Additionally, sustainability training is recognized as essential to strengthen the value proposition offered to customers and promote a more informed buying process, while at the same time enhancing the attractiveness of retail positions and increasing retention.

RETAIL//FASHION//SUSTAINABILITY//INNOVATION//TRAINING

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Over the past two decades, large fashion and design groups, both in the luxury and mass market segments, have gradually abandoned their exclusive role as manufacturers of goods and turned into full-fledged retail chains. This transition has made the retail sector one of the biggest employers in the fashion and design world. While in the past, brands favored the indirect sales channel (based on intermediaries such as agents, distributors, and stores that buy and resell products) today much of the revenue comes from directly operated retail channels, where the manufacturer reaches the end consumer through various retail formats. In these channels, the B2C logic prevails, meaning the manufacturer's main objective is sell-out (i.e., selling to the end consumer), as opposed to the sell-in, which characterizes the B2B logic of indirect

retail channels and refers to sales in the store. There are three main reasons that drive fashion and design companies toward downstream integration:

1. To convey brand identity and encourage cross-selling of a total look and lifestyle. (It's easier, no doubt, to promote products outside the core business in directly operated stores.)
2. To get to know the end consumer, a strategic advantage for refining marketing strategies and merchandising decisions.
3. To boost profitability by retaining margins that would otherwise go to retailers and intermediaries.

Some large stores now have the same number of employees as medium-sized companies. For example, in 2023, the most representative store of an Italian luxury brand in Rome's Via dei Condotti employed more than 130 people: about 10% were managers, 65% were salespeople, and the rest were warehouse workers, customer service personnel, administrative staff, and tailors.

Given the centrality of stores, the role of sales staff is vital to raising consumer awareness of sustainability. In recent years, this professional profile has undergone profound changes, requiring not only new skills but also new attitudes. The aim of this article is to explore the evolution of the role of the retail professional, with an accent on the impact of sustainability storytelling in increasing the attractiveness of the position and retaining staff.

INNOVATION IN RETAIL

The new focus of retail is experience and service. Especially for high-end brands, the store goes beyond the function of a simple point of sale to become a space dedicated to creating unique experiences through the sales ceremony. This approach transforms stores into strategic tools for communicating brand values, making them media platforms, in a sense, capable of entertaining and educating customers with sophisticated, personalized experiences and services. So the store (whether physical or digital) is configured as a profit center, but at the same time as a manifesto and a visual representation of the brand. This leads to the need to maximize not only economic performance, but also the customer experience, incentivizing shoppers to visit more often and stay longer.

Advances in digital technologies and new ways to use consumer data have helped reshape the retail industry (Klaus & Kuppelwieser, 2023). Looking at the latest trends, we see the growing importance of digital experiences, such as virtual try-on, which allows customers to see how desired items would look on them without having to physically try them on. In this highly digital context, the physical store maintains its positive performance and relevance over online sales channels (Altagamma Consensus, 2024), which act as complements and not necessarily substitutes in the omnichannel strategy. Physical stores are seen as destinations where the shopping experience is different from online contexts (Dirvanauskas, 2020).

Innovation in the physical store is necessary, but it is crucial to preserve the authenticity and DNA of the brand. In the context of fashion and design, omnichanneling means, on the one hand, transferring the exclusive in-store experience to the digital space and, on the other hand, creating a fluid customer experience by innovating the offline experience through digital. An example of this fusion of physical and digital is click-and-collect, a service used by many fashion brands that integrates social media features into the retail experience, allowing customers to order items online and receive them at home or in the store. This is where the use of technologies such as AI comes into play, to track inventory levels, study customer buying patterns to assess product needs, and automatically order merchandise for stores. On a day-to-day basis, AI can automate the supply chain, manage cash flow, evaluate pricing and promotions, and monitor key store performance metrics.

FROM CUSTOMER SERVICE TO CLIENTELING

Store management must be integrated into the customer journey, which includes all marketing levers and tools used to engage with customers before, during, and after the purchase. Customer Relationship Management (CRM) is a term that refers to the practices, strategies, and technologies that companies use to manage and analyze customer interactions and data throughout the customer lifecycle, with the goal of improving business relationships, fostering loyalty, and driving revenue growth. Building on the information captured by CRM, the evolution of this approach - clienteling - uses these data in a targeted way to create personalized customer experiences. Clienteling marks a fundamental shift in customer relationships: whereas customer service is reactive, clienteling is proactive (Table 1).

TABLE 1 MAIN DIFFERENCES BETWEEN TRADITIONAL CUSTOMER SERVICE AND CLIENTELING

Traditional customer service	Clienteling
Answers customers' questions	Anticipates customers' questions
Treats all customers equally	Treats each client individually
Collects data to solve purchasing problems	Collects data to personalize shopping
Provides short-term, transactional reports	Fosters long-term relationships based on loyalty

The goal of the clienteling strategy is to consistently convey brand values across all touch points and create valuable and memorable experiences for customers. Clienteling should be viewed not simply as an IT infrastructure for collecting and managing data, but as a complete environment that encompasses the emotions and opinions of customers. This integrated approach is critical to establishing a customer-centric culture that supports growth through big data analytics, personalized communication strategies, long-term retention, emotional branding, and organizational evolution.

But are store associates prepared for this paradigm shift? The role of salespeople and store managers in the fashion and design industry has been under the lens for several years now. This article explores how these functions are evolving to meet the challenges of digital and sustainability.

THE NEW ROLES OF RETAIL

The Boutique Survey[1] found that there is still limited use of technology and a lack of consistency in promoting the sustainability narrative within the store. More than 80% of boutiques said they would support the introduction of digital training tools for their staff to raise awareness of sustainable brands, products, processes and practices, and to stimulate discussions with customers about sustainability. This approach would help educate consumers to recognize the premium price of quality products.

It is worth noting that upgrading digital skills and ongoing sustainability training are also seen as tools to enhance the role of salespeople, a crucial aspect for the future of fashion and design brands. Indeed, they need to have more and more qualified staff in their stores, but they must contend with the perception of the role as underpaid, monotonous, with long exhausting hours and limited career opportunities. As a result, these stores find it difficult to recruit young talent; the main method is word of mouth. In addition, without improving staff skills, effective sustainability training cannot be transferred to either sales associates or end customers.

In order to understand how roles in stores are evolving, what skills employees need, and how to

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1. Between April 2023 and May 2024, after a thorough study of the relevant literature, interviews were conducted with 4 high-end Italian brands and 59 independent boutiques in Milan, 8 of which were re-interviewed for in-depth study. In addition, they examined 45 job descriptions for retail positions in brands and department stores in the fashion and design industry, both Italian and international, advertised on LinkedIn and *The Business of Fashion*.

implement sustainable practices, we formulated some key questions: Can in-store jobs be made more attractive to recruit top talent? What are the necessary skills and abilities that these professionals should possess and develop to cope with increasing digitization and the importance of sustainability? What role should training play in honing skills and retaining staff?

The primary responsibilities of an ideal client advisor, which we identified through this study, are reported in Table 2. Note that while the first six tasks relate to activities that salespeople have commonly performed in the past, the others are clear examples of the modern version of the role. The list of tasks in Table 2 clearly illustrates how the salesperson has become a key business-development figure, often with a budget to create personalized experiences for high-spending customers.

Styling, the ability to make targeted suggestions based on the customer's physical and personal characteristics, is also part of this expertise.

For this reason, salespeople today are also fashion consultants. Their skillsets have also changed with the introduction of new technologies that create immersive experiences and with the use of digital devices that can train them on new product offerings and track all customer information. Finally, salespeople must have a knack for storytelling to convey brand DNA in terms of heritage, iconic products, and sustainability.

In summary, customer relations staff must be proactive, flexible, technology savvy, team oriented, entrepreneurial, and skilled in interpersonal communications. In terms of training, there were some differences based on store size. In the independent boutiques we surveyed, training focused mainly on sales and storytelling activities, which are perceived as indispensable for increasing sales. However, since digital tools and technologies are not frequently used, specific training in this area is limited; the same is true of sustainability issues. In contrast, this content is the topic of training for larger brands, where the need for more articulated

TABLE 2 MAIN DUTIES OF A CLIENT ADVISOR

Engage in cross- and up-selling for all product categories
Maintain product replenishment and physical inventory of goods
Participate in organizing promotional and in-store events
Serve customers according to the brand's sales ceremony
Follow brand standards and policies in terms of dress, personal care, and language
Dialogue with clients and advise them on general trends in the fashion world and developments in the luxury market, showing a passion for these areas
Create an exceptional service experience by welcoming, listening and assisting customers to fulfill and even exceed their needs, demonstrating excellent knowledge of products, including their sustainable characteristics, as well as brand history and heritage
Build and strengthen customer relationships, purposefully interacting different nationalities and types of customers, always putting customers at ease
Ensure qualitative monitoring and updating of customer information according to company tools (CRM), to retain current customers and develop actions with new high-potential customers
Act as brand ambassador to build relationships with new customers and VIP clients
Implement and manage the boutique's promotional programs to keep social relationships with customers active and build customer loyalty
Proactively maintain long-term relationships with customers
Strive to achieve individual and store goals, improving and developing the business
Promote open and constructive communication with other team members, always being cooperative and proposing effective solutions
Help manage product displays according to brand visual codes
Ensure the functional maintenance of the store and appropriate levels of products on the sales floor, in line with company policies and procedures

skills stems from the greater variety of roles.

Figure 1 illustrates the structure of a medium to large store (20 to 100+ employees) and identifies positions that would lead to a career path, in terms of store management and people management. Based on this structure, the top role in a boutique is the store manager, who is responsible for coordinating the other lower-level managers and employees. Essential skills for store managers include the ability to multi-task and make decisions, action-oriented leadership and strong motivation, solid organizational skills, effective communication, an aptitude for problem-solving, team development and coaching, and leading by example (Table 3). More and more often, these professionals are also responsible for raising awareness of sustainability issues. This includes educating employees about sustainable labels and certifications, sourcing and traceability, product sustainability, the environmental impact of transporting and storing goods, as well as managing the repair and reuse of damaged and/or unsold products.

In addition to the store manager, there are other roles in larger boutiques, such as the operations manager, who is responsible for overseeing all operational activities (Table 4).

Finally, the visual merchandiser creates the setting of the boutique's interior and storefront in line with the brand's target world (Table 5).

FINAL CONSIDERATIONS

This analysis of retail roles has shown how the salesperson is evolving into a true advisor, both for existing and potential customers. In terms of the actual sales activity, the transformation will increasingly turn towards edutainment, a mix of entertainment and education on product quality and brand codes. Here, sustainability education will play a crucial role in qualifying the value proposition to customers, teaching them to make better choices.

Some fashion brands have begun to provide

FIGURE 1 SAMPLE STRUCTURE OF A FASHION/DESIGN FLAGSHIP STORE
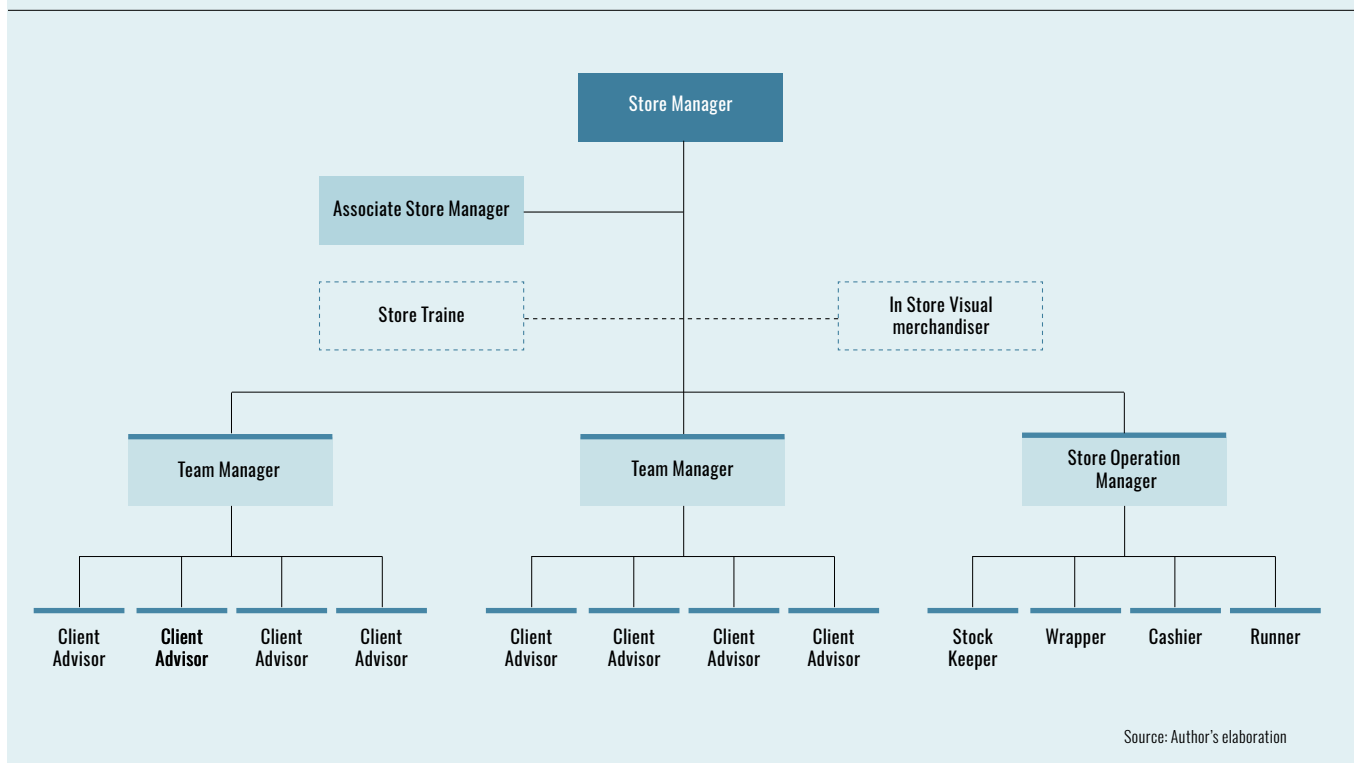

Source: Author's elaboration

TABLE 3 MAIN DUTIES OF A STORE MANAGER

Set monthly goals and objectives and prepare company reports

Lead the team effectively to ensure individual and store goals are achieved, improving and developing the business

Manage staff and scheduling, and conduct interviews to select new employees

Support the team in building, developing and maintaining the customer database, ensuring repeat visits and customer retention

Make certain that customer complaints are resolved promptly and successfully

Provide staff training and development, performance management and coaching

Organize marketing and promotional activities that reflect the brand image

Recruit new customers and convert them into VIP customers by providing them with exceptional experience and establishing a long-term relationship

Ascertain that all sales and operational policies and procedures are followed in the store

Think hybrid, taking advantage of all types of online and offline outlets

Develop the omnichannel mindset among the team, constantly promoting the different touchpoints of customer experience (physical and digital), a clienteling approach, and sales techniques with a focus on VIPs

Ensure that the team provides exceptional standards of customer service and exceeds customer expectations by following the brand sales ceremony

Maintain the efficient operation of the boutique by following the established guidelines and procedures of the retail academy, if applicable

Verify that all operational standards are followed, from replenishing stock to organizing displays according to brand visual merchandising guidelines

Guarantee adequate coverage of sales targets by analyzing historical traffic data and anticipating peak hours

Provide a consistent example of brand image through attitude, personal care, dress code, language and customer relationship management

Manage all health and safety issues by following company procedures and ensuring a secure environment

Create a dynamic and inclusive environment to motivate everyone to create team spirit and achieve results

Act as a coach for team members and foster a growth mindset by constantly monitoring team development plans and individual progress

TABLE 4 MAIN DUTIES OF AN OPERATIONS MANAGER

Ensure that inventory and logistics are properly managed

Control product quality

Train and recruit new staff and handle scheduling

Supervise the various types of technology used in the store

TABLE 5 MAIN DUTIES OF A VISUAL MERCHANDISER

Manage storefront installation to enhance customer experience

Create a visual strategy, such as placing products under certain lighting so that they are more attractive to customers

Create new proposals to update installations, especially when there are new collections and new collaborations

During the holidays, use seasonal elements to create the theme of a festive experience in the boutique to stimulate customers to make purchases

general product sustainability training through podcasts, corporate videos, quizzes, and role-playing games. It is conceivable that the next frontier will be post-sale sustainability training, particular-ly in areas such as repair, pre-owned, and recycling. However, as noted above, nothing is being done in this regard by independent boutiques. This tells us that there is a serious need for more sustainability training, a need that is only partially being met and addressed by stores.

Our field study allowed us to create three clusters of stores that require diffe-rent content and tools:

1. Large brands with directly operated stores, a high level of digitization and retail academies that already address sustainability, albeit limited to internal products and business processes.
2. Large brands with directly operated stores, a high level of digitization, and retail academies that do not address sustainability.
3. Independent multi-brand boutiques and concept stores with little or no digitization, no retail academies, and no sustainability focus.

The same independent boutiques that are lagging behind in training their employees are crucial in conveying messages to local communities and promoting small and medium brands that represent the excellence of Italian supply chains. This is an opportunity to "train-the-trainers" (i.e., to train salespeople so that they in turn train end customers) through videos delivered on platforms accessible to clusters of stores. The survival of independent retail depends on its ability to improve the quality of its value proposition in the eyes of its customers; ESG practices are an indispensable element to this end. Also essential is to offer employees opportunities not only for economic growth but learning through continuous training as well.

Here are suggested topics for training modules and future sales content:

- Helping customers understand how to read labels, explaining the performance and alternatives

in terms of sustainability of textile and leather supply chains.
- Clarifying the concept of Life Cycle Assessment (a methodology that measures the environmental footprint of a product/service throughout its life cycle).
- Compliance with regulations standards or best practices aimed at achieving goals, such as sustainability, which must be pursued not only by the company itself but also by the partners it works with).
- Outlining available options when a product reaches the end of its life cycle.

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MANAGERIAL IMPACT FACTOR

- **The role of the salesperson**: This has evolved to encompass complex activities such as clienteling, promoting business development, styling, using digital skills, and brand storytelling.
- **The role of the store manager**: An increasingly complex job, these professionals must now focus on multichannel, customer base, competitors, brand DNA, and product and people management, which is becoming critical.

- **Centrality of experience and service**: The integration of advanced technologies (video, podcasts, AI, blockchain) makes the store a critical juncture in the customer journey, offering edutainment and interaction before, during and after the purchase.
- **Sustainability as a tool for building loyalty**: Client advisors will be vital ambassadors in educating customers about sustainable practices, adding value to the value proposition and shoring up store loyalty.

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