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FRANCESCO BILLARI

Building the future with demography

While demographic change may seem slow and unnoticeable, its impact on the economic, social, and political future of a country is profound. This is particularly evident in Italy, the third oldest country in the world after Monaco and Japan. Growing longevity and the coexistence of multiple generations within families, organizations, and markets require a rethinking of education and integration policies. Embracing a demographic perspective can facilitate the development of innovative public policies and sustainable business strategies.

SOCIETY AND CULTURE//DEMOGRAPHICS//DIVERSITY MANAGEMENT//IMMIGRATION//SUSTAINABILITY

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Think future, build future. The strategies of companies, institutions, and corporations are based on approaches that project today onto tomorrow. Among these, one approach remains underutilized: the analysis of change through the lens of demography. Although demographic change may seem slow and almost imperceptible, this very phenomenon is one of the most powerful forces shaping our economic, social, and political future – a true megatrend. To envision the future and build a sustainable tomorrow, it is essential to adopt a demographic perspective. By starting with demography and then exploring the dynamics of human capital and markets, we aim to reflect on how both the slowness and inertia as well as the rapidity of demographic change profoundly affect the challenges ahead, with a particular focus on Italy.

Tomorrow is today: Slowness that builds the future
One of the most striking images to illustrate the influence of demography on our future is that of a clock's hands. This concept, introduced by the demographer and economist Alfred Sauvy, founder of the Institut National d'Études Démographiques in Paris (still the largest center for demographic studies in the world), captures the interplay between different societal forces. According to Sauvy, politics moves at the rapid pace of the second hand, often responding to successive emergencies with quick decisions. The economy, in turn, follows the rhythm of the minute hand, oscillating in short- and medium-term cycles

influenced by both macroeconomic trends and the micro-level timing of business planning. However, we must also confront the apparent immobility of the hour hand, which represents demographics. Although it often escapes our attention, the "slowness" of the hour hand plays a key role in determining medium- to long-term trends.

Because of their inherent slowness, demographic phenomena often go unnoticed, yet they have profound consequences. Let's take a long-term perspective: in Italy, life expectancy in 1861 was only 29 to 30 years, while today it exceeds 83 years. Over the past century, advances in life expectancy have "gifted" us with about four additional months of life each year – equivalent to an extra eight hours a day! Similarly, global life expectancy has increased at a comparable rate over the past sixty years, and now averages 72 years. Although demographic change is slow, the increase in life expectancy has significantly shaped our identity today, highlighting the need for individuals, institutions, and companies to look toward the future. Yesterday's tomorrow is not today's, which is why we must be ready to embrace and manage this change.

Italy's example: From pyramids to ships

The transformation of Italy's demographic structure has been radical. In 1861, Italy was a youthful nation characterized by a population pyramid that was wide at the base and narrow at the top, indicating a growing population dominated by children. At that time, the elderly made up only a small part of the population, which consisted primarily of children, adolescents, and adults. Today, the situation is starkly different. By 2024, only 15.1% of the Italian population is under the age of 17, while 24.3% is over the age of 65. This shift is due not only to

FIGURE 1. POPULATION PYRAMID OF ITALY AS OF 1964

FIGURE 2. POPULATION SHIP OF ITALY AS OF 2024
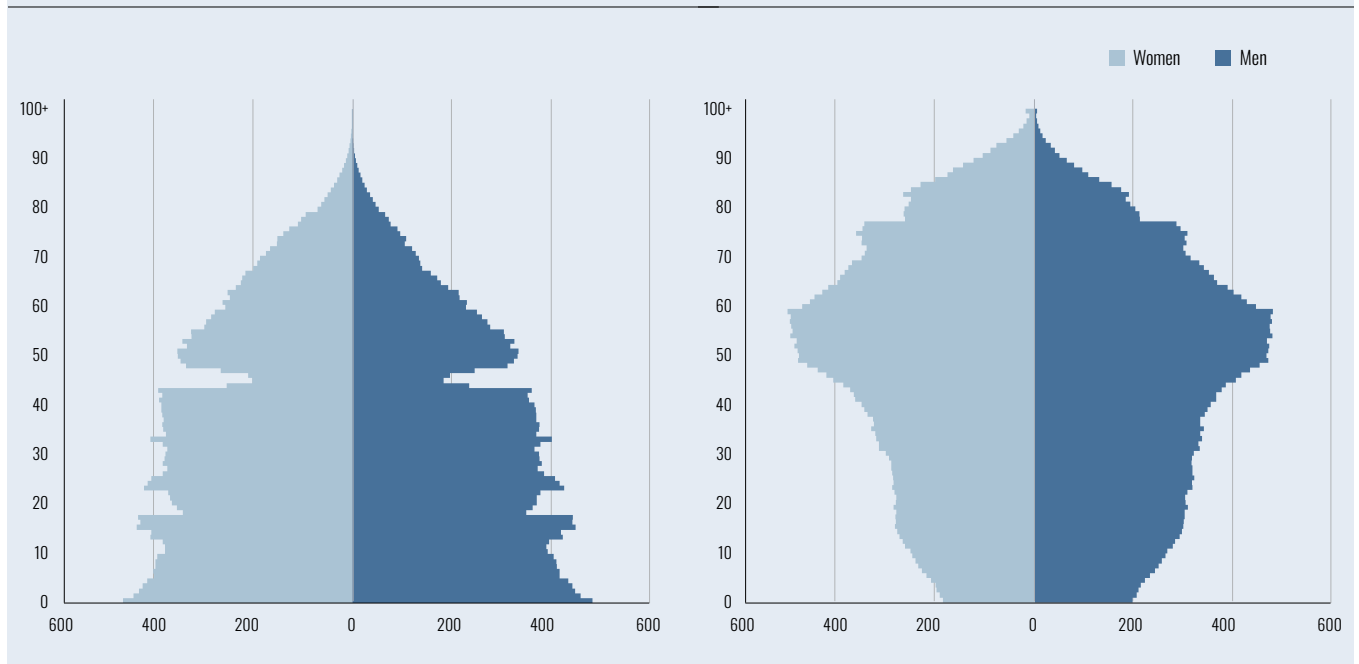
increased life expectancy, which places Italy among the top ten countries in the word in terms of longevity, but also to declining birth rates. This decline can be partially explained by a failure to adapt to gender diversity in society, particularly in the workplace, which requires a focus on shared parenting responsibilities.

Specifically, Italy has experienced a dramatic decline in the number of births, from over one million in 1964 – that year still marks the peak of births and the sixty-year-old cohort is now the largest demographic group – to fewer than four hundred thousand in 2023. Consequently, the projected number of births in 2024 is likely to be about one-third of what it was sixty years ago. The population pyramid of 1964 (Figure 1), which showcases the legacy of that era, has now been transformed into a container ship seen from the stern in 2024 (Figure 2), with a marked reduction in the number of children and young people. As a result, Italy has become the third oldest country in the world, surpassed only by Monaco and Japan. Going forward, the ability to adapt and innovate in response to the challenges posed by global aging will be crucial.

Failure of human capital to adapt

For the first time in history, increased longevity has allowed multiple generations to live together simultaneously. This situation goes beyond the simple categories that marketing experts or family business analysts might use to describe different age groups. Instead, this demographic shift highlights how various generations interact within families, workplaces, and broader markets. What are the implications for human capital?

As life expectancy continues to rise, it is imperative that learning is seen as an integral part of our lives. This shift has led to the concept of lifelong learning, which is becoming increasingly important as we live longer. In addition, we must pay attention to the early stages of life, as they play a crucial role in the formation of human capital. Unfortunately, the institutions responsible for this education have not adapted to the transition from pyramids to ships. A notable example is Italy, where the Gentile reform of 1923, conceived when life expectancy was around 50 years, reserved higher education for a small elite.

Today, however, as we have observed, the base of the demographic ship is thinning, and we need an inclusive education system that prepares all young people for the challenges of an increasingly complex and globalized world. Human capital is built by starting at the base of the demographic ship and progressively moving to the higher "decks." With less than 30% of 25- to 34-year-olds in Italy holding a bachelor's degree, the country is at a disadvantage. As a result, the training needed to navigate the age of artificial intelligence inevitably demands a longer learning curve. By comparison, the average percentage of college graduates among young people in OECD countries exceeds 47%, while South Korea, which has the highest graduation rate in this age group, approaches 70%.

It is therefore crucial that Italy abandons the notion of an elitist education system and creates a framework that gives everyone, regardless of background, the opportunity to contribute to society. It is no coincidence that young Italians

struggle to fully embrace adulthood. They lack access to university campuses, adequate housing policies, and a supportive social context that facilitates their journey to independence. As a result, many remain at home with their parents for much longer than their peers in other European countries, delaying their transition to adulthood and reducing their propensity to take risks and innovate during their formative years.

Migration and ethnic diversity: The risk of "permaemergency"

When discussing immigration, the term "state of emergency" is often used. Consider the Italian context: in recent decades, governments have declared a state of emergency on immigration no less than eight times, starting with the Andreotti government in 1992 and continuing with the Meloni government in 2023. This persistent state of emergency not only reflects Italy's struggles to manage migration flows, but also contributes to a narrative of instability and fear.

However, immigration is not a temporary problem that can be solved with emergency measures. It represents an extension of diversity, complementing the existing gender and generational diversity. The diversity of ethnic and cultural backgrounds is a reality that we must confront with foresight and inclusiveness. Today, nearly 9% of the Italian population is made up of foreign residents. Once known primarily as a country of emigration, Italy is now a destination for immigrants.

We can no longer afford to overlook this reality; instead, we must work to improve integration at all levels of our ethnically diverse society, particularly in the more economically advanced areas. Additionally, we must plan for orderly immigration flows that will help strengthen Italy's demographic landscape. In the coming decades, we should consider the Italian (and European) demographic landscape as complementary to the demographic pyramid of the Global South, which continues to have a substantial youth population. Notably, the global peak in birth rates occurred in 2012, with over 144 million births recorded that year.

Using the lens of demography: From public policy to the role of business

The ageing of the population and the coexistence of several generations as a result of long-term demographic changes; the evolution of family structures with declining birth rates and increasing gender diversity; the challenges faced by young people requiring a reassessment of human capital formation; the emergence of new ethnic diversity – these are all significant phenomena. Despite their complexity, these trends allow us to outline plausible future scenarios. Consequently, they demand innovative public policies at local, national, and supranational levels.

Companies, too, need to adopt a demographic perspective – not only to anticipate the current and future demands of markets characterized by strong and growing generational, gender, and ethnic diversity, but also to address the challenges posed by an aging population. Moreover, companies should look inward to capitalize on these diverse attributes and thereby increase productivity in a socially and environmentally sustainable manner.

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THE RISING ADOPTION OF GRI STANDARDS
ENHANCING SUSTAINABILITY ACROSS THE VALUE CHAIN

Sustainability implies a change in the way companies address the challenges they face, integrating traditional profitability goals with environmental and social responsibility. A key framework incorporating these principles is provided by the Global Reporting Initiative (GRI), a standard widely used by companies to disclose their sustainability practices. Based on data from 272 companies, this article analyzes the different levels of GRI adoption among SMEs and large Italian companies.
By illustrating the level of disclosure in relation to GRI standards, this study aims to provide potentially useful benchmarking insights for Italian companies seeking to strengthen their commitment to actioning sustainable business practices.

SUSTAINABILITY//GRI STANDARDS//ESG//VALUE CHAIN//SUSTAINABILITY REPORTING

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The increasingly central concept of sustainability at the corporate level reflects a growing trend, as companies move toward adopting more informed, ethical business practices, as they integrate environmental, social and governance (ESG) criteria into corporate strategies and operations. Such an approach not only aims to ensure long-term profitability and success, but also contributes to achieving sustainable development goals, creating value for shareholders, for the community, and for the environment.

Recognizing the importance of corporate sustainability in the current global context, the European Commission is actively promoting these principles among businesses through a number of targeted initiatives and policies. Two of the most prominent are the European Green Deal and the

Sustainable Finance Action Plan, which incentivize companies to integrate sustainability into their strategies, operations and reporting processes (European Commission, 2024). By promoting transparency, innovation and collaboration, the European Commission aims to facilitate the transition to a more sustainable and resilient economy, giving companies a key role in achieving positive ESG outcomes (European Commission, 2024).

A growing commitment to integrating sustainability principles into business operations can also be seen in Italy, where the shift is supported by several initiatives. The most consequential of these is known as the PNRR (National Recovery and Resilience Plan), which aims to address the ESG challenges exacerbated by the pandemic by promoting long-term sustainability and resilience (Ministry of Economy and Finance, 2024). This and other initiatives not only demonstrate the growing relevance of sustainability goals in the Italian business landscape, but also map out a clear path toward a more environmentally and socially responsible future.

The growing awareness of sustainability issues has also led to an increase in reporting in Italy. In fact, more and more companies are voluntarily reporting their ESG performance through platforms such as the Global Reporting Initiative (GRI), one of the most popular sustainability reporting systems in the world, used by more than 10,000 organizations in over 100 countries (Global Reporting Initiative, 2024). The widespread use of the GRI is a testament to the credibility and effectiveness of these reporting criteria in helping organizations communicate their sustainability performance in a transparent and consistent manner. According to a recent study on sustainability reporting, up to 90% of Italian companies in the N100 group[1] are likely to produce a GRI-compliant report (KPMG, 2022).

Despite the consensus on sustainability reporting standards, particularly the GRI, there is considerable heterogeneity in the adoption of these systems. This variance is influenced by many factors, including company size (the focus of this article), industry, geographic location, regulatory environment, and corporate culture. For example, large companies with greater resources and global operations are championing these reporting practices, a trend motivated by a combination of needs ranging from regulatory compliance to stakeholder pressure to a commitment to corporate social and environmental responsibility.

While large corporations have dedicated sustainability teams, advanced reporting systems, and established structures for measuring and disclosing ESG performance, small and medium-sized enterprises (SMEs) face major hurdles in initiating reporting practices. Key challenges include a dearth of resources, limited awareness of the benefits of reporting, and a lack of expertise in implementing specialized systems such as GRI standards. In addition, many SMEs operate in highly competitive markets with low margins and lean organizational structures, making it difficult to allocate resources to sustainability initiatives.

Despite these challenges, the trend towards adopting ESG approaches is gaining ground. So it's useful to attempt to make an in-depth comparison of the disclosure levels of GRI standards, distinguishing between large companies and SMEs. Our aim is to identify any differences in the transparency and completeness of reporting, to provide explanations for the main discrepancies that emerged from our analysis, and to suggest effective approaches for implementing this reporting system.

THE STUDY

This study was carried out as part of the GRINS Project (Growing Resilient, Inclusive and Sustainable), funded by the EU's Next Generation

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program. Our objectives are three: to survey the current level of disclosure of environmental and social aspects of the GRI system among Italian companies; to illustrate the main differences in the level of disclosure of sustainability practices between SMEs and large companies; and to outline the key steps for implementing a reporting system in line with GRI principles. To this end, we conducted an analysis based on company size using data collected from a heterogeneous sample of 272 Italian companies. We also reviewed the sustainability reports of 100 large companies and interviewed some of the 172 SMEs operating in different sectors in Italy.

GRI DISCLOSURE IN ITALIAN COMPANIES

The GRI system includes indicators for a wide range of standards related to the sustainability and impact areas of business activities, including emissions, energy use, water consumption, waste management, and biodiversity. The goal is to guide companies in their efforts to operate sustainably and communicate transparently about their environmental and social practices. Figure 1 shows the averages and standard deviations we found in our sample for the various GRI environmental indicators.

To simplify our analysis, we distinguish between indicators that show an above-average dissemination compared to the full sample, in contrast with the ones that receive less attention in public reporting.

For the former, we find that among the Italian companies in the sample:

- 45% report responsible waste generation and management practices.
- 44% publish information on energy and water consumption and waste management practices.
- 43% report the use of sustainable raw materials and products in their operations.
- 42% report greenhouse gas emissions.

By contrast:

- 36% disclose air pollutant emissions.
- 30% report their environmental compliance practices and the environmental criteria they use to evaluate suppliers.
- 21% disclose the impact of their activities on biodiversity and ecosystems.

FIGURE 1. MEAN AND STANDARD DEVIATION – GRI ENVIRONMENTAL STANDARDS
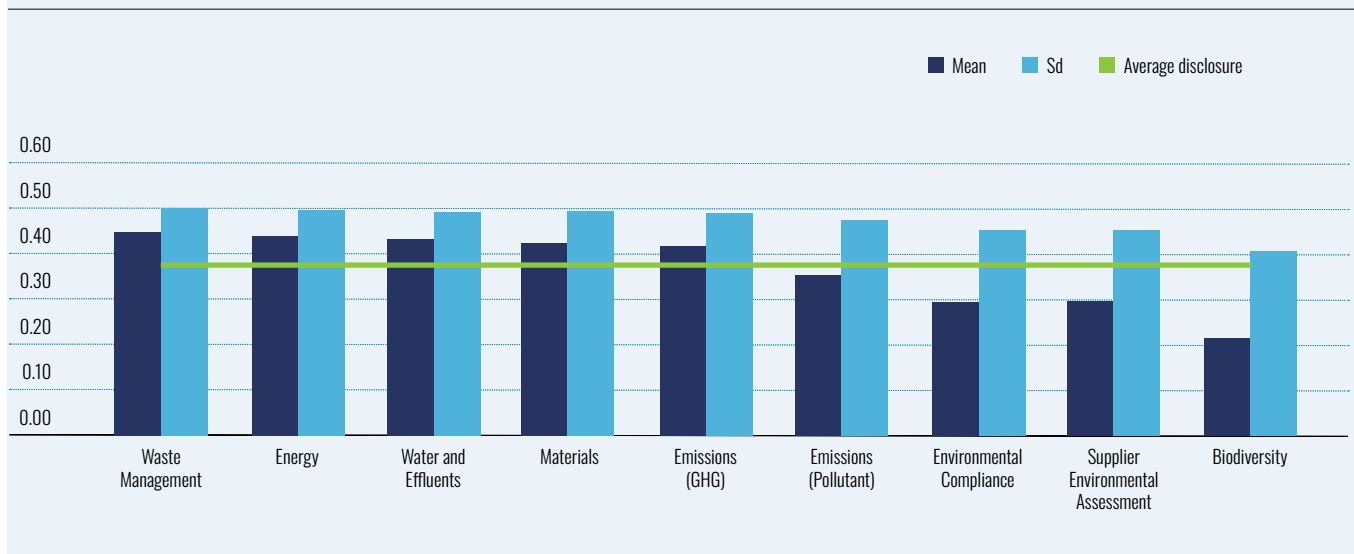
When analyzing data from the full sample, there is clearly a strong focus on indicators related to energy conservation, waste management, greenhouse gas emission reduction, and water consumption, regardless of company size. In contrast, there is limited reporting on compliance with environmental regulations and standards, which seems to be motivated by the perception that communication on these issues provides little value to stakeholders in light of relative regulatory enforcement.

As for the low incidence of the indicator on assessing the environmental performance of suppliers, this is presumably motivated by the fact that the SMEs in our sample are not yet equipped to conduct vendor rating analyses that include sustainability performance. The low level of reporting on biodiversity, on the other hand, seems to be influenced by several factors, including a lack of awareness of its importance, difficulties in measuring its impact, and the perceived complexity of implementing conservation measures.

Similar to the approach we used for the environmental sustainability indicators, we move on to distinguish the different social sustainability indicators based on how frequently they are reported. Figure 2 shows the overall mean, averages and standard deviations for each GRI indicator in our sample.

In terms of the most frequently cited indicators,

FIGURE 2. MEAN AND STANDARD DEVIATION – GRI SOCIAL STANDARDS
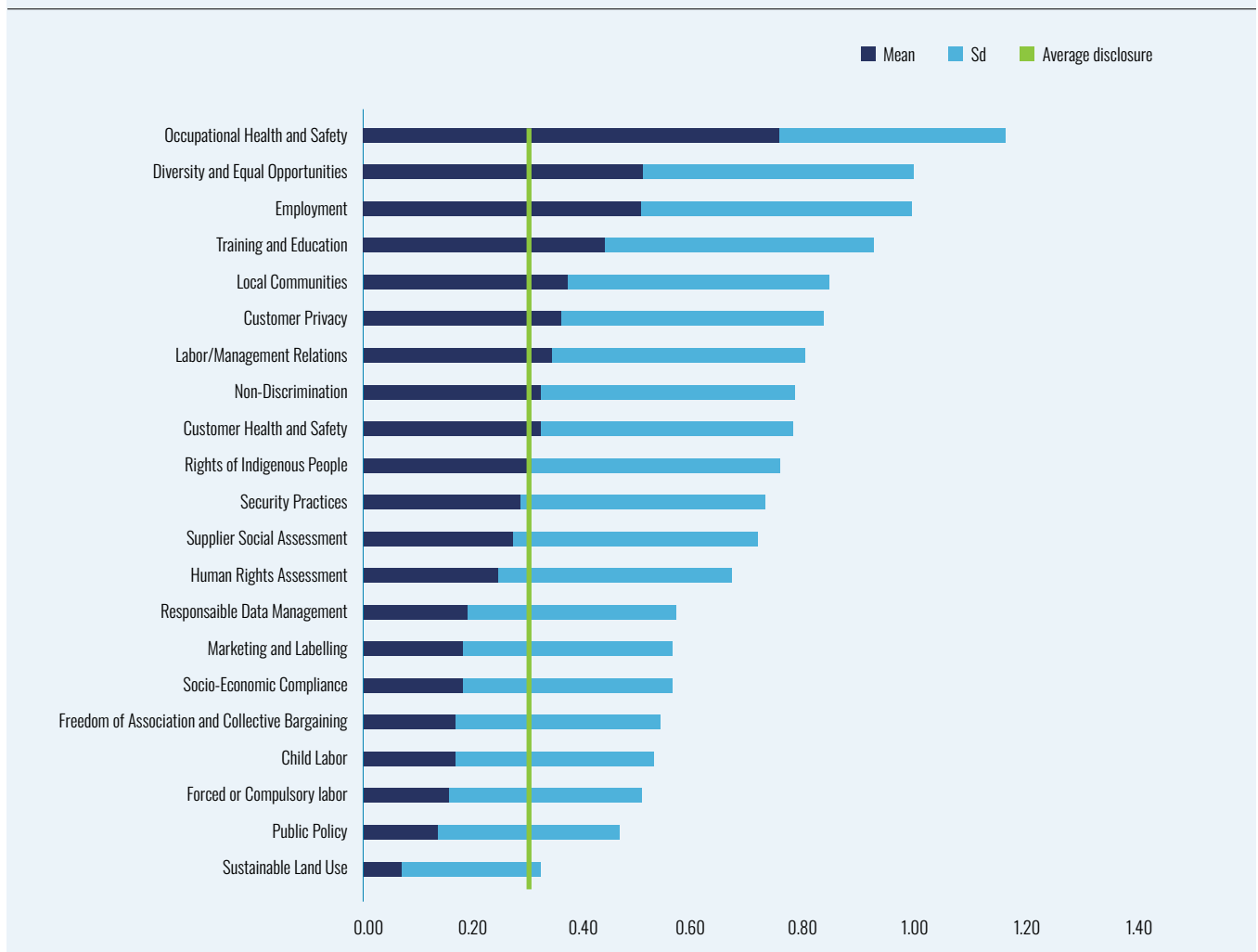
it is worth noting that:

- 78% of companies report practices aimed at fostering employee well-being and promoting a culture focused on safety; these organizations also invest in developing and improving employee skills.
- 52% report practices aimed at ensuring transparency in the hiring processes, promoting quality employment opportunities and diverse work environments, and supporting inclusion and equal access to career opportunities.
- 38% disclose the impact of their activities on local communities, reflecting their commitment to community engagement, support, development and well-being. In addition, 37% of companies disclose the policies and measures they implement to protect customer data and information, reflecting their commitment to respecting and ensuring privacy (an issue that is also regulated at the EU and national level).

However, an examination of the below-average scores reveals that:

- 28% of companies report actions to identify, assess, and manage human rights risks and impacts on stakeholders.
- 19% report compliance profiles on various socio-economic issues such as labor laws, fair competition, anti-corruption measures, and ethical business practices. The same number of firms assess respect for freedom of association and collective bargaining rights, and disclose information on their marketing and labeling initiatives.
- 16% disclose information on their participation in developing, reviewing, and promoting public policy.

In terms of social sustainability, several salient indicators also emerge from reporting. In particular, Italian companies are clearly interested in investing in their employees, focusing on health, safety and training, and promoting working conditions that guarantee equal opportunities and quality employment. Another relevant indicator concerns the contribution of companies to their host communities, a fact that is not surprising given the strong roots of Italian companies in the territory. These businesses often make localization one of their strengths, both in industrial district and in areas where a company's origins foster deep socio-economic relationships with local communities.

Some less frequently reported indicators, such as indigenous rights (7%), child labor (17%) and forced labor (17%), are less relevant in the Italian context. This is partly due to effective worker protection in the regulatory framework, union action and public pressure, which all to some extent minimize the incidence of these issues.

DIFFERENCES BETWEEN LARGE COMPANIES AND SMEs

GRI Environmental Standards

To identify the differences in how enterprises of various sizes approach sustainability reporting issues in the Italian business landscape, we compare the disclosure practices of GRI standards below, distinguishing between large companies and SMEs. Focusing on said standards, our results show an elevated level of environmental responsibility among large companies, as evidenced by systematically higher average scores compared to SMEs for all indicators (see Figure 3). In some cases, the difference in adoption is greater than 50%. Specifically:

- **Energy and greenhouse gas emissions**: Adoption of these standards is exceptionally high among large enterprises (m = 0.81, Sd = 0.40 and m = 0.80, Sd = 0.39, for energy and greenhouse gases, respectively) and low among SMEs (m = 0.22, Sd = 0.41 and m = 0.19, Sd = 0.39, for energy and greenhouse gases, respectively).
- **Waste management practices**: Again, adoption is higher in large enterprises (m = 0.77, Sd = 0.42)

than in SMEs (m = 0.26, Sd = 0.44).

In contrast, large enterprises and SMEs show similar frequencies of disclosure in the following case:

- **Use of sustainable materials** (m = 0.51, Sd = 0.50 and m = 0.37, Sd = 0.49, respectively).

In the first two instances, the difference can be explained by the greater availability of resources in large companies, which allows them to invest in advanced waste management technologies to optimize operational efficiency. In addition, these enterprises are often required to comply with specific regulations, such as the EU's waste management policy, which focuses on waste prevention, recycling, and "waste-to-energy" (WtE) practices. This contributes to high rates of disclosure on related business practices.

In contrast, attention to the use of sustainable materials does not appear to vary by company size. This is due to the importance of this question in manufacturing companies. What's more, the high incidence of outsourced activities, typical of Italian industry, extends the need to use sustainable inputs along the entire supply chain, regardless of

company size. However, there is notable variance among the firms we analyzed, which we attribute to the variety of sectors and the heterogeneity in our sample.

GRI Social Standards
With regard to GRI Social Standards, large companies are also noticeably more engaged in all categories, as evidenced by consistently higher average scores than SMEs (see Figure 4). This difference is particularly pronounced (between 44% and over 50% with respect to SMEs) for the standards related to:

- **Diversity and equal opportunities**: m = 0.84, Sd = 0.37 compared to m = 0.33, Sd = 0.47 of SMEs.
- **Training and education**: m = 0.80, Sd = 0.40 compared to m = 0.24, Sd = 0.43 of SMEs.
- **Non-discrimination** m = 0.60, Sd = 0.49 compared to m = 0.16, Sd = 0.37 of SMEs.
- **Supplier social assessment** m=0.57, Sd = 0.5 compared to m=0.12, Sd = 0.33 of SMEs.
- **Human rights practices** m = 0.56, Sd = 0.5 compared to m = 0.11, Sd = 0.32 of SMEs.

Company size in this case appears to impact in many ways. Issues such as diversity and inclusion,

FIGURE 3. GRI ENVIRONMENTAL STANDARDS (LARGE COMPANIES VS SMEs)

Legend: Large Enterprises (m); SMEs (m); Large Enterprises (Sd); SMEs (Sd)

Categories: Energy, Emissions (GHG), Waste Management, Water and Effluents, Emissions (Pollutant), Supplier Environmental Assessment, Materials, Environmental Compliance, Biodiversity
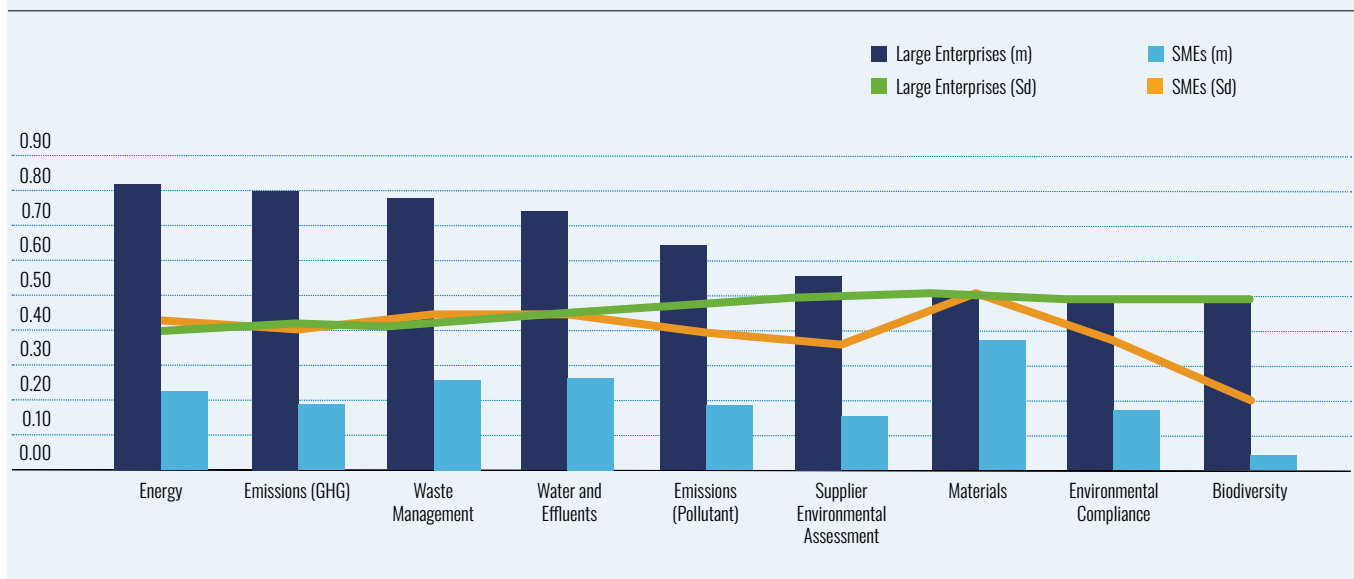
training, and the creation of a fairer and more inclusive working environment are now an integral part of the strategic choices of large companies which, unlike SMEs, can afford to invest in sophisticated human resource management processes.

In contrast, a similar percentage of disclosure is found between large companies and SMEs for:

- **Occupational safety** (m = 0.85, Sd = 0.36 and m = 0.73, Sd = 0.44).
- **Customer data protection** (m = 0.46, Sd = 0.50 and m = 0.32, Sd = 0.47).
- **Security practices** (m = 0.33, Sd = 0.47 and m = 0.30, Sd = 0.46).

Therefore, the level of disclosure in the areas of occupational health and safety and data protection does not appear to be influenced by company size. In fact, as mentioned above, these standards are informed by Italian legislation and strict EU and national occupational safety regulations. Examples include EU Directive 89/391/EEC and the directives of the National Institute for Insurance against Accidents at Work (INAIL in Italian), which require all companies to prioritize health and safety measures. Similar considerations apply to data protection: the introduction in 2018 of the General Data Protection Regulation (GDPR), Regulation (EU) 2016/679, has led companies to adopt strict data protection measures and ensure transparency in data processing practices.

FIGURE 4. GRI SOCIAL STANDARDS (LARGE COMPANIES VS SMEs)
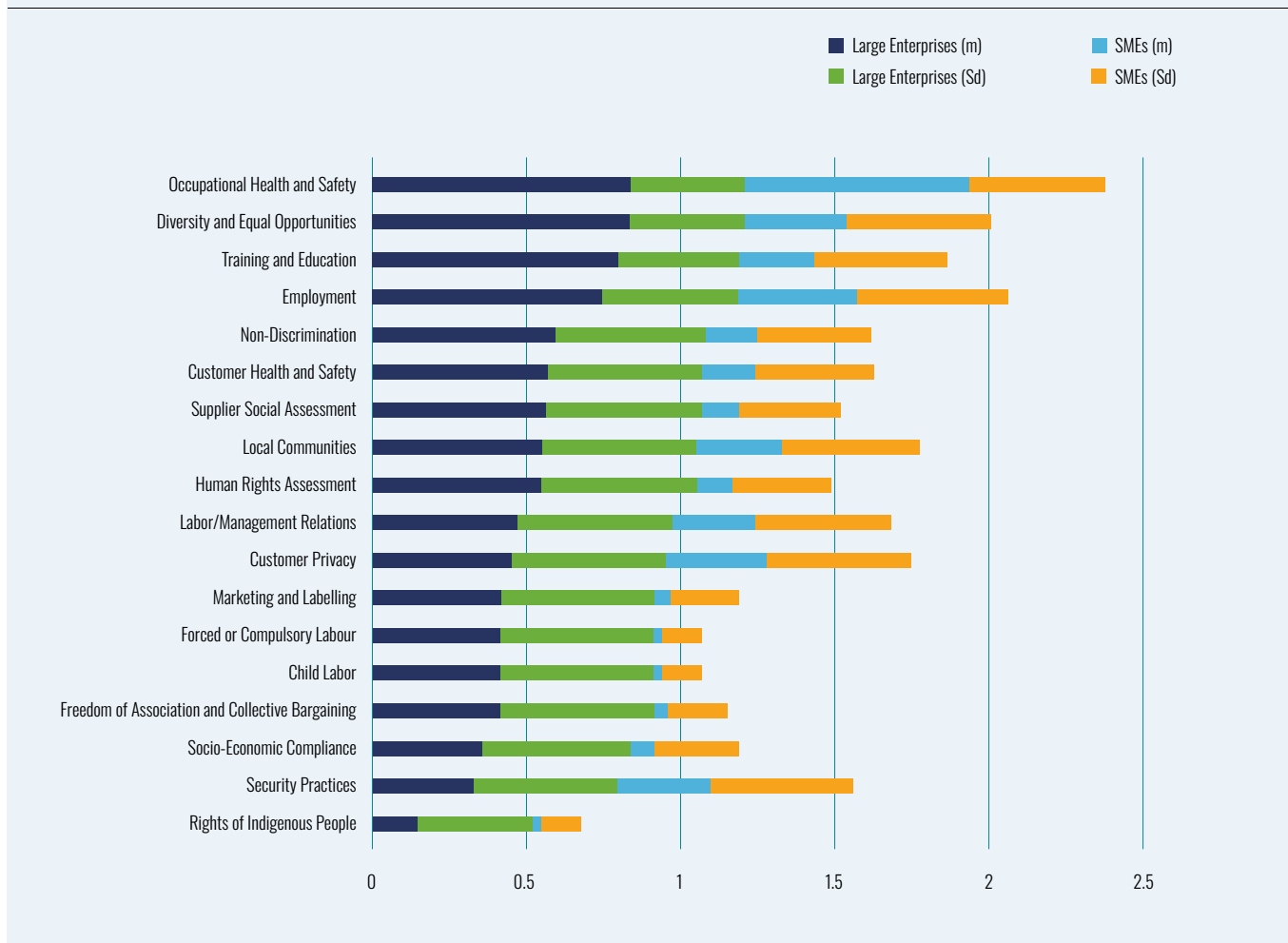
TAKEAWAYS FOR MANAGEMENT

As we can see from the descriptive analysis summarized above, GRI standards provide a comprehensive framework for organizations wishing to initiate sustainability reporting for their activities. Taking into account the various aspects that qualify ESG performance, these standards provide a reporting platform and precise guidelines that enable companies to disclose key sustainability indicators. These are grouped into 35 thematic areas organized by ESG category, including energy use, water management, biodiversity conservation, emissions, waste management, environmental compliance, supplier environmental assessment, employment practices, and labor relations (GRI, 2024).

From the perspective of sustainable, responsible management, it's essential for reporting companies to select and publicly disclose only those issues that are relevant to their operations, i.e., those that reflect business practices in the most rigorous and transparent manner. The GRI standards define the metrics that can be used and provide guidance for consistent periodic reporting which is useful for monitoring trends as ESG performance improves over time. The GRI reporting process involves four main steps that must be performed iteratively: identification, prioritization, validation, and review.

Identification: Sustainability issues are selected based on stakeholder interest and their current and future impact.
The first step is for the sustainability team to initiate a stakeholder mapping exercise to identify who is directly affected by the company's activities or who can influence the company's strategy. Next, the team is responsible for organizing meetings with the different categories of stakeholders to compile and share a list of the most pertinent sustainability issues that will be considered in the next steps of the process (GRI, 2013).

Prioritization: Among the various issues identified in the first step, priorities are set according to their importance to the organization and stakeholders, establishing appropriate materiality thresholds and deciding which aspects to concentrate on most.
In this second phase, a multidisciplinary group needs to be set up, onboarding the sustainability team and representatives from different business areas such as control and finance, operations, human resources, and marketing. This group is tasked with developing a materiality matrix, a tool that evaluates various sustainability indicators and ranks them according to their importance to the company and their impact on stakeholders. This process allows the organization to identify the issues to focus on using the measures provided by the GRI standards (GRI, 2013).

Validation: Systems for collecting and measuring data are developed and internal data are translated into public information.
The sustainability team is responsible for developing standardized procedures for data collection to ensure consistency and integrity. This is a vital activity to ascertain that the selected metrics meet the requirements of the GRI standards which can be used in disclosure. This delicate process is often carried out in collaboration with external auditors (where possible) to guarantee impartiality and to validate the accuracy of the data through third-party verification (GRI, 2013).

Review: The data are examined, compared to previous reports, and the next reporting cycle is determined (Bateman et al., 2017).
In this phase, the sustainability team reviews the data and assesses how the company's activities impact both the environmental and social sides of sustainability using the GRI as a framework. The results are compared with time series, where available, to analyze changes over time. The final report is drafted by the sustainability team and then rigorously reviewed by external auditors and senior management. This is an iterative process that may require several rounds of review, culminating in formal approval of the GRI report (GRI, 2013).

FINAL CONSIDERATIONS

The process summarized here is precisely described in the GRI G4 guidelines, which were developed specifically for sustainability reporting. (Please refer to these guidelines for further details, GRI, 2013). It's essential to follow the four steps outlined above to produce a successful sustainability report. Equally important, top management must adopt a broad vision that goes beyond simple reporting and integrates sustainability values and practices into the company's overall strategy, as well as day-to-day processes and activities.

To this end, investing in training is indispensable. Training programs, which should onboard all levels of the organization, serve to disseminate knowledge and improve employees' skills, and to raise general awareness that everyone needs to contribute to support sustainability initiatives. Furthermore, seeing that sustainability reporting, like any other performance, is an ongoing process, companies should strive to continuously improve their sustainability performance by publishing annual reports and shoring up their sustainability practices over time. Management must continually evaluate and refine sustainability practices to adapt them to changing
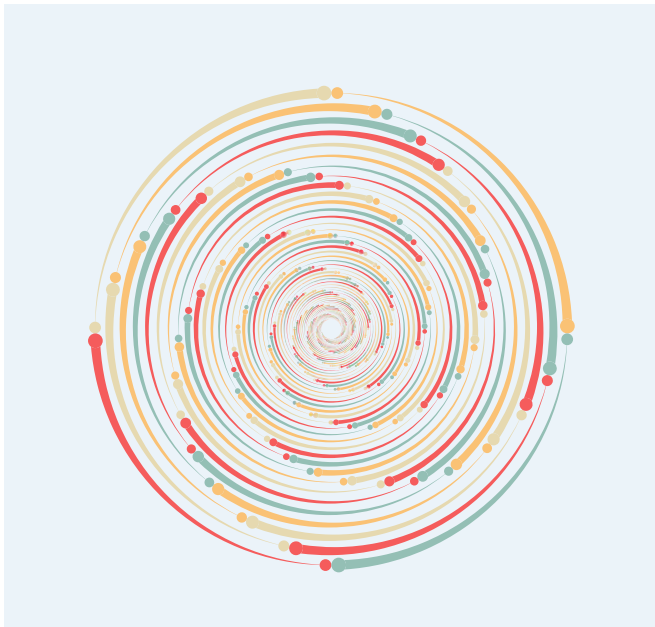
standards and stakeholder expectations; this will ensure the effectiveness and infiltration of sustainability efforts at all levels of the organization.

As we previously highlighted, the current level of adoption of reporting practices shows natural heterogeneity, partly reflecting the flexible nature of the system in question. It's also clear that larger companies perform and report better in all GRI areas and view ESG performance as a central component of competitive strategy and reputation.

Four key points emerge from the summary presented here:

- **Operational consistency**: Large companies not only have higher average scores, but also demonstrate greater consistency in sustainability practices, the result of work done over time.

- **Priority areas for investment and reporting**: As shown in Figure 5, both SMEs and large companies place considerable emphasis on occupational health and safety issues, reflecting a shared commitment to ensuring the well-being of workers. In a country like Italy, which for on the job safety holds the tragic record of three deaths per day and one accident per minute at work, this priority underscores the urgent need to secure safer working conditions that comply with current regulations.

- **Resource allocation**: Large companies lead the way in their efforts to promote diversity, fight corruption and manage energy sustainably. Their investments in these areas go beyond mere compliance and demonstrate a proactive approach aimed at achieving positive social and environmental outcomes.

- **Performance gap**: The marked difference between large companies and SMEs in sustainability reporting practices highlights the need for the latter to invest in processes and initiatives that are increasingly inspired by the principles of sustainability and responsibility.

Figure 5 illustrates the reporting priorities of large companies and their systematic superiority over SMEs in reporting on all standards.

In Italy, where the business landscape is predominantly populated SMEs, it's crucial that these companies develop, implement and report on their sustainability projects. Otherwise, they risk being excluded from production chains dominated by leading companies that make sustainability a key element in defining their strategies and communicating with their stakeholders.

FIGURE 5. GRI STANDARDS (LARGE COMPANIES VS SMEs)

■ Large Enterprises   ■ SMEs

THE MAXIMUM PERCENTAGE FOR BOTH THE LARGE AND SMES

- Occupational Health & Safety
- Energy
- Emissions (GHG)
- Anti-corruption
- Water & Effluents
- Non-discrimination
- Supplier social assessment
- Human Rights Assessment
- Materials
- Anti-competitive behaviour
- Labor/management relations
- Procurement practices
- Freedom of Association and Collective Bargaining
- Child Labor
- Socio-economic compliance
- Rights of Indigenous People

0% 20% 40% 60% 80% 100% 120% 140% 160% 180%

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SUSTAINABILITY AND BUSINESS PERFORMANCE
BUILDING RESILIENCE WITH GRI PRACTICES

To what extent do sustainability initiatives adopted by companies, in compliance with the Global Reporting Initiative (GRI), promote economic resilience? This study analyzes and compares the resilience of SMEs and large companies in Italy, examining the relationships between sustainability indicators according to the GRI taxonomy and the relative economic resilience performance of these organizations, measured by turnover. The results show that although large companies generally perform better than SMEs in all dimensions of sustainability, both categories follow similar approaches in implementing GRI practices, ensuring marked improvement in economic resilience.

RESILIENCE//GRI STANDARDS//SUSTAINABILITY//VALUE CHAIN//GLOBAL REPORTING INITIATIVES (GRI)

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Despite the growing attention of policymakers, companies, and society focused on the issues of resilience and sustainability, research on the synergies between these two concepts is still limited (Negri et al., 2021). Some studies suggest that sustainability can enhance corporate resilience by facilitating adaptation to changing circumstances, thereby reducing the negative impact of disruptions (Maleki Vishkaei and De Giovanni, 2024). However, other research suggests that there is no direct correlation between sustainability and resilience, as the latter is more closely related to business operations than sustainability, which is more complex in nature (Júnior et al., 2023). These mixed results underscore the need for a more in-depth analysis to identify the mutual relationships and potential synergies

between the two concepts, paving the way for companies to develop in both directions.

In light of this, the purpose of our study is to examine the relationship between the adoption of Global Reporting Initiative (GRI) recommendations and factors that influence resilience. Although several taxonomies exist to support sustainability reporting, we chose to use the GRI standards because of their proven effectiveness in measuring and communicating impact on critical sustainability issues such as climate change, human rights, governance, and social welfare. Developed with input from a wide range of stakeholders, including companies, civil society, labor unions, and academic institutions, the GRI Standards are applicable to organizations of all sizes, sectors, and locations, and provide a comprehensive overview of material issues that are relevant to companies.

To assess the effectiveness of a company's economic resilience, our study focuses on the interactions between the economic, social and environmental dimensions of the GRI taxonomy and the resilience levers outlined by the Resilience Consortium of the World Economic Forum (WEF). These levers, identified through a rigorous research protocol, are quantified through accurate estimates of their impact on global economic growth.

GRI STANDARDS

To analyze the link between resilience and sustainability, we identified a set of GRI standards for examining the social, economic, and governance sustainability of companies. Specifically, to measure social sustainability, we focused on the following indicators: employment, labor management, occupational health and safety, training and education, diversity and equal opportunity, non-discrimination, freedom of association and collective bargaining, child labor, forced or compulsory labor, security practices, indigenous peoples' rights, human rights compliance assessment, local communities, supplier social

practices assessment, customer health and safety, marketing and labeling, customer privacy, and socioeconomic compliance. For environmental sustainability standards, we concentrated on: materials, energy, water and wastewater, biodiversity, emissions (pollutants), emissions (GHGs), waste management, environmental compliance, and supplier environmental assessment. Finally, our dataset includes four dimensions of economic sustainability and governance: procurement practices, anti-corruption, anti-competitive behavior, and taxation

METHODOLOGY

Our study is based on a dataset of interviews with 172 Italian SMEs, which provided input on how they adopted GRI standards and implemented sustainability practices. Similarly, we collected information on 100 large companies by reviewing financial statements and sustainability reports published on official websites. The final dataset provides valuable information on sustainability practices and initiatives and allows us to analyze and map the ESG strategies of Italian companies. The sample includes several sectors: manufacturing (36%), agribusiness (19%), ICT (17%), engineering (13%), healthcare (7%), services (5%) and other sectors (3%).

To analyze the synergies between sustainability practices and economic resilience, our study uses the framework introduced by the WEF, which assigns each resilience lever a percentage score between one and five to estimate its impact on GDP growth. After normalizing the impact rates of the eight resilience factors we selected (which we will explain in the next section), we assigned their final weights to come up with a sum of 100%. We then calculated the economic resilience score using the average adoption rates of the GRI standards by companies and the normalized weights of the eight resilience levers. We applied our methodology to different sectors, which allowed us to compare SMEs and large companies.

FIGURE 1. THE IMPACT OF SOCIAL AND ENVIRONMENTAL SUSTAINABILITY ON THE ECONOMIC RESILIENCE OF ITALIAN COMPANIES

S1:
FORCED MIGRATION OF PEOPLE
◀◀
- Labor Management
- Local Communities

- Waste Management
- Environmental Compliance
- Supplier Environmental Assessment
- Marketing and Labelling
- Sustainable Land Use
▶▶
S2:
DAMAGES FROM EXTREME WEATHER CHANGES

S3:
ENERGY AND SUPPLY CHAIN DISRUPTIONS
◀◀
- Procurement Practices
- Materials
- Energy
- Water & Effluents
- Biodiversity

- Employment
- Labor Management
- Training and Education
- Diversity and Equal Opportunities
- Non-discrimination
- Child Labor
- Forced or Compulsory Labor
- Freedom of Association and Collective Bargaining
- Rights of Indigenous People
- Human Rights Assessment
- Supplier social Assessment
- Socio-economic Compliance
▶▶
S4:
INCOME, GENDER, AND RACIAL INEQUALITIES

S5:
AIR POLLUTION AND MALNUTRITION
◀◀
- Emissions (pollutants)
- Emissions (GHG)
- Waste Management
- Environmental Compliance
- Supplier Environmental Assessment
- Marketing and Labelling

S6:
LACK OF HEALTHCARE ASSISTANCE
◀◀
- Occupational Health and Safety
- Customer Health & Safety

- Anti-corruption
- Socio-economic Compliance
- Anti-competitive Behavior
▶▶
S7:
FIGHT AGAINST CORRUPTION

S8:
LOSSES DUE TO LACK OF ADVANCED TECHNOLOGIES
◀◀
- Pratiche di sicurezza
- Privacy del cliente
- Gestione responsabile dei dati

THE MAIN LEVERS OF RESILIENCE

Applying the model proposed by the WEF to our dataset, the results indicate that while all GRI standards are generally relevant to the economic resilience of companies, the greatest impact is exerted by the following resilience factors: (S1) forced relocation of people; (S2) damage from extreme climate change; (S3) energy and supply chain disruption; (S4) income, gender, and racial inequality; (S5) air pollution and malnutrition; (S6) lack of health care; (S7) fighting corruption; and (S8) losses due to lack of advanced technology. These impact drivers are divided into various subcategories related to the GRI standards, detailed in Figure 1.

Figure 2 shows the average impact of each resilience factor on GDP growth. Corruption emerges as having the highest percentage impact, demonstrating its ability to dramatically undermine the economic stability of businesses due to additional costs, loss of reputation, and legal risks. Disruptions to the supply chain and energy sources, especially renewable energy sources, can be detrimental to business continuity, underscoring the importance of developing contingency plans and diversifying energy sources, especially in energy-intensive sectors. Major fallout from losses due to a lack of advanced technologies is also highlighted, underscoring the need to invest in innovation and digitization to maintain international competitiveness and achieve the sustainability goals of the 2030 Agenda, including decarbonization plans.

In terms of social sustainability, a lack of healthcare can reduce employee productivity and increase costs related to absenteeism and medical care. To mitigate these impacts, companies must implement policies that target the health and well-being of employees, ensure adequate access to care, and promote health. Income, gender, and race inequalities are an additional concern, as they can undermine social cohesion and create tensions inside and outside the company, fueling a climate of tension and conflict. Although companies today are more likely to activate inclusive policies and take concrete actions to promote equity and diversity, practices and behaviors that perpetuate inequality persist, requiring effective cultural change management.

Our findings reveal additional factors affecting social sustainability, such as air pollution and malnutrition, which can lead to increased health care costs and negative environmental impacts,

FIGURE 2. THE AVERAGE IMPACT OF THE RESILIENCE FACTORS ON THE GDP (%)
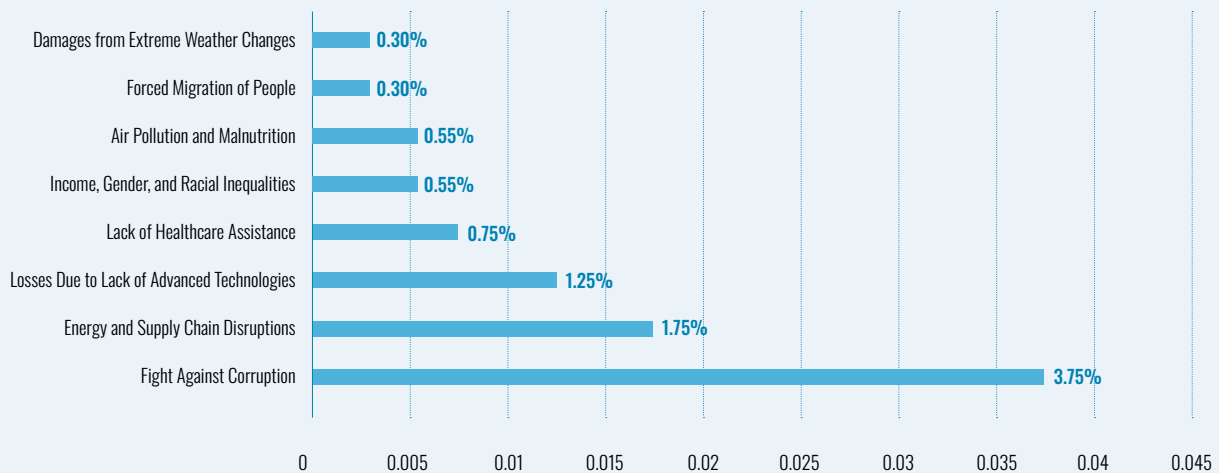
underscoring the need to rethink corporate social responsibility and environmental sustainability from a holistic perspective. Finally, although relatively low in percentage terms, forced displacement and damage resulting from extreme climate change cannot be overlooked, as they can pose new and unforeseen risks and as such affect the long-term economic resilience of companies.

COMPARISON BETWEEN LARGE COMPANIES AND SMEs

Overall, the results shown in Figure 3 indicate that large companies have superior turnover resilience performance across all drivers analyzed, with an aggregate score that is almost double that of SMEs.

S1. Forced displacement of people

Driver S1 relates to the forced displacement of people through coercion and violence and involves a range of challenges in the destination country,

from direct issues such as access to employment, family reunification, and education, to indirect issues such as conflict, persecution, and natural disasters.

Together, these dynamics can significantly affect the balance between labor supply and demand. Our results (Figure 3) show a weak correlation in large firms and SMEs between this driver and economic resilience in terms of revenue recovery after a disruption. Specifically, large companies have a resilience score of 1.7 compared to 0.9 for SMEs, representing a gap of 47.05%. This gap can be attributed to the greater availability of jobs and bigger investments by large companies in business and workforce diversification. Indeed, the ability to attract fresh talent and new professionals strengthens the adaptability to weather changes and crises.

In contrast, SMEs are often constrained by limited resources, both human and financial, which makes it more difficult to respond effectively to external shocks. If these are not adequately addressed, they can result in the

FIGURE 3. COMPARISON OF RESILIENCE SCORE BETWEEN LARGE COMPANIES AND SMEs
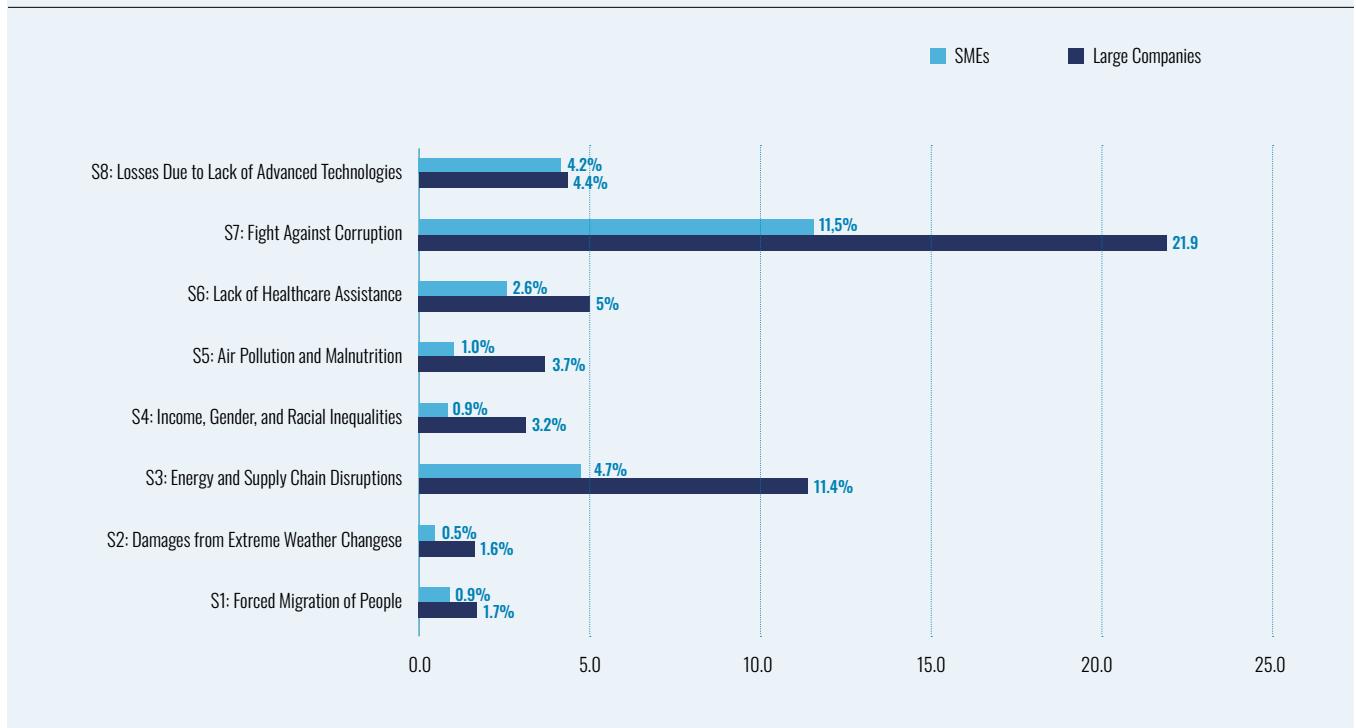
migration of employees to other locations or countries, further reducing the ability of SMEs to improve revenue resilience. This difference in economic resilience performance underscores the importance of supporting SMEs in times of crisis and in the face of global challenges, to reduce skills leakage and in doing so preserve Made in Italy know-how and the workforce.

S2. Damage from extreme weather events

Driver S2 covers key business sustainability indicators such as waste management, environmental compliance, supplier environmental assessment, marketing, labeling, and sustainable land use. This driver has a sizeable impact on the economic resilience of companies. Extreme weather events are difficult to predict and cope with. As such, they can upend the entire supply chain, causing disruptions in raw material procurement, distribution logistics, and personnel mobility, and potentially even temporarily shut down production activities. Therefore, it is essential that companies take preventive measures and develop contingency plans to adequately contend with these challenges and minimize negative consequences.

Our results show a resilience score of 1.6 for large companies compared to 0.5 for SMEs on a scale of 0 to 3.3. This gap reflects ample room for improvement for both categories. The variation in scores can be attributed not only to the different financial capacities required to implement and manage effective resilience and contingency plans, but also to the obligations imposed by sustainability certifications and current regulations. Indeed, large companies are often involved in international tenders, which means they are required to adhere to strict sustainability principles, particularly in selecting and managing their suppliers. Given the extensive global presence of large companies, these two processes affect the supply chain at different levels and in different countries, prompting them to invest in innovative technologies and targeted operational practices to monitor supplier activities, reduce

environmental impacts, and improve resilience to climate crises. In addition, their greater international exposure subjects them to more intense public and regulatory scrutiny, pushing them to maintain high standards of sustainability to protect their reputations and comply with market expectations and applicable regulations. These dynamics explain the gap in economic resilience performance between large companies and SMEs.

S3. Energy and supply chain disruptions

The S3 driver relates to sourcing practices, purchased materials, energy sources, water use, waste management, and biodiversity. In a global context where supply chains need to ensure a sustainable flow of resources such as energy, oil, and gas, the relationships between the various actors are closely interlinked and vulnerable to international crises and conflicts. The lack of appropriate strategies, such as source diversification, flexible contracts, careful planning of transportation capacity, and adequate safety stocks, can exacerbate the risks of disruption and reduce the ability of companies to maintain economic resilience.

The results of our analysis show a resilience score of 11.4 for large companies, while SMEs score 4.7. (The maximum is 19.) This 59% gap highlights the appreciable differences in disruption management capabilities between the two groups. Large companies, with greater availability of resources and access to advanced technologies, can implement more robust and sophisticated strategies that provide higher levels of economic resilience. These strategies include investments in green technologies, increased collaboration with strategic suppliers, and the adoption of sustainable practices that not only mitigate risk but also improve operational efficiency.

In contrast, SMEs with fewer resources and limited access to technology often find themselves negotiating less favorable terms and struggling to adapt quickly to changing market dynamics and regulatory pressures. Their ability to respond

can be further compromised by the lack of effective resilience plans, which are critical to managing disruptions without suffering severe consequences. But such plans require substantial investments of economic resources.

S4. Income, gender, and racial inequalities

Driver S4 covers employment, labor relations, training and education, diversity and equal opportunity, non-discrimination, child labor, and human rights. Managing these indicators has become increasingly complex for companies large and small due to the multifaceted nature of these issues. For example, gender inequalities (such as women earning less than men on average) result from a combination of cultural, social and economic factors. Similarly, racial inequalities are not limited to the wage gap, but also manifest themselves in access to education, employment opportunities, and exposure to poverty risks for affected communities.

Large companies and SMEs have made sizeable investments in recent years to address inequality and generate benefits for communities and the global economy. However, data analysis shows a 72% gap between large companies and SMEs (which scored 3.2 and 0.9, respectively). This difference can be attributed to the ability of the former to implement more effective strategies to address critical issues related to the S4 driver. With their global presence and greater availability of financial resources, large companies can implement effective policies to promote equality and diversity in the workplace and monitor implementation throughout the supply chain. These efforts result in training programs that raise awareness of gender and race issues, inclusive career plans that promote the representation of women and minorities in management roles, and hiring practices that overcome unconscious bias, facilitating the discovery of new talent. In contrast, SMEs face greater challenges in implementing meaningful change due to their small size, limited resources and reduced bargaining power, especially in global supply chains.

Engaging in the fight against inequality is not only ethically imperative; it also boosts productivity by broadening the base of resources and expertise available to the company. It is therefore vital that SMEs are given incentives and support to improve their ability to manage diversity effectively, reducing the resilience gap with larger companies and improving economic competitiveness.

S5. Air pollution and malnutrition

This driver analyzes the impact of two critical global issues: emissions of pollutants and greenhouse gases into the environment and the impact of food shortages on public health. Specifically, this driver covers the following GRI topics: pollutant and greenhouse gas emissions, waste management, environmental compliance, and labeling marketing practices.

Air pollution resulting from toxins and greenhouse gases, is responsible for many deaths in G7 countries and negatively affects public health and the environment, leading to increased healthcare costs and reduced agricultural productivity. By the same token, malnutrition is a direct consequence of limited food availability and is exacerbated by population growth and climate change, which threaten food production.

Larger companies tend to have greater environmental impacts due to their large-scale industrial operations and long supply chains. However, they often offset these impacts through investments in clean technology and corporate social responsibility initiatives, including nutrition programs and support for local communities. Data from our analysis shows that large companies have a resilience score of 3.7, indicating greater awareness and ability to cope with impacts than SMEs with a score of 1.0. This 73% percent gap can be attributed to the ability of big players to implement advanced strategies and integrate higher standards of sustainability into their operations, such as adopting sustainable sourcing practices, investing in emission reduction technologies, and nutrition awareness

initiatives. In addition, large companies actively participate in international tenders that set strict sustainability criteria in evaluating suppliers, a practice that SMEs find difficult to implement due to their limited organizational and financial capacities.

S6. Inadequate healthcare

This driver analyzes the ability of companies to ensure access to healthcare services for employees and guarantee safety for customers. It includes GRI indicators such as occupational health and safety, and customer health and safety, which can also be addressed through effective marketing and labeling policies.

Inadequate healthcare poses a serious risk to the well-being of employees and consumers and has a direct impact on a company's productivity and reputation. In the event of a disruption here, the lack of adequate healthcare measures can significantly undermine the economic resilience of companies, given the strong link to the social sphere. Our analysis finds an economic resilience score of 5.0 for large companies compared to 2.6 for SMEs, a 48% difference that can be explained by the former's ability to offer comprehensive health insurance programs and benefits that go beyond the minimum legal guarantees, including access to preventive care and wellness and psychological support. These programs not only improve the overall health of employees, reducing sick days and increasing productivity, but also contribute to greater resilience thanks to employee availability and on-call time, minimizing strikes and absenteeism. In addition, large companies are more likely to strictly adhere to customer health and safety regulations and to invest in marketing campaigns that promote health awareness, thereby building brand equity and consumer trust. In contrast, SMEs struggle to offer advanced health and safety programs or initiatives due to tighter budgets, resulting in a shortfall compared to larger companies. This not only increases workplace risks, but also reduces the attractiveness of SMEs. Therefore, while large companies can leverage

their resources to create safer workplaces and a more trusted customer base through transparent communication and proactive investments in health and safety, SMEs may need external support or favorable public policies to fill these gaps and improve their economic resilience.

S7. Fighting corruption

This driver refers to GRI topics related to anti-corruption, socio-economic compliance, and anti-competitive behavior, which are important indicators for preventing the abuse of power. In fact, corruption is generally a major impediment to economic resilience, as it siphons off valuable resources and undermines confidence in the economy and business stability.

Our analysis shows an economic resilience score of 21.9 for large companies, while SMEs score 11.5. (The maximum score is 40.8.) These results highlight that while both categories need to strengthen their anti-corruption policies, large companies demonstrate greater economic resilience in this area.

The differences in anti-corruption strategies between large companies and SMEs are mainly due to available resources and organizational capabilities. Large companies are often forced to implement advanced control and compliance systems, monitoring systems, regular training programs for employees on ethics and compliance, and set up dedicated anti-corruption teams. While these initiatives help reduce corruption, they also require additional measures and expenditures to collect and analyze data along the supply chain through continuous auditing and tracking mechanisms. These systems are especially necessary for large companies that frequently participate in international tenders and global trade, where sustainability and anti-corruption criteria are stringent, detailed and vary from country to country.

This exposure requires large companies to maintain high standards of transparency and accountability, not only to comply with legal requirements, but also to enhance their public

image and build trust among stakeholders.

SMEs can also adopt anti-corruption strategies, albeit on a smaller scale, such as offering regular employee training, implementing clear zero-tolerance policies on corruption, and working with external entities to verify compliance. Given the gap with large companies, SMEs need external support and public policies that incentivize transparency and business ethics to improve their economic resilience.

S8. Losses due to lack of advanced technology

The S8 driver includes GRI topics such as security practices, customer privacy and responsible data management, and highlights how a lack of technology upgrades can affect the economic resilience of companies in the face of an increasingly digitized business environment and increasingly interconnected supply chain relationships.

The results of our study show relatively low economic resilience scores for both groups analyzed: 4.4 for large companies and 4.2 for SMEs. (The maximum score is 13.8.) The minimal difference in performance between the two groups (only 5%) suggests that the industrial sector as a whole faces formidable difficulties in adapting to technological change. This delay in adopting digital systems, a move which requires necessary changes in business processes and routines, can have serious consequences for economic resilience. Technological obsolescence not only reduces production efficiency and increases energy consumption with consequent environmental impacts, but also affects business operations, causing frequent breakdowns, malfunctions or prolonged downtime.

To address emerging risks and increase economic resilience, it is critical for both large companies and SMEs to deploy a technological upgrade and digitization strategy. This includes investing in innovation and technology, research and development, partnering with technology companies and labs, or implementing state-of-the-art systems to integrate and automate global business processes and supply chains.

The minimal difference in resilience scores between large companies and SMEs indicates that all Italian companies today face daunting challenges in implementing new technologies, often due to rigid organizational structures, complex decision-making processes, and limited resources. To overcome these obstacles, companies must develop economic resilience plans that support sustainability indicators with by digitization, ensuring systematic certification of the real impact of sustainable practices, to avoid the risk of green washing.

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DANIEL RUZZA

RESPONDING TO SHOCK EVENTS
TIME TO RECOVERY, INDICATORS, AND STRATEGIC APPROACHES

By analyzing a sample of 525 Italian companies, the study examines their level of resilience during the first wave of COVID-19. Our main objectives are twofold. On the one hand, we want to determine how the level of business resilience, as measured by specific indicators, can contribute to reducing the time-to-recovery (TTR). This will provide insights into the relationship between the recovery time of business flows and the stability of business performance during a disruption. On the other hand, from the perspective of managerial decision-making, we aim to identify practices that can improve the level of resilience of business operations.

SUPPLY CHAIN//OPERATIONS MANAGEMENT//RESILIENCE STRATEGIES//SUSTAINABILITY//TIME-TO-RECOVERY

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CRED (Centre for Research on the Epidemiology of Disasters) is a research unit at the University of Leuven that has been studying international disasters and conflicts for more than 30 years, integrating research and training activities with relief, rehabilitation and development activities. Since 1988, CRED has been monitoring events and disasters by collecting and analyzing information published in the Emergency Events Dataset (EM-DAT). The frequency of disasters year after year has multiplied. In fact, from an average of 200 disasters per year in the 1980s, the number rose to over 300 by 2010, and today more than 56% of companies worldwide face at least one unforeseen situation each year. These disruptive events range from natural disasters like tsunamis and

earthquakes, to pandemics, including the recent COVID-19 crisis, to man-made disasters, such as geopolitical tensions, conflicts, terrorist attacks, and economic crises.

Much of the literature on disruption management argues that the most effective strategy in the current environment is to minimize the risk of such events occurring, or at least to reduce the likelihood that they will affect the company's core business (Macdonald and Corsi, 2013). However, there are events of such magnitude that they have an intense, unpredictable impact on the entire value chain, regardless of the accuracy and effectiveness of risk planning systems. When such events cannot be predicted, a company can only attempt to mitigate their impact and recover in the aftermath as quickly as possible.

Therefore, in addition to preventive activities pertaining to risk planning and management, we need to understand how to effectively implement the phases of response and recovery from discontinuities (Ali et al., 2017). Resilience, or the ability to maintain or even improve performance indicators during periods of turbulence, plays a central role in this context. The most serious and dangerous effects of a disruption manifest in the loss of performance, which threatens the competitiveness of a company. In this case, the concept of performance is not limited to the financial sphere, which generally garners more attention, but also includes other indicators that can signal the impact of a discontinuity before it's reflected in the financial statements. These indicators are grouped into the three categories below.

- **Operational performance**: monitoring product quality, inventory management, and on-time delivery.
- **Go-to-market performancet**: tracking sales, customer service, and market share.
- **Performance related to invested resources**: including indicators such as ROI (Garrido-Moreno et al., 2024; Gu et al., 2021).

Following a disruption, the primary goal of any company is to minimize the impact by restoring business operations as quickly as possible – a critical factor in ensuring business continuity and containing the costs associated with the disruptive event.

Longer recovery times result in higher costs and reduce the likelihood of full recovery. This concept is measured by Time To Recovery (TTR), which captures how long it takes for an organization to return to full pre-crisis operations. Clearly, the speed and success of the recovery depends largely on the skills and decisions of managers.

To illustrate the importance of managerial decisions on TTR, the case of Nokia and Ericsson offers useful insight (Sheffi, 2005).

In 2000, Philips was the main supplier of chips for mobile phones when a fire in the Albuquerque plant destroyed part of the production facilities and most of the inventory.

Nokia reacted quickly and proactively, finding new suppliers within days and managing to keep its performance virtually unchanged. Ericsson, on the other hand, took a wait-and-see approach to crisis management, allowing several weeks to pass before taking any concrete action. This delay proved costly: Ericsson lost significant market share to Nokia, suffering an economic blow estimated at $2.3 billion.

In today's socio-economic context, characterized by frequent crises and strong competitive tensions in many industries, companies can't stall in the face of disruptive events: interventions must be timely and targeted. To identify the performance indicators that businesses need to monitor to detect early signs of impact, intervene promptly and minimize TTR, we examined a sample of 525 Italian companies exposed to the first wave of COVID-19. For each company, we compiled and analyzed the above indicators and assessed their correlation with post-pandemic TTR.

RESILIENCE AND PERFORMANCE INDICATORS

The discontinuity management literature distinguishes two main ways in which discontinuities can affect companies: through financial and economic impacts and through impacts on service delivery (Yu and Qi, 2004). The former refers to the costs and lost revenues resulting from a disruptive event, while the latter encompasses all disruptions that impede the conduct of normal business activities and ultimately prevent the firm from meeting customer demand. The impact on service delivery can be measured using performance indicators divided into the categories mentioned above: operational performance, go-to-market performance, and investment-related performance.

Operational performance summarizes the performance indicators of business operations related to production and logistics processes (De Leeuw and Van Den Berg, 2011). In this category, three indicators were considered that monitor inventory management, quality of finished products, and timeliness of deliveries.

Inventory management concerns a company's ability to keep enough goods or products on hand to meet the demands of internal and external customers. A disruption can upset the delicate balance between purchasing, production and sales, negatively impacting inventory management. For example, during the COVID-19 pandemic, transportation restrictions, factory closures, and supply difficulties caused supply chain disruptions for 75% of companies worldwide (Tanaka and Guo, 2020). In addition, changes in customer consumption habits can lead to fluctuations in demand, accelerating the obsolescence of some products and further complicating inventory management due to the risk of accumulating unsold inventory.

The second operational performance indicator considered here is product quality, which measures a company's ability to maintain high operational standards even under disruptive conditions. The quality of a product refers to its features, functionality and performance, and must meet or exceed customer expectations and desires.

Quality encompasses various aspects, including durability, reliability, functionality, safety, and aesthetics. During a disruption, product quality can be compromised by disruptions in the supply chain, resulting in shortages of raw materials and subsequent downtime and the need for rescheduling. Similarly, restrictions and safety measures imposed during disruptive events, such as pandemics, may result in a shrinking workforce or changes in working conditions. Shortages of skilled personnel and changes in production arrangements can adversely affect product quality, especially if they interfere with training and supervision activities and quality control measures. However, since high product quality is one of the key differentiators from competitors (Clemons and Slotnick, 2016), disruptions can also represent an opportunity. Indeed, companies can use the crisis to assess and bridge the quality gap with the competition to strengthen their position in the market.

The third operational performance indicator is delivery capability, which measures reliability and efficiency in fulfilling customer orders. This factor is particularly important because it reflects the efficiency of the supply chain. In fact, to meet lead times, companies must coordinate and synchronize various processes effectively, including order processing, inventory management, production, and logistics planning and execution. Satisfactory lead times are contingent on a smoothly functioning supply chain that minimizes disruptions and optimizes resource utilization. Disruptions affect the entire supply system and require additional effort from companies to maintain this delivery capability at a level consistent with competitive demands, avoiding delays, capacity constraints, and order fulfillment limitations.

Go-to-market performance measures the ability to introduce and maintain products and services in the marketplace. Three main indicators were considered in this category: sales, pre- and post-sales customer service, and market share. During a disruption, sales play a key role because the most critical economic and financial impact comes from the company's inability to generate revenue. This can be caused by product unavailability, store closures, shortages of goods on shelves or in warehouses, or lack of alternative options. Ensuring sales continuity is essential to maintaining sufficient cash flow to cover costs, invest in growth opportunities, increase resilience, and facilitate rapid recovery. By carefully monitoring of sales, companies can assess their financial performance, detect the impact of a disruption on their financial and economic equilibrium and gauge its severity in a timely fashion. In addition, sales provide valuable insights for adapting marketing strategies to changing socio-economic conditions, allowing production and distribution to be adjusted accordingly.

The second go-to-market indicator is customer service, which refers to the support and assistance provided to the customer before, during, and after the purchase. This service is critical to building and maintaining customer satisfaction, loyalty, and trust by responding to customer inquiries, resolving problems or complaints, and ensuring an overall positive shopping experience. During a disruption, customer service plays a key role in clearly and effectively communicating the difficulties and issues caused by the disruption. Studies show that product unavailability, delivery delays, and any quality discrepancies are more readily accepted by customers in the presence of effective customer service (Gorry and Westbrook, 2011). In addition, quality customer service contributes to customer loyalty, which translates into a stable customer base and repeat sales. During periods of uncertainty, when traditional demand forecasting models may be less effective, information from customer service can help improve the accuracy of estimates, which in turn optimizes inventory management and production planning.
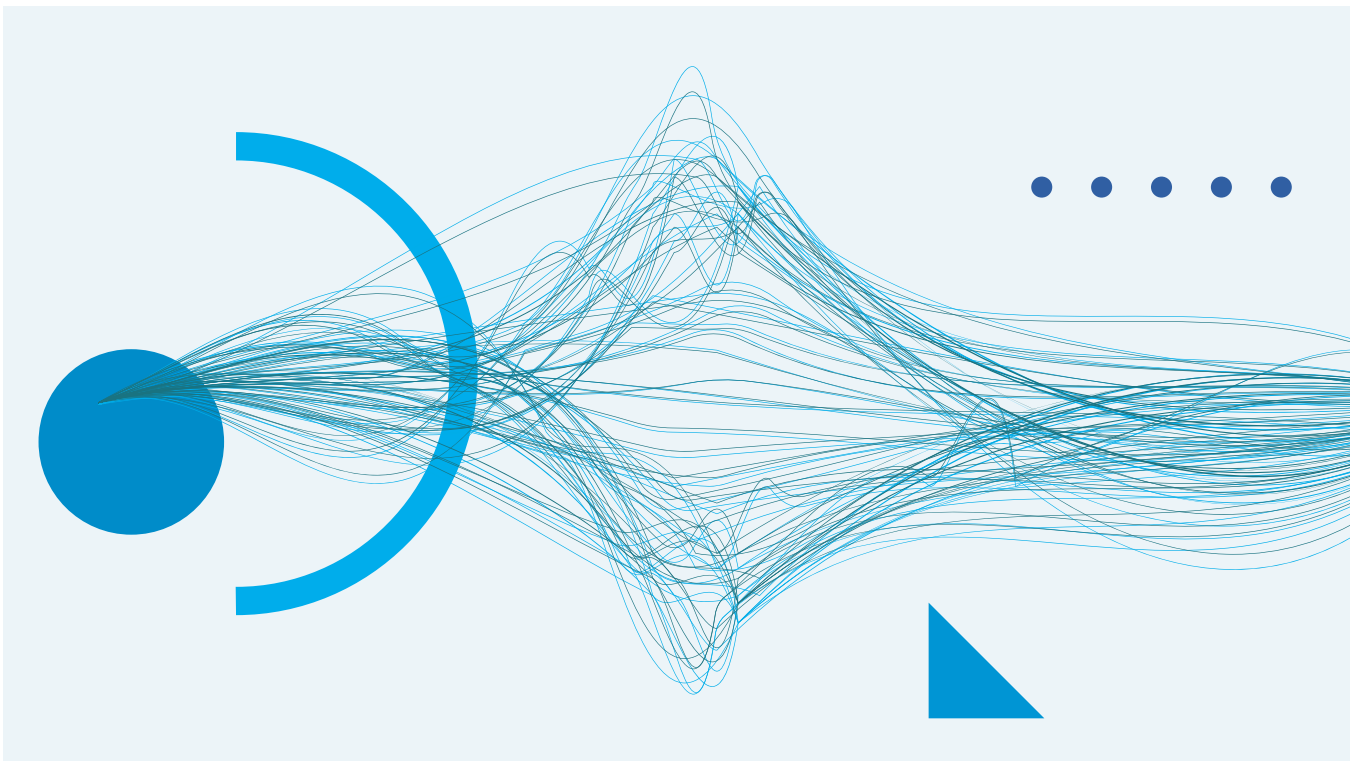
The third go-to-market indicator is market share, which measures a company's presence and competitiveness relative to its competitors. Traditional strategies to boost market share, such as expanding product lines and moving into heterogeneous markets (Tang, 2006), can be counterproductive in a crisis because they tend to proliferate production complexity and associated costs. In addition, changes in buying habits, contractions in some sectors, difficulties in reaching consumers, and problems in the supply chain increase the risk associated with these strategies. This can affect a company's profitability and financial stability, reducing the resources available for future growth and investment.

Investment performance, reflecting a company's ability to manage its investments wisely, is measured by ROI. Disruptions tend to have a negative effect on ROI because of their impact on revenue and the additional costs of implementing security measures to maintain business continuity or adapt operations to changing circumstances.

During disruptions, uncertainty and financial challenges intensify, forcing companies to prioritize resource allocation to projects or initiatives that can contribute to satisfactory ROI. In this context, thanks to ROI, in its aggregate form, companies can assess the effectiveness of their investment activities and their ability to adapt to changing market conditions.
This in turn enables informed investment allocation decisions and secures the effective and efficient use of resources.
By analyzing the components of ROI, companies can also evaluate the dynamics related to prices, costs, volumes, and efficiency of fixed and current assets. The purpose of this is to identify areas for improvement and opportunities for intervention. ROI also serves as a benchmarking tool, useful for comparing the profitability of investments over different time periods or among similar enterprises.

PERFORMANCE INDICATORS AND TIME TO RECOVERY

To identify what activities management should focus on to improve TTR, in the sample we analyzed the correlation between TTR and the performance indicators related to each of the categories described above. Note that the correlation does not imply a direct cause-and-effect relationship; instead it should be interpreted as the tendency for the TTR to change if there is consistently high performance in one of the areas described.

Table 1 illustrates our results. As might be expected, all the performance indicators show a positive correlation with better TTR, suggesting that improvement in each indicator contributes to a faster recovery in business performance. Although this may seem obvious, some indicators have a higher absolute value than others, suggesting a more intense effect. As shown in Table 1, the indicator associated with sales activities is the most influential, while the delivery indicator is the least influential.

Looking at the individual indicators, we can see that effective inventory management during a disruption promotes the rapid recovery of pre-crisis operations, ensuring the immediate availability of raw materials and components needed to resume normal business activities. Conversely, suboptimal inventory management can cause delays due to the need to restore normal levels of raw materials. Some functional strategies for proper inventory management include supplier diversification, which reduces the risk of supply chain disruptions, and keeping buffer stocks, which protects against unexpected spikes in demand or delays in supply.

Similarly, a high-performing customer service is critical to maintaining a strong customer base during a crisis. Brand loyalty is a key competitive advantage in the post-disruption recovery phase, guaranteeing customer retention at a time when new customer acquisition may be more

difficult. In this sense, training customer service personnel and using technology to improve service can enhance the effectiveness of customer interactions, securing a stable customer base and faster recovery.

Maintaining sales continuity during periods of uncertainty is a clear indicator of a company's presence and stability in its markets. The ability to absorb consistent sales volumes provides a competitive advantage during recovery by reducing the time associated with the marketing and communications activities required to bring products and services back to market. In addition, sales continuity provides regular cash flows, ensuring financial stability and resources to invest in recovery.

A higher ROI indicates an efficient use of invested resources. As we've seen with sales, one way to strengthen a company financially in the face of disruptions is to build an investment portfolio that is resilient to discontinuities (and as such able to limit losses or generate gains even during downturns). This strength facilitates and accelerates recovery by providing more financial resources than competitors.

Product quality is directly linked to brand image and the reliability of the production logistics system. By maintaining consistent product quality, companies signal to customers that product standards remain unchanged even during disruptive events. As a result, quality helps maintain the company's reputation with its customers by increasing the likelihood that they will make repeat purchases during the recovery.

Finally, market share reflects a firm's competitive position. Companies with larger market shares enjoy a stronger position in their target markets and can exercise greater bargaining power with their customers and suppliers, facilitating a faster recovery.

RESILIENCE STRATEGIES

From a management perspective, it's vital to identify practices that increase the level of resilience, measured, as above, by monitoring TTR-related performance indicators (Table 2). Resilience is an indispensable strategic capability that enables rapid anticipation, adaptation, response, and recovery following an unexpected impactful event. To design an effective crisis management system and support resilience, companies would do well to examine discontinuities at three key moments: before, during, and after the disruptive event. At each of these stages, performance indicators tracking provides early warning of the need for specific strategic actions to minimize TTR and facilitate rapid recovery.

Each discontinuity phase involves different strategic actions, which can be classified as follows:

- Proactive actions to prepare for a disruptive event.
- Contingency actions to respond to the disruption.

TABLE 1. CORRELATION BETWEEN RESILIENCE AND PERFORMANCE INDICATORS OF SPECIFIC AREAS. ALL VALUES ARE SIGNIFICANT

	Stock availability	Delivery	Product Quality	Sales	Customer Service	Market share	ROI
Time to Recovery	-0.147**	-0.089*	-0.105*	-0.329***	-0.221**	-0.150**	-0.199**

***p-value<0.01;   **p-value<0.05;   *p-value<0.1.

- Reactive actions to restore performance after the unexpected event has occurred.

Effectively managing these strategic actions requires specific capabilities and underlying enablers. For example, preparing for proactive actions depends on the ability to anticipate and identify the possibility of a disruptive event occurring. This requires effective monitoring of environmental changes and changes in indicators before business performance is impacted. Once a potential threat is identified, the implementation of competing actions depends on adaptive and responsive capabilities. The former involve the continuous adjustment of business activities to ensure the availability of critical resources during disruptions, while the latter enable an effective and timely response to events.

Finally, preparing for responsive actions in the post-discontinuity phase calls for resilience and learning capabilities. Thanks to resilience, the company can readjust and return to normalcy after the upheavals caused by the discontinuity. Learning skills are useful for analyzing the events that have occurred, assessing their impact, evaluating the effectiveness of the countermeasures taken. All this serves to improve the prevention and response system in a cyclical review perspective.

Expanding on the approach we propose, each of the capabilities described above is in turn made up of specific enablers that facilitate their development.

- Anticipatory capability requires awareness of potential emergencies through a thorough understanding of the company's vulnerabilities, robustness to change, discontinuities and the possibility of their occurrence, corporate safety and soundness in the face of possible crises, and data management (pre-disruption).
- Adaptive and responsive capabilities require flexibility in adapting to change, redundancy through maintaining excess capacity, collaboration with supply chain partners, and agility and speed in responding to discontinuities.
- Recovery and learning capabilities include contingency planning or reviewing existing plans, assessing the market position potentially changed by the crisis, and managing the knowledge and lessons learned from the discontinuity. Social capital and relationships with other members of the value chain should be leveraged to promote learning and strengthen connections.

The performance indicators detailed in this article are necessary to monitor each of the capabilities we have described. To respond to a crisis in a timely manner, companies need to pay attention to the dynamics of each indicator in all phases of discontinuity, since there is no single category that takes priority over the others. Given their correlation with the TTR, indicators that are kept under control and that display no excessive discontinuities suggest the possibility of restoring an adequate level of operations in a short time. Table 2 summarizes specific practices that can be followed to develop the key capabilities we describe and to realign performance indicators with business objectives.
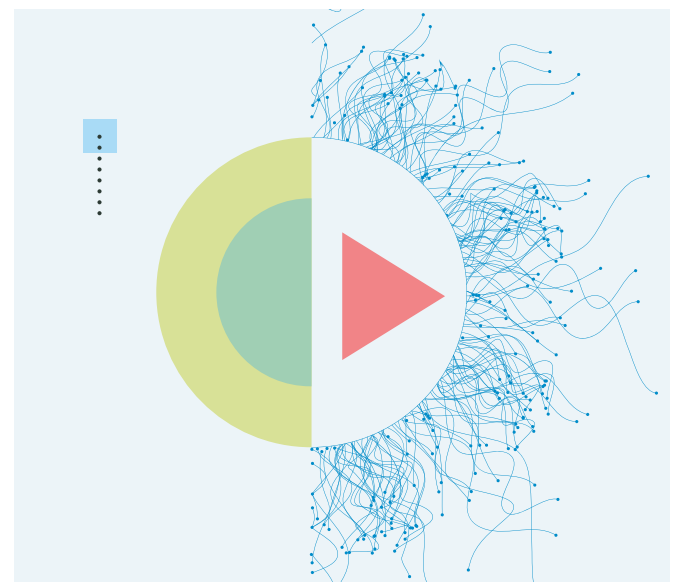
TABLE 2. RESILIENCE PRACTICES IN THE STAGES OF DISCONTINUITY (ADAPTED FROM ALI ET AL., 2017)

Discontinuity phase and consequent actions	Key capabilities	Enabling elements	Praxis
Antecedent phase and proactive strategic actions	Ability to anticipate	Awareness of the situation	• Monitoring and interpretation of events, • Continuity planning, • Mapping supply chain vulnerabilities, • Preparation of warning strategies, • Risk prevention and containment, • Risk control/transfer/sharing with supply chain partners.
		Robustness	• Supply chain network design favoring: segmentation, decentralization, density. • Identification of critical partners, • Design management and product flow, • Preparation of a delivery strategy, • Anticipation/preparation for change.
		Visibility	• Performance monitoring through KPIs, • Predisposition of an IT capability, • Information sharing with partners, • Implementation of integrated systems for transparency, • Fostering connections.
		Security	• Ensure physical/commodity security, • Introduce a culture of safety, • Prepare countermeasures to counterfeiting, • Cybersecurity, • Introduce multi-level defense systems, • Creating public-private partnerships (PPPs), • Fostering cooperative strategies with supply chain partners
		Knowledge management (pre-interruption)	• Know your supply chain deeply, • Education and training, drills, simulations, and supply chain exercises, • Introducing the culture of resilience, • Involve board leadership, • Create a risk management department, • Fostering risk awareness, • Fostering inter-organizational learning.
Concurrent phase and competing strategic actions	Adaptability	Flexibility	• Flexible supply through multiple suppliers, • Flexible production processes or resources, • Flexible product via referral, • Flexible pricing through responsive pricing, • Flexible transport mode, • Flexible order fulfillment
		Redundancy	• Maintain overcapacity in production, transportation, or resources, • Rely on multiple suppliers, • Store safety supplies, • Prepare a strategic inventory, • Provide backup/emergency storage facilities, • Maintain low capacity utilization.
	Responsiveness	Collaboration	• Plan collaboratively with supply chain partners, • Sharing information with partners, • Coordinating with partners, • Cooperate with competitors as well.
		Agility	• Speed in adapting to change, • Responsiveness to respond to unexpected situations.

Discontinuity phase and consequent actions	Key capabilities	Enabling elements	Praxis
Next phase and strategic reactive actions	**Recovery capacity**	**Emergency planning**	• Reconfiguring the supply chain, • Acquire the necessary resources to cope with future crises, • Prepare restoration plans, • Reduce time to market, • Prepare scenario analyses.
		Market position	• Increase financial strength (consider mergers and acquisitions), • Increase market share, • Maximizing efficiency, • Improve adaptability to unexpected situations, • Structuring customer relationships, • Increase communications with customers.
	Learning ability	**Knowledge management (post-interruption)**	• Investing in education and training, • Collect post-interruption feedback, • Increase knowledge of the costs/benefits of actions taken to cope with the crisis, • Becoming a continuous learning organization, • Looking beyond the risks to see the opportunities, • Increase innovation in emergency planning and continuity management
		Social capital	• Improve trust with internal collaborators and external partners, • Fostering inter-organizational relationships, • Improving interpersonal competence, • Leveraging co-creation processes

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ACKNOWLEDGEMENTS

VISUAL READING

THE CONTAGIOUS POWER OF INCLUSIVE BRANDS

The commitment to Diversity, Equity & Inclusion (DEI) among companies has traditionally focused on the HR dimension, which has minimal visibility on the outside. In recent years, however, more and more brands have recognized their social role in promoting an inclusive culture, even at the B2C level. This has led them to embrace social responsibility and customer engagement, and to ensure transparency, consistency and continuity in their inclusion efforts.

The research group, with Prof. Sandro Castaldo (Bocconi University) acting as Scientific Coordinator, is a heterogeneous team in terms of skills and background; the idea is to capture all the nuances of Diversity, Equity & Inclusion (DEI) at the B2C level. The people at Focus Management (Emanuele Acconciamessa, Anna Righi, Francesca Ibba, and Marianna Bartiromo) together with the Diversity Foundation team (Francesca Vecchioni, Gabriella Crafa, Gabe Negro, and Francesca Bonfanti) have been working on the Diversity Brand Index since 2018. This study, as of 2024 in its seventh edition, is the only one that measures the impact of inclusive actions by brands on business and on the choices made by female consumers.

A key element of the Diversity Brand Index 2024 is the web survey, conducted during 2023 on a sample of 1,070 respondents, which confirmed and reinforced insights from previous editions. Indeed, an even stronger link emerges between brands' commitment to DEI, NPS, and revenue growth. NPS or Net Promoter Score is a word-of-mouth indicator measuring the percentage difference between Promoters and Detractors. Some industries turn out to be closely associated with the concept of inclusion by the market: Retail and Apparel & Luxury Goods win over consumers for their perceived commitment on DEI, confirming the data of the previous edition. As regards this dimension, the Toys sector is also on the rise, demonstrating how brand focus on future generations contributes to differentiating positioning.

BRANDS* PERCEIVED AS MORE INCLUSIVE

Top 50 brands in terms of number of mentions which emerged from the survey, in alphabetical order

2023 - 50 BRANDS

6% TOYS
Barbie, Lego, Mattel

6% TELCO
Fastweb, Tim, Vodafone

24% RETAIL
Amazon, Asos, Coop, H&M, Ikea, Intimissimi, Lidl, McDonald's, Ovs, United Colors of Benetton, Zalando, Zara

6% MEDIA
Disney, Netflix, Sky

8% INFORMATION TECHNOLOGY
Google, Microsoft, Spotify, TikTok

2% UTILITY
Sorgenia

22% APPAREL & LUXURY GOODS
Adidas, Armani, Calvin Klein, Desigual, Diesel, D&G, Dior, Gucci, Levi's, Nike, Versace

2% AUTOMOTIVE
Ferrari

2% CONSUMER ELECTRONICS
Apple

6% CONSUMER SERVICES
Generali, FS Italiane, Intesa Sanpaolo

6% FMCG
Coca-Cola, Ferrero, Pepsi

10% HEALTHCARE & WELLBEING
Dove, L'Oréal, Mac Cosmetics, Nivea, Sephora

2022 - 50 BRANDS

22% APPAREL & LUXURY GOODS
Adidas, Calvin Klein, Desigual, D&G, Giorgio Armani, Gucci, Lacoste, Levi's, Nike, Versace, Victoria's Secret

2% AUTOMOTIVE
Toyota

8% CONSUMER ELECTRONICS
Apple, Brondi, Microsoft, Samsung

4% CONSUMER SERVICES
FS Italiane, Intesa Sanpaolo

8% FMCG
Barilla, Coca-Cola, Ferrero, Nonno Nanni

8% HEALTHCARE & WELLBEING
Dove, Nivea, L'Oréal, Pantene

6% INFORMATION TECHNOLOGY
Google, Instagram, Meta

10% MEDIA
Disney, Disney +, Freeda, Netflix, Rai

24% RETAIL
Intesa Sanpaolo
Amazon. Decathlon, Esselunga, H&M,
Ikea, Intimissimi, Lidl, McDonald's, Primark, United Colors of Benetton, Zalando. Zara

2% TELCO
TIM

4% UTILITY
Enel, Sorgenia

2% TOYS
Barbie

Source: Diversity Brand Index 2024 research run from January to December 2023

NPS NET PROMOTER SCORE: WORD OF MOUTH

2022

+72.8%

INCLUSIVE BRANDS

-71.2%

NON-INCLUSIVE BRANDS

2023

+73.6%

INCLUSIVE BRANDS

-87.5%

NON-INCLUSIVE BRANDS
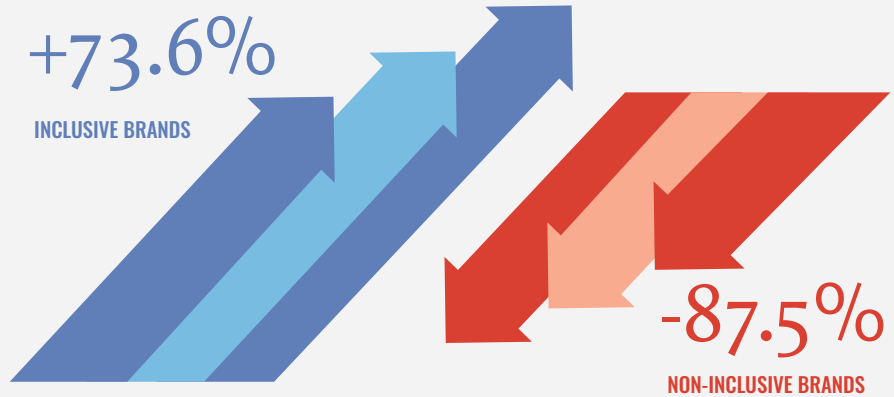
Source: Diversity Brand Index 2024 research run from January to December 2023

The sensitivity and maturity of the Italian population around inclusion is growing. Segmentation shows increases in the clusters that are more active on DEI (Engaged and Involved) issues, while the share of Angry 2.0 people who are more hostile to diversity is shrinking, albeit less noticeably over the years. Cluster trends manifest how inclusion is an evolutionary path for the population, in which the cultural dimension plays a crucial role in creating awareness followed by engagement and activism. People's maturity on DEI is reflected in their ability to value brand engagement and turn it into brand ambassadorship.

The gap in terms of NPS between companies perceived as inclusive, for which the indicator increases to +73.6% (+0.8 p.p.), and those perceived as far from DEI issues, for which the NPS worsens further, plummeting to -87.5% (-16.3 p.p.). Using international benchmarks, it is possible to estimate that the difference in revenue growth between the two types of company has reached an all-time high: 23.4% (+2.4 p.p. from the previous edition), naturally in favor of those perceived as more inclusive.

SEGMENTATION OF THE POPULATION

2023

INVOLVED
15.2%

INDIFFERENT
12.8%

TRIBAL
11.2%

AWARE
8.8%

ANGRY 2.0
13.9%

ENGAGED
28.4%

UNAWARE
9.7%

2022

ENGAGED
+0.7 P.P.

ANGRY 2.0
-4.8 P.P.

INDIFFERENT
+0.7 P.P.

TRIBAL
+0.6 P.P.

INVOLVED
+1.5 P.P

AWARE
0 P.P.

UNAWARE
+1.2 P.P
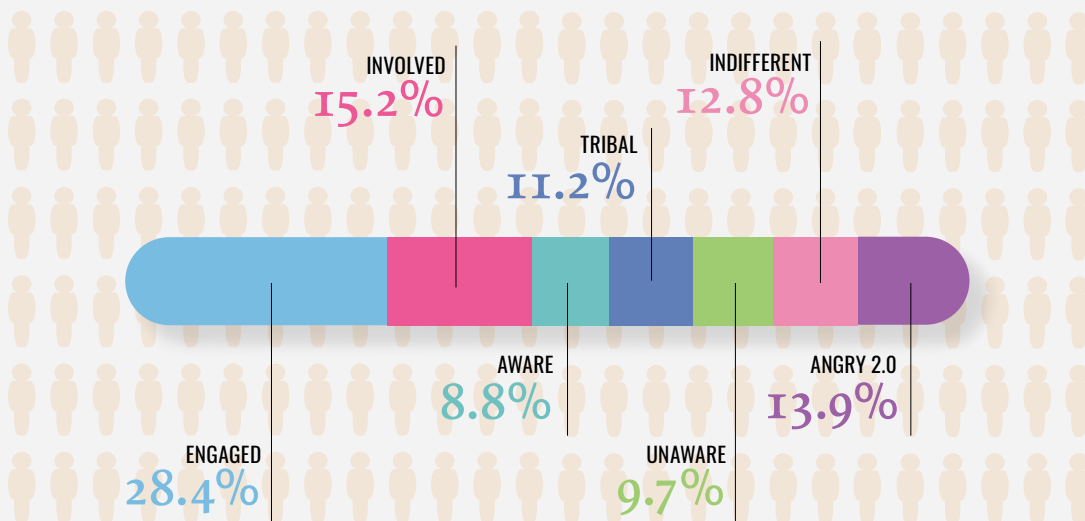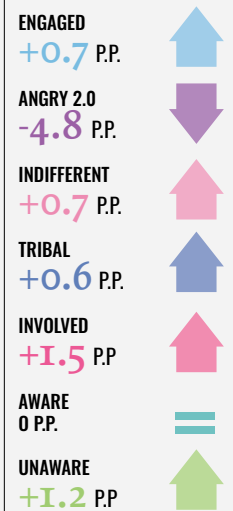
Source: Diversity Brand Index 2024 research run from January to December 2023

P.P. = percentage point

UNVEILING THE NATURE OF BIG DATA ANALYTICS CAPABILITIES
TRUST AND THE MODERATING ROLE OF ENVIRONMENTAL HOSTILITY

To realize a data-driven transition, firms must evolve into more collaborative and democratic entities. This requires cultivating organizational trust and understanding its effects on developing the tangible, intangible, and human resources relating to big data analytics capability (BDAC). Despite the relevance of the topic, empirical evidence on the impact of organizational trust on BDAC is lacking. This paper explores the effects of organizational trust on various dimensions of BDAC and analyzes the moderating role of environmental hostility. Our research reveals the contingency-dependent nature of trust in developing BDAC, as its effects become positive when entrepreneurs perceive increasing environmental hostility. To fully leverage a data-driven transition in hostile environments, managers should focus on achieving higher organizational trust to enable a data-driven culture, improve technical and managerial skills, and empower employees.

MANAGEMENT//ORGANIZATIONAL TRUST//BIG DATA ANALYTICS//ENVIRONMENTAL HOSTILITY//SMEs

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INTRODUCTION

Big data represents a disruptive paradigm shift for businesses (Chauhan et al., 2022; George et al., 2014; Ekbia et al., 2015). According to McAfee and Brynjolfsson (2012), firms that anchor their activities on data show productivity rates and profitability that are 5% or 6% higher than their counterparts. Data-driven firms are business organizations that build tools, abilities, and culture on data (Anderson, 2015; Persaud and Zare, 2024). To leverage the potential of data effectively, the various roles in these firms are often structured into multiple teams, each possessing complementary competencies. The culture of data-driven organizations is goal-first, inquisitive, learning-oriented, and iterative (Anderson, 2015). This cultural footprint is reflected in information exchanges and internal dialogues that extend beyond traditional

business boundaries, which are often perceived as silos (Kitchens et al., 2018). Therefore, data-driven organizations are collaborative and democratic since teams are conceived, from top-down and bottom-up, to share knowledge and information by providing broad access to data to all their members.

Typically, an organization can unleash its potential through information exchange and close cooperation among its members, functional areas, or business units. To achieve this, cultivating organizational trust (OT) is key (Castaldo et al., 2010; Guinot et al., 2016; Kayabay et al., 2022). While technical solutions like big data analytics and artificial intelligence (AI) garner considerable attention (Sullivan and Wamba, 2024), we must recognize that organizations are fundamentally about people (Huynh et al., 2023; Korherr and Kanbach, 2023; Mikalef et al., 2019a). How individuals collaborate and work together impacts organizational performance. Boosting competitiveness in the big data era hinges on addressing people-centric issues rather than solely relying on new technology implementations (Forbes et al., 2023).

OT is the fundamental foundation of dynamic capabilities and big data analytics capability (BDAC) (Fainshmidt and Frazier, 2017). Indeed, dynamic capabilities depend on collective learning and coordinated efforts by organization members, both influenced by the organization's social climate. This in turn shapes patterns in attitudes, behaviors, and interpersonal relationships among colleagues. As a result, this study argues that OT can directly impact the development of BDAC by facilitating information processing and knowledge management, improving the collaborative dynamics at an organizational level, boosting responsiveness, and stimulating continuous learning mechanisms (Nyamrunda and Freeman, 2021; Pattanayak et al., 2024; Salancik and Pfeffer, 1978).

Despite the prominent role of OT in data-driven organizations, no empirical evidence reveals what the actual impact of OT is with regard to the multiple dimensions of BDAC and how each one develops (Fainshmidt and Frazier, 2017; Grover et al., 2018; Gupta and George, 2016; Mikalef et al., 2019a). BDAC

is a multidimensional construct that includes all organizational resources relevant to the transition toward data-driven. These dimensions refer to tangible (e.g., data, time, financial resources), intangible (e.g., data-driven culture and organizational learning), and human resources (e.g., technical and managerial skills). Understanding the influence of OT on BDAC development can further our comprehension of the antecedents that successfully drive a firm's adoption of the big data paradigm. Previous literature has made limited progress in identifying said antecedents, leaving a major research gap (Huynh et al., 2023).

To fill this gap, our paper aims to analyze the relationships between OT and BDAC dimensions to help unveil the complexity of BDAC and discover its intrinsic nature. Unpacking a construct means extracting it from its "black box" and contributing to its theoretical development while providing more specific practical takeaways.

This research also considers environmental hostility (EH) as a moderator, focusing on its interplay with OT. By doing this, the present paper addresses the call for further studies (Huynh et al., 2023) to examine the influence of environmental factors on the development of BDAC (Mikalef et al., 2019a). Investigating EH as a moderator of BDAC can also help reinforce our methodological rigor (Huynh et al., 2023), as it allows us to identify boundary conditions and significant contexts, deriving more precise insights into the relationship between OT and BDAC. More solid OT equips firms with a greater capacity to accomplish organizational changes (van Dam et al., 2008), improving the ability to share information among members (Oh, 2019). For this reason, OT may offer distinct advantages to firms operating in hostile environments where information proliferation is heightened.

Here, we argue that EH can compel firms to adopt data-centric strategies to manage spiraling complexity and uncertainty (Teece et al., 2016). The perception of EH can influence the collaborative efforts of business teams (Breugst et al., 2020) and determine organizational changes to cope with new environmental conditions (Hitt et al., 2020), representing a stimulus to undertake strategic change

by developing BDAC. Therefore, the interaction between OT and EH could be constructive as far as BDAC development. Taking stock of the previous research gaps and drawing on the dynamic capabilities view (Teece, 2007; Teece et al., 2016), this paper answers the following research questions: **What is the relationship between OT and BDAC? What is the role played by EH in this linkage?**

To accomplish the research aims described above, this study applies partial least square-path modeling (PLS-PM) on a sample of 200 Italian SMEs. Our findings reveal the contingency-dependent nature of trust with regard to BDAC development, as the effects of trust become positive when entrepreneurs perceive rising EH. The results indicate that, if there are no external triggers, the effectiveness of OT in advancing a data-driven transformation diminishes.

Our paper contributes to the existing literature by addressing two significant research gaps. First, we enrich the research on trust and big data by empirically examining the relationship between OT and the multidimensional construct BDAC. Our work enhances our knowledge of the antecedents that drive a successful transition toward the big data paradigm. Second, this study incorporates EH as a moderating factor, responding to calls for further investigation into the influence of environmental conditions on BDAC development. By exploring the interplay between OT and EH, this research provides insights into the boundary conditions and contextual factors that shape the relationship between OT and BDAC. Third, this paper contributes to the context-specific literature on big data in SMEs, demonstrating that BDAC is inherently trust-based and contingency-dependent in such contexts.

Improving our knowledge on this topic can have relevant implications for business practice. In a hostile environment, OT is a driver that facilitates the development of multiple BDAC dimensions, including organizational learning, data-driven culture, technical and managerial skills, and data management. Therefore, executives should monitor the level of OT and invest in building social relationships and a stronger sense of community (Gratton and Erickson, 2007). Firms could capitalize on the interplay between

OT and EH to enable inclusive, flowing data-driven decisional processes, avoiding the erratic choices that decision-makers may make when they challenge growing environmental complexity (Mitchell et al., 2011).

LITERATURE REVIEW

Organizational trust (OT)

Trust indicates one's expectation that a person who is honest, benevolent, and competent will perform future actions that are beneficial for the trustor in situations of perceived risk and vulnerability (Castaldo et al., 2010). In this condition, trustors expose themselves to vulnerability by trusting: trust is the "willingness to take risks" (Schoorman et al., 2007, pp. 346). Specifically, OT is the trustor's expectation (e.g., employee, manager, etc.) that a workmate will perform an activity that brings organizational benefits in situations of interdependence, where the completion of a task depends wholly or partly on the action of that workmate (Huff and Kelley, 2003; Kramer and Lewicki, 2010). OT can embrace multiple hierarchical levels and individuals at the same level. Specifically, lateral trust indicates the trust between workmates with similar positions in the organization. Instead, vertical trust involves the relationships between workers and their superiors or subordinates (McCauley and Kuhnert, 1992).

OT is a context-specific concept. In other words, every organizational context gives rise to unique trust-based relationships among the organization's members. For example, the power relationships and the information asymmetry between supervisors and subordinates generate different degrees of trust in organizations (Schoorman et al., 2007). What's more, breakdowns in trust can have dangerous consequences (Gillespie and Dietz, 2009; Kramer and Lewicki, 2010), so organizations should nurture this nonmaterial factor to avoid default and maximize its potential. Also, the concept of OT extends beyond interpersonal trust to include trust in technology, such as AI (Glikson and Woolley, 2020). In fact, since

AI will increasingly shape future workplaces, human trust in technology becomes crucial to developing BDAC effectively.

Fainshmidt and Frazier (2017) define "trust as a social foundation of dynamic capabilities" (p. 550). The same authors highlight that such capabilities "rely on collective learning and coordinated effort by organization members, the organization's social climate, which shapes patterns in attitudes, behaviors, and interpersonal relationships among organizational members" (p. 550). They find that trust directly influences the development of these dynamic capabilities, enabling social information processing and social exchange, and affects how the organization's members act and think (Hellriegel and Slocum, 1974; Salancik and Pfeffer, 1978). Trust can enhance relational dynamic capabilities by fostering responsiveness and ensuring reliable communication between business actors (Nyamrunda and Freeman, 2021; Pattanayak et al., 2024). By building trust, firms strengthen their dynamic capabilities of knowledge sharing and new resource combinations, culminating in the increase of a firm's absorptive capacity (Pütz et al., 2023). When colleagues trust one another, they are more likely to share information and collaborate effectively. This enhanced trust fosters an organizational environment where employees feel safe sharing their thoughts and vulnerabilities, resulting in more open, transparent communication (Pattanayak et al., 2024). Also, building trust makes it easier to capture capabilities by enabling cooperation, engagement, and minimizing conflicts (Tabaklar et al., 2021).

Big data analytics capability (BDAC)

To transition into data-driven organizations, firms need to shift their decision-making style from intuition-centered to data-centric (McAfee and Brynjolfsson, 2012; Tabesh et al., 2019). Big data opens paths to new strategizing since data-driven organizations tend to take data-led information as the primary source of viable knowledge (van Rijmenam et al., 2019). However, the realization of big data potential hinges on a more complex architecture of elements at the organizational level. Academic literature refers to the multidimensional concept of BDAC to indicate the firm's ability to exploit big data and generate strategic insights (Grover et al., 2018). In fact, BDAC improves firms' strategies by leveraging new information, amplifying the synergies between business areas, and making it possible to seize new business opportunities (Akter et al., 2016). In addition, by leveraging BDAC, firms can address market changes and customer needs, optimize their internal operations, and innovate their business models (Ciacci and Penco, 2023; Dubey et al., 2020; Kitchens et al., 2018; Ur Rehman et al., 2016). BDAC facilitates environmental scanning as well, which firms use to identify opportunities for new productions (Duan et al., 2020; Sheng et al., 2017). BDAC also enables the development of dynamic capabilities (e.g., agility, Mikalef et al., 2019a; Sivarajah et al., 2017) and reduces uncertainty by extracting meaning from data to improve strategic decision-making (Chen et al., 2015).

Gupta and George (2016) identify three BDAC components, i.e., tangible, intangible, and human resources. Tangible resources involve the technological architecture adopted to integrate, store, process, analyze, and visualize data, the amount of data at disposal, and basic resources (e.g., money to invest, time) (Dubey et al., 2020; Gupta and George, 2016). Since firms can buy tangible resources on the market, they do not represent potential sources of competitive advantage. Instead, intangible resources, which are critical for the success of an organization's BDAC, represent differentiating factors over rivals. Intangible resources refer to a data-driven organizational culture (McAfee and Brynjolffson, 2012), allowing firms to collect, manage, share, and exploit by data-driven decision-making, and organizational learning. This process consists of exploring, storing, sharing, and applying knowledge (Chen et al., 2015). Lastly, human resources represent the technical, managerial, and relational competencies surrounding employees who work in a data-driven organization (Anderson, 2015; Wamba et al., 2017). The interaction between these elements helps create a differentiation factor (Sivarajah et al., 2017).

Because BDAC is the sum of tangible, human, and intangible resources, it represents a distinctive aptitude for creating innovative business models (Ciacci and Penco, 2023).

Environmental hostility (EH)

Shifting from intuitive to data-centric decision-making paradigms can enhance the firm's ability to effectively address new environmental conditions and windows of opportunity by improving responsiveness, reducing cognitive biases, and providing timely strategic insights (Grover et al., 2018; Sullivan and Wamba, 2024). This ability is crucial to stay competitive in turbulent, unstable business environments. Therefore, the perception of environmental complexity and unpredictability can lead firms to undertake strategic changes to develop new dynamic capabilities to respond to changing external conditions (Clauss et al., 2021; Teece, 2007). The literature demonstrates that environmental turbulence is a crucial contingent variable in the dynamic capabilities view (Chen et al., 2015; Kreiser et al., 2020; Michaelis et al., 2021).

Our paper deals with the concept of EH, a specific form of turbulence centering on the action of competitive external forces that threaten firms (Breugst et al., 2020). Precisely, EH indicates "the degree of threat to the firm posed by the multifacetedness, vigor and intensity of the competition and the downswings and upswings of the firm's principal industry" (Miller and Friesen, 1983, p. 222). These threats include characteristics of the industry, competition, customers, and markets (Green et al., 2008), such as the firms' failure rate, competitive intensity, customer loyalty, and profit margins. Hostile environments are marked by fluid market structures, globally dispersed expertise and technologies, and a constant search for innovation (Teece, 2014). As a result, environmental hostility forces firms to break away from established routines and engage in continuous learning to manage new layers of complexity and uncertainty, which improves their chances of survival and success in these hostile conditions (Teece et al., 2016). All these exogenous factors undermine the firms'

ability to control the fate of their competitiveness (Michaelis et al., 2021). Since entrepreneurs in the same industry may perceive EH differently (Tang and Hull, 2012), it can be viewed either as an opportunity or a threat. Indeed, while EH poses risks to business competitiveness, it also serves as a catalyst for innovation, spurring the firm to adopt new organizational paradigms (Hitt et al., 2020; Mikalef et al., 2019a).

HYPOTHESES DEVELOPMENT

The relationship between OT and BDAC

Higher OT can result in more data flowing between the different functional areas (Anderson, 2015) due to managers' belief that their workmates can derive valuable information from the volume of data (Kayabay et al., 2022; Levin and Cross, 2004). Therefore, data-driven firms may leverage their OT by acquiring more data to create new knowledge (Barton and Court, 2012), as knowledge is more manageable and more easily transferable when trust-based ties are stronger (Levin and Cross, 2004). Literature shows that higher levels of OT can trigger the propensity to innovate processes (Ellonen et al., 2008). OT also enhances investment decisions by instilling confidence in the organization's ability to effectively deploy new tools, competencies, and knowledge, with the expectation of rewarding outcomes. Therefore, since trust is associated with expectation (Castaldo et al., 2010), OT may stimulate managers to invest more resources when they believe that this would allow workmates to improve their attitudes and the competencies they need to do their jobs. Finally, this inclination to invest resources in developing BDAC may lead to improving the technological infrastructure (Ellonen et al., 2008).

In addition, OT may positively impact the human dimension of BDAC. The success of managers' skills depends on their ability to coordinate, share information with workmates, and deal with new knowledge (Gupta and George, 2016; Mikalef et al., 2019a). Therefore, such skills

may benefit from a context with more trust among workmates and more willingness to work together. At the same time, higher OT leads superiors to democratize the internal decisional process, tasking their subordinates to develop the analytical skills they need (Anderson, 2015). In addition, a firm with higher OT may offer more training programs to employees to hone their analytical competencies (Tzafrir, 2005). Finally, technical skills may improve thanks to constant internal dialogue and enhanced collaboration (Braganza et al., 2017).

By prompting investments in employee training, OT fosters a data-driven culture (Mikalef et al., 2019a). Specifically, cultivating such a culture means delegating responsibilities to employees with the appropriate skills to extract strategic insights from data (Anderson, 2015; Kayabay et al., 2022). Higher levels of OT reinforce this dynamic (Liden et al., 1993). In addition, a data-driven culture is an open-minded environment where relationships are crucial. For instance, data-driven decisions are supported by constant interactions among data analysts and decision-makers. Making decisions based on data analytics is an iterative process informed by the coordinated integration of complementary forms of knowledge (Hindle and Vidgen, 2018). OT may also positively affect the organization's learning (Guinot et al., 2013; Guinot et al., 2016), encouraging people to share, interact, and work as a team (Mayer et al., 1995). In other words, higher OT may benefit organizational learning by improving information transmission and knowledge creation (Oh, 2019). Therefore, we formulate the following hypotheses:

H1. OT significantly and positively affects the data (H1a), basic resources (H1b), technology (H1c), managerial skills (H1d), technical skills (H1e), data-driven culture (H1f), and organizational learning (H1g) dimensions of BDAC.

The moderating effect of EH in the relationship between OT and BDAC

When EH is higher, firms are more likely to undertake strategic change to address the environmental conditions (Breugst et al., 2020; Clauss et al., 2021; Teece, 2007), facilitating a transition from an intuition-based to a data-centric paradigm. By leveraging superior OT levels, firms can acquire and share larger volumes of data. The widespread dissemination of data facilitated by OT across functional areas leads to better management of information flows and analytics processes. The volume of data proliferating in hostile environments is greater because of the more powerful dynamics surrounding big data creation (George et al., 2014). When the amount of data increases, the need for an adequate technological architecture to store, visualize, and analyze data emerges. By implementing more advanced technologies, firms can process data to reduce environmental complexity and derive more comprehensible insights.

Therefore, the interaction between OT and EH may positively affect the propensity to prioritize investing in big data projects and implementing new technologies. In hostile environments, decision-makers need a strategic tool to facilitate the decisional processes in the face of enhanced complexity (Breugst et al., 2020; Mitchell et al., 2011). When EH is more intense and the need for agile, and flexible decisional tools becomes more urgent, higher OT may lead firms to invest more basic resources in BDAC, under the assumption that workmates will contribute to generating positive returns from the investment.

Managerial skills depend on managers' ability to cooperate, share information, and deal with new knowledge, i.e., the mutual trust among managers and workmates (Castaldo et al., 2010; Jones and George, 1998; McAllister, 1995). Trust may be even more pronounced as EH grows. Thompson (1967) writes that, under conditions of uncertainty and complexity, mutual trust is a requirement to sustain coordinated actions and adjustments. OT plays a relevant role in enhancing managerial skills in decision-making, particularly in environments that demand swift strategic responses. In addition, OT intensifies the frequency of organizational dialogue, a core aspect of managerial skills. Concerning technical skills, firms need professionals to derive strategic insights from data. As a reaction to EH, superiors may democratize the internal decisional

process by entrusting subordinates possessing adequate skills to enact them to exploit data (Anderson, 2015). Also, higher OT leads to improving employee training to raise their analytical competencies. This is especially the case when EH intensifies, posing new challenges and giving rise to the need to acquire, analyze, and exploit data with greater speed and precision. In other words, EH prompts organizations to invest more resources to train their employees, and OT is the fertile ground where that training can be most effective. Since big data augments the ability to manage risks and make timely decisions (Mikalef et al., 2019a), EH facilitates the progressive development of data-driven mental models, resulting in an enhanced big-data culture.

In conditions of EH, acquiring and analyzing larger volumes of data can lead to the extraction of more relevant knowledge (Urbinati et al., 2019). However, greater EH generates a higher proliferation of information that requires processing. In this regard, OT is crucial in enabling firms to utilize data for assimilating and generating new knowledge. With no OT to serve as a catalyst it may be difficult for firms to activate smooth routines based on information exchange between members while avoiding information overload.
Therefore, we argue that:

H2. EH significantly and positively moderates the relationship between OT and the data (H2a), basic resources (H2b), technology (H2c), managerial skills (H2d), technical skills (H2e), data-driven culture (H2f), and organizational learning (H2g) dimensions of BDAC.

Figure 1 depicts the conceptual model and linkages between the higher-order variables in our study. We posit that OT plays a significant role as an antecedent of dimensions of BDAC, while we expect EH to moderate such relationships positively.

METHODOLOGY

To empirically test the hypotheses, we apply partial least square–path modeling (PLS-PM) and bootstrapping validation on a cross-sectional and cross-industry sample of 200 Italian SMEs. The PLS method is commonly employed for analyzing causal relationships due to its robustness in handling variables that do not follow a normal distribution (Ciacci and Penco, 2023; Galindo-Martín et al., 2019). Additionally, PLS enhances the predictive accuracy of the analysis, making it a suitable choice for research focused on predictive modeling (Benitez et al., 2020). The units of analysis have been randomly chosen among firms using big data analytics. The respondents are entrepreneurs (9%), members of the owner family engaged in business management (20.9%), and top managers (70.1%). All the respondents are people involved in strategic management with a global understanding of the firm's business model, activities, and processes; 80% are men and 20% are women. Respondents are aged 50-64 (53%), 35-49 (43.5%), and over 65 (3.5%). The firms in our sample belong to different sectors, including manufacturing (55%), trade (24%), services (16.5%), primary industries (2.5%), financial services (1.5), and utilities (0.5%).

Measurement scales
During the preparatory stage of our research, we ran a pilot test with a subsample of 26 respondents to identify potential issues and refine the wording of the questions. In this phase, participants were asked to review and validate the relevance and completeness of the questionnaire items. Their feedback was instrumental in adjusting specific items, enhancing the clarity and reliability of the finalized questionnaire. The constructs are measured through 7-point Likert scales tested and validated in the literature. OT, derived from Huff and Kelley (2003), includes items like, "There is a very high level of trust in this organization," and "If someone in this organization makes a promise, other individuals within the organization will almost always trust that the person will do their best to keep the promise." BDAC is measured through the multidimensional scale by Mikalef et al. (2019a). EH is based on the scale compiled by Green et al. (2008), including items like "The failure rate of firms in my industry is high," "My industry is very risky, such that one bad decision

could easily threaten the viability of my business unit," and "Low-profit margins are characteristic of my industry." We performed an exploratory factor analysis on each latent construct to check the robustness of the scales and exclude the items that show a weak correlation to the factor in question.

Measurement model
Model validation considers the formative and reflective nature of the constructs (Henseler et al., 2014). Formative construct validity is tested by checking the adequacy coefficient (R^2) (MacKenzie et al., 2011). For all the constructs, R^2 is higher than the threshold of 0.5. The variance inflation factors (VIF) test does not show multicollinearity problems, as it is lower than 10. Finally, all the weights of the items and the latent constructs are statistically significant (Petter et al., 2007).

In testing the reflective constructs for reliability, Cronbach's alpha reaches the threshold of 0.7. We performed a supplementary test (DG rho) in which all the values were higher than 0.815, supporting

FIGURE 1. CONCEPTUAL MODEL

ENVIRONMENTAL HOSTILITY

H2. OT x EH ➡ BDAC's dimensions

EH is expected to positively moderate the relationship between OT and BDAC by compelling firms to undertake strategic changes to address new environmental conditions. Increased data flow in hostile environments necessitates advanced technological infrastructure for analyzing data, which OT facilitates by enhancing collaboration and trust among employees. This interaction improves knowledge management and organizational learning mechanisms while stimulating managers and employees to develop new skills.

+ H2.

+ H1.

ORGANIZATIONAL TRUST

BIG DATA ANALYTICS CAPABILITY'S DIMENSIONS

H1. OT ➡ BDAC's dimensions

OT is expected to positively affect BDAC's dimensions by fostering an organizational environment where data flows between functional areas and managers are more likely to trust that their colleagues can derive valuable insights from data. OT leads to innovative processes and investment in new tools, competencies, and technological infrastructure by instilling confidence in achieving rewarding outcomes. OT enhances managerial and technical skills by encouraging coordination and information sharing. OT can nurture a data-driven culture by devolving responsibilities to skilled employees, fostering open-mindedness and steady interactions among data analysts and decision-makers.

the internal consistency of the constructs. In addition, the outer loadings are higher than cross-loadings, and AVE exceeds the threshold of 0.5 in all cases, proving an overall good discriminant validity. We conclude that the tests demonstrate the overall robustness of the constructs.

RESULTS

In this study, we run two distinct models. The first model tests the control variables (age and gender) on the dependent variables. The only significant output it provides is the positive effect of age on managerial skills (β = 0.148; t-value = 2.110). This result highlights the importance of experience in relation to managerial skills (Gupta and George, 2016), a difficult-to-teach, firm-specific competence. In fact, as managers age, they accumulate inimitable knowledge and insights from their interactions and decision-making processes in the firm, sharpening their overall managerial skills. This experiential learning contributes to their ability to effectively deploy resources to optimize processes and identify emerging opportunities (Mannor et al., 2016).

The second model tests the hypotheses (Figure 2). Table 1 summarizes the results of the PLS model and bootstrap validation. Considering the relationships between OT and BDAC dimensions, OT-technology (β = -0.363; t-value = -5.482) and OT-organizational learning (β = 0.159; t-value = 2.177; CI = 0.011, 0.304) prove to be significant. Moreover, OT seems to negatively influence the adoption of new technologies to exploit big data analytics. Considering the hypotheses of a direct effect of OT on the single dimensions of BDAC, our model only confirms H1g.

When EH acts as a moderator, the relationships become significant and positive (β = 0.427; t-value = 6.442). More in general, the effect of OT in a hostile environment generates significant increases in resources (β = 0.318; t-value = 4.460), technology (β = 0.427; t-value = 6.442), manager skills (β = 0.269; t-value = 3.716), technical skills (β = 0.209; t-value

= 2.884), data-driven culture (β = 0.221; t-value = 3.025), and organizational learning (β = 0.124; t-value = 1.695; CI = 0.003, 0.301). This means that OT is a noteworthy antecedent of BDAC in a hostile environment, except for the relationship between OT and the data dimension (β = 0.261; t-value = 3.614). Instead, bootstrapping does not support the significance of the relationship between OT and data (CI = -0.198, 0.458) moderated by EH. In summary, our model validates all moderation hypotheses except for H2a.

DISCUSSION

Our findings indicate that OT enhances BDAC by significantly influencing its constitutive dimensions under the moderating effect of EH. The impact of OT as an antecedent of BDAC is contingent since it depends on EH moderation. In this context, OT lays the groundwork for an organizational environment in which to develop the different dimensions of BDAC.

When there is no moderation, the only significant relationships exist between OT and BDAC technology and OT and BDAC organizational learning. Surprisingly, the former reveals detrimental effects. This can be explained by the fact that, in general, SMEs avoid fruitless investments since their budgets do not allow them to invest in non-essential resources (Miller et al., 2021). This condition often locks SMEs into a state of frugality (Kuckertz et al., 2020). Decisions to invest more heavily in an area may stem from the belief that future revenues will compensate for this effort. Our results demonstrate that firms, despite their high levels of OT, may avoid unprofitable investments to adopt new technologies by favoring intuitive and heuristic decision-making (Elbanna et al., 2013). In addition, in the absence of an external trigger, firms may opt to restrict or streamline their technological architecture to avoid unnecessary internal complexity (Bayona et al., 2001). Under normal conditions, high OT could lead workmates to find solutions without the aid of

new technologies, or to collaborate with partners to support their activities (Teece, 1992).

Concerning the relationship between OT and technical skills, our findings highlight that managers do not need to hire or train skilled employees until an external factor intervenes. Our analysis reveals a similar outcome for the relationship between OT and managerial skills. Concerning the cultural dimension of BDAC, in the absence of EH, our results indicate that SMEs do not change their mindset, meaning that a higher OT could lead to preserving the current organizational culture identity.

The framework significantly changes when EH acts as a moderator. Indeed, our findings support all the hypotheses presenting EH as a moderator except for the OT-data relationship. This means that OT does not enable data improvement, so firms operating in a hostile environment should concentrate on acquiring the right data rather than more data (Bradlow et al., 2017; Janssen et al., 2017). An excessive amount of data could, in fact, undermine the decisional processes (Merendino et al., 2018). As these results demonstrate, when EH grows, firms with high OT may prefer to implement new technologies by leveraging more advanced technical skills rather than acquiring and integrating additional data from sources of questionable quality; this would avoid creating information overload.

Developing an adequate technological architecture is necessary to cope with hostile external environments, and OT serves as the foundation for deploying more advanced technologies successfully. OT and technologies together allow firms to define data-based strategies by connecting workmates along different hierarchies (Mikalef et al., 2019b). In these terms, technology serves as a tool for democratization.

As EH poses new challenges, it is increasingly urgent for organizations to have the ability to acquire, analyze, and exploit data with greater speed and precision. In this environment, firms need professionals who can gain strategic insights from data (De Mauro et al., 2018). When OT is higher,

superiors are more prone to democratize decision-making by entrusting subordinates who have the right skills with this responsibility (Anderson, 2015). Therefore, management is more likely to invest in training employees to perform tasks more effectively. In this regard, OT underpins the development of technical capabilities in hostile environments. Our results show that a similar trajectory characterizes the relationship between OT and managerial skills.

Considering the cultural dimension of BDAC, the findings indicate that in a hostile environment, firms need to transform their culture by fostering a data-driven mindset, encouraging transparent and open communication, and promoting continuous learning mechanisms (Bargoni et al., 2024). The transition toward a data-driven culture also implies prioritizing data-informed decisional processes, breaking down silos to facilitate information sharing across departments, and investing in training programs to enhance employees' analytical skills and technological proficiency (Anderson, 2015; Persaud and Zare, 2024). The effect of OT on a data-driven culture is related to the greater propensity of management to invest in employee training (Mikalef et al., 2019a), assuming the investment will bring positive returns. Vertical trust is basic for realizing this assumption (McCauley and Kuhnert, 1992) since managers are more prone to undertake strategic investments when they trust their subordinates' ability to perform tasks effectively and responsibly.

Cultivating a data-driven culture means the value of big-data information overrides human intuition (Gupta and George, 2016; McAfee and Brynjolffson, 2012), implying that management tasks employees who possess the appropriate skills with extracting meaning from data. Therefore, such a cultural change is more likely when OT permeates the various functional areas and encompasses workmates along the top-down hierarchical scale (Anderson, 2015).

The external environment is crucial in driving BDAC development. Firms need OT to make their strategic processes more democratic along the

TABLE 1. RESULTS FROM PLS-PM

Hypothesis	Relationship	Estimate	t-value	Bootstrapping confidence interval	Hypothesis testing
H1a	OT ➡ data	-0.182	-2.519	(-0.327, 0.171)	Not supported
H1b	OT ➡ basic resources	-0.040	-0.556	(-0.195, 0.130)	Not supported
H1c	OT ➡ technology	-0.363 ***	-5.482	(-0.471, -0.239)	Not supported
H1d	OT ➡ managerial skills	-0.042	-0.574	(-0.172, 0.092)	Not supported
H1e	OT ➡ technical skills	0.091	1.253	(-0.062, 0.237)	Not supported
H1f	OT ➡ data-driven culture	-0.015	-0.210	(-0.148, 0.121)	Not supported
H1g	OT ➡ organizational learning	0.159	2.177	(0.011, 0.304)	Supported
H2a	OT x EH ➡ data	0.261 ***	3.614	(-0.198, 0.458)	Not supported
H2b	OT x EH ➡ basic resources	0.318 ***	4.460	(0.156, 0.485)	Supported
H2c	OT x EH ➡ technology	0.427 ***	6.442	(0.247, 0.582)	Supported
H2d	OT x EH ➡ managerial skills	0.269 ***	3.716	(0.173, 0.436)	Supported
H2e	OT x EH ➡ technical skills	0.209 **	2.884	(0.104, 0.382)	Supported
H2f	OT x EH ➡ data-driven culture	0.221 **	3.025	(0.095, 0.396)	Supported
H2g	OT x EH ➡ organizational learning	0.124	1.695	(0.003, 0.301)	Supported

*** p-value < 0.001;   ** p-value < 0.005;   * p-value < 0.01;   Bootstrapping based on 5000 samples

FIGURE 2. ESTIMATED RELATIONSHIPS OF PLS-PM
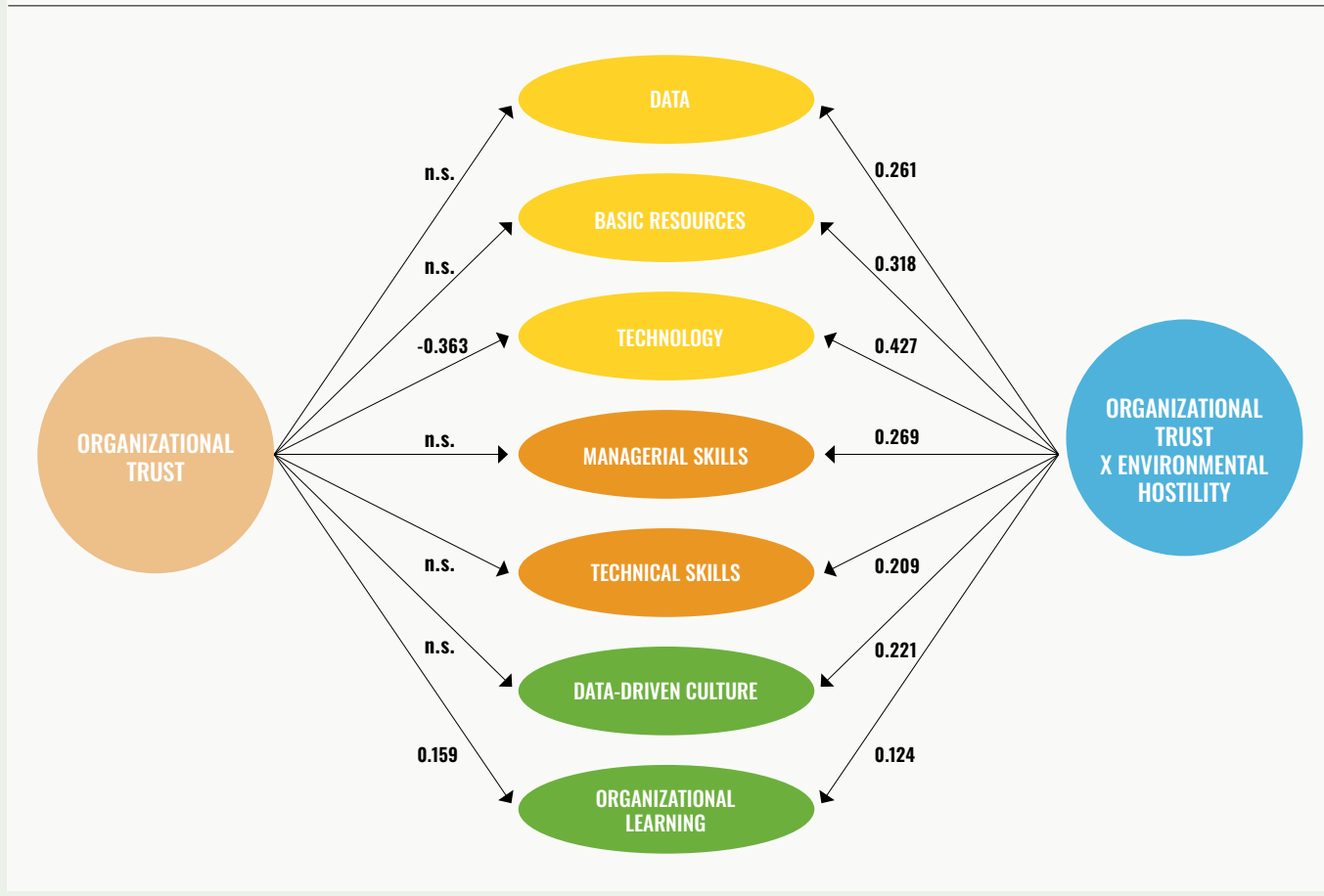
entire decision-making chain (Anderson, 2015). Under constrained conditions, the ability to process information and make assessments may fail for decision-makers (Chen et al., 2015; Dubey et al., 2020). Instead, cultivating OT helps managers develop BDAC to avoid erratic decisions when facing hostile environments (Mitchell et al., 2011). In summary, as EH intensifies, firms need to adopt innovative tools that make decision-making more flexible and effective. Data is latent knowledge, while OT is a knowledge conduit, indicating a natural predisposition of the firm to foster internal flows of knowledge. By leveraging the right combination of OT and BDAC, firms can improve their capacity to transform information into structured knowledge (Nonaka, 1994). Moreover, as EH increases, OT becomes a catalyst for innovation and resilience. The success of this process is crucial to boost competitiveness in rapidly changing, knowledge-intensive environments.

Theoretical implications

Several theoretical implications arise from our study. Building on the previous literature, this paper aims to clarify whether OT is an antecedent of BDAC, and which of its dimensions OT nurtures. In addition, this study evaluates contextual conditions by analyzing the effect of the interplay between OT and EH on the development of BDAC. First, our work contributes to enriching trust and big data literature by exploring the relationship between OT and the multiple dimensions of BDAC. This contribution helps to deepen our knowledge of the antecedents of BDAC (Huynh et al., 2023) while providing insights into OT as a social foundation for dynamic capabilities (Fainshmidt and Frazier, 2017). Our results highlight the contingency-dependent nature of the relationship between OT and BDAC, unveiling the significant role of OT as a driver of BDAC when specific environmental conditions exist in the competitive scenario. These results only partially support previous literature theorizing the enabling role of OT and collaborative culture in successfully embracing the data-driven paradigm (Anderson, 2015; Kayabay et al., 2022). Unpacking

the multidimensional nature of BDAC, this study shows that OT directly contributes to improving organizational learning, while higher levels of OT discourage the development of the technology dimension. However, OT does not significantly affect the other BDAC dimensions.

Second, this study assesses the role of EH as a moderator, responding to a specific literature gap regarding the effects of environmental conditions in setting strategic boundary conditions shaping the development of BDAC (Huynh et al., 2023). While previous literature primarily focused on analyzing the interaction between environmental factors and BDAC in achieving specific outcomes (Mikalef et al., 2019; Mikalef et al., 2020; Wamba et al., 2020), this study concentrates on the interplay between environmental conditions and a potential antecedent of BDAC. By understanding the influence of these external factors, researchers can derive more precise and context-specific insights, ensuring that their findings are robust and applicable to real-world scenarios.

Third, this paper adds empirical evidence to the niche focusing on BDAC development in SMEs, which academic research has just begun to explore (Maroufkhani et al., 2023; Omrani et al., 2024). Our findings expand the current body of knowledge by showing that BDAC in SMEs is inherently trust-based and contingency-dependent.

Managerial implications

From a managerial point of view, our research highlights how essential it is for firms to regularly monitor their level of OT when transitioning to a data-driven organizational model. Firms can use different tools to assess OT. For example, anonymous surveys gauging employees' perceptions of trust within the organization can provide valuable insights. By offering feedback sessions where employees can discuss their concerns and share their experiences, organizations can identify trust-related issues. Another effective OT monitoring tool is a trust audit to evaluate the quality of communication and collaboration, and the transparency of practices. Executives should

also invest in social relationships and create a stronger sense of community (Gratton and Erickson, 2007) by promoting team-building activities, social events, and initiatives that encourage creative collaboration and learning (e.g., "serious games").

This paper underscores the importance of the social fabric within the organization as the foundation for dynamic capabilities and competitive advantage, a force with the potential to shape collective learning and action. These findings suggest that to effectively develop BDAC, firms should prioritize initiatives aimed at building and nurturing trust among employees and managers, including transparency in communication, accountability at all levels of the organization, and fair treatment of employees. For example, adopting a rational vertical communication style and setting clear employee performance goals can enhance transparency and accountability. At the same time, engaging in CSR activities by implementing fair employment practices and reward systems contributes to higher job satisfaction and OT (Castaldo et al., 2023; Zhao et al., 2022).

As AI is becoming a core component of business activities and the development of BDAC, firms must ensure that their employees trust related technologies (Glikson and Woolley, 2020). Managers should foster trust in AI by ensuring transparency in how AI systems operate within the organization, making such systems explainable and comprehensible outside the "black box," and establishing guidelines and ethical standards for fair AI use. Encouraging AI-human collaboration means designing user-friendly systems that are seamlessly integrated into existing workflows and providing ad hoc training sessions as well. Creating feedback mechanisms, AI communities, and timely sharing procedures can have the dual effect of shoring up trust in AI and reinforcing OT.

Also, firms should proactively adapt their strategies and practices to respond effectively to EH. This may involve conducting regular assessments of the competitive scenario, identifying potential threats and opportunities, and adjusting organizational processes and priorities accordingly.

In addition, by developing contingency plans with specific behavioral guidelines, firms can not only have rapid responses to environmental changes, but they can also help instill a sense of safety in employees and enhance mutual trust.

CONCLUSION, LIMITATIONS, AND FUTURE RESEARCH DIRECTIONS

The aim of our work is twofold: first, we examine whether OT serves as an antecedent to the individual dimensions of BDAC; second, we assess whether EH is a significant moderator in the relationship between OT and the dimensions of BDAC. Our results suggest that OT, under conditions of EH, plays a crucial role in enhancing BDAC, as it significantly influences various dimensions. Our results offer fresh insight into BDAC in SMEs and expand the current body of knowledge.

However, our work has some limitations that introduce new opportunities for research and managerial practice. As a first limitation, this study does not consider other variables that could affect the relationship between OT, BDAC dimensions, and EH. Therefore, future research should identify and analyze antecedents of BDAC and their relationships with OT. At the same time, it is noteworthy that OT could potentially play a dual role in this framework as both an antecedent of BDAC and an outcome. Future studies could enrich this feedback-loop perspective by conducting quantitative and qualitative analyses. In addition, EH is not the only exogenous variable that significantly influence the relationship between OT and BDAC. Environmental dynamism, turbulence, and uncertainty could represent other incidental external variables. Future research may concentrate on these variables to verify the generalizability of the results.

This study may also be affected by bias due to the single respondent. Moving forward, this limitation could be overcome by interviewing several informants for the same statistical unit. In addition, future research could consider samples with a higher concentration of younger managers to underscore

the potential generational implications of the study. For example, the literature highlights the fact that different generations (e.g., X and Y) can have different perceptions of the transition toward digital transformation and data-driven configurations of processes and workplaces, culminating in tensions, bottlenecks, and organizational breakdowns.

Therefore, qualitative research could uncover the trust-based mechanisms that can prevent such potential downsides, while quantitative research could analyze the inter-generational impact of OT on the dimensions involved in data-driven or digital transformations. Lastly, as this work may fail to capture generalizations beyond a single country or industry, future studies should focus on cross-country and cross-industry analyses to expand the boundaries of this research.

MANAGERIAL IMPACT FACTOR

- In hostile environments, OT facilitates the adoption of a data-driven culture, the development of technical and managerial skills, the empowerment of employees, and more effective data management.

- In the absence of a trigger from the external environment, OT is less effective in determining the development of BDAC.

- The interplay between OT and EH leads managers to adopt advanced technologies to implement data-driven decision-making, improving information processing and knowledge sharing.

- Managers should address EH by adjusting strategies to assess the competitive landscape, identify threats, and fine-tune organizational processes.

- Managers can promote surveys, creative activities, and CSR to monitor and foster OT, and encourage responsible AI development to strengthen a sense of community and build trust in technology.

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INSIGHTS FOR THE ITALIAN MARKET
VALUING COMPANIES WITH EQUITY BETA

The purpose of this paper is to compare the effects of using different methodologies to empirically estimated equity betas in business valuation. In particular, the effects of using returns calculated at different frequencies, i.e., daily, weekly and monthly, and more or less econometrically reliable cutoffs are compared. In addition, the temporal stability of the estimates is examined by reporting the results obtained at the sectoral level. The aim is to provide useful guidance for practitioners, avoiding the uncritical application of methodologies developed with reference to financial contexts that are quite different from the Italian scenario.

ACCOUNTING AND CONTROL//BETA EQUITIES//BUSINESS VALUATION//ITALIAN MARKET//FINANCIAL SYSTEM

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INTRODUCTION

Valuing a company requires a thorough understanding of the underlying theories of corporate finance. Such expertise is necessary not only to apply the approaches established in the literature with rigor, but also to guide decisions, particularly when information is insufficient. In the latter respect, in an underdeveloped financial market such as Italy's, one of the most challenging steps in valuation is undoubtedly determining the cost of capital. As already mentioned, the theoretical framework for identifying the cost of capital is well established. However, the comparison with reality weakens the theoretical certainties, which are usually developed based on assumptions and models that are far removed from concrete situations. In particular, we should point out that

empirical studies on the subject have focused almost exclusively on Anglo-Saxon contexts, which are not terribly similar to ours, for example with regard to the development of financial markets. The number of listed companies used to estimate valuation parameters, or the identification of risk factors capable of explaining business risk and, consequently, the cost of capital: these are just a few examples of the diversity of contextual conditions that we can count. With regard to this last point, it is worth noting that in the US market, equity β is now considered one of many risk factors identified in the literature to measure the cost of capital (see, among others, Fama and French, 1992; 1993; 1996). This contrasts with the Italian context, where such an approach does not seem to be so well established. Consequently, the lack of in-depth study has led to apparent confusion and discrepancies with the economic-financial literature, which mainly refers to other scenarios.

Even in the Anglo-Saxon context, however, in practice β is still the only risk factor considered in most cases. In fact, an influential academic study by Graham and Harvey (2001), reporting the results of a questionnaire administered to CFOs of U.S. companies, shows that 73% of respondents "always" or "almost always" use β of the CAPM as the sole factor for estimating the cost of capital. The study also highlights that, paradoxically, it is large companies that have this preference. Evidence of this type is also found in a similar work by Mengoli and Sandri (2012), which instead deals with Italian companies. Once again, the analysis confirms that β is indispensable in estimating the cost of capital. Yet Italian CFOs seem to be divided between those who determine β independently and those who refer to β calculated by analysts rather than practitioners. In any case, both studies show that this method is the most widely used in practice and is preferred to other more or less complex alternatives.

This is perhaps one reason why numerous studies have focused almost exclusively on trying to better understand β and its possible limitations. To name just a few, Carroll and Wei (1988) demonstrate the need for a relationship that is not limited to the linearity of β, while Chen et al. (1986) suggest using it in relation to other macroeconomic variables. Hollstein et al. (2020), to reevaluate β with respect to factors such as those proposed by Fama and French, show that with intraday data, we can better explain the "size" effect without adding other factors. Therefore, they more or less explicitly advocate an Occam's razor logic.

Some studies analyze how to calculate β correctly. Roman and Terrazza (2018), using French stocks in the CAC40 index and choosing an E-Garch model over a simple OLS method, consider daily data and investigate which period is appropriate to use. An interesting result highlighted by the authors concerns the OLS estimates, which tend to demonstrate greater divergence than the more sophisticated model with high β securities. The issue of the interval effect is specifically addressed by several authors, including Scholes and Williams (1977), Dimson (1979), and Corhay (1991). The latter, for example, focuses on stocks listed on the Brussels Stock Exchange, concluding that it is preferable to avoid using time intervals that are too short for measuring returns when calculating β. In addition, the study presents much more evidence, such as the fact that calculations based on weekly data (i.e., returns calculated from Monday to Monday rather than from Friday to Friday) lead to higher β estimates. Martikainen (1991), who analyzes stocks listed on the Helsinki Stock Exchange, also examines the effect of non-synchronous trading bias and how it explains why βs increase with the frequency of returns grows: indeed, Ðs calculated on daily returns are smaller than those calculated on weekly returns and even smaller than those calculated on monthly returns. Agrrawal, Gilbert, and Harkins (2022) go further and test which βs are more predictive of subsequent returns depending on the frequency of the data used in the estimate, and find that Ðs calculated on a weekly basis emerge as the best performers as far as predicting both subsequent weekly and monthly returns.

Perhaps most interesting, especially in the Italian context, is the need to measure the unsystematic risk component, which Lakonishok

and Shapiro (1986) demonstrate is crucial. In this respect, Smith and Smith (2004) go further and estimate the cost of non-diversification in quantitative terms. Using a database of high-tech IPOs to estimate the cost of capital for entrepreneurs and VCs, the authors find that owning an undiversified portfolio is two to four times more costly than estimated using β alone compared to a diversified portfolio. Specifically, in a typical case, the cost of capital would more than triple from 11.4% to 40.0%.

The main objective of this paper is to provide up-to-date evidence the empirical estimation of equity β, with reference to companies operating mainly in the Italian context. The aim is to offer potentially actionable indications for practitioners who need to determine the cost of capital in company valuations. In particular, we highlight the peculiarities and effects of the various methods normally applied to determine equity β to offer guidelines for choices in different situations. In fact, thanks to these insights, the appraiser can avoid making uncritical decisions regarding the methodologies to adopt for the estimation, well aware that extant research may apply to contexts very different from the Italian one.

Specifically, this study focuses on the estimation of equity β, a crucial parameter in the equilibrium model of a financial market. Developed independently by Sharpe (1964), Lintner (1965), and Mossin (1966), equity β is a measure of the systematic risk of a financial asset, i.e., the tendency of the return on an asset to vary as the market changes. Statistically, this parameter is measured by the ratio of the covariance of a stock's return to the market return with the variance of the market return. Thus, equity β is a financial measure that can provide useful insights into business risk; consequently, it forms the basis for determining the cost required by shareholders to finance said risk (see Berk and De Marzo, 2013; Guatri and Bini, 2005). The most direct way to estimate equity β is to regress stock returns against market returns. Once the methodology is defined, however, discrepancies emerge in the choice of the frequency of returns (daily, weekly or monthly) and in the level of estimation quality required for the parameter to be accepted. Therefore, the objective of this paper is to compare the impact of these two dimensions on the valuation of corporate equity.

It is worth noting that one way around this problem might be to use βs provided directly by well-known financial sites such as *Yahoo Finance*, which is perhaps the most famous and widely used. However, while these βs may seem like a convenient alternative, they have several limitations. In particular, to reiterate the risk of using black-box estimates, the βs provided by *Yahoo Finance* are based on monthly estimates over a three-year (36-month) horizon, and factor in closing prices rather than capital-adjusted prices to calculate returns. These considerations already reveal the obvious limitations of this parameter, but going further, consider that these βs are computed using the S&P500 market index as a reference, i.e. a U.S. financial market indicator consisting only of large caps. These arguments seem sufficient to suggest that we should not trust this source, making it all the more necessary to examine calculation methods more closely to avoid relying uncritically on estimates of equity β.

Considering the latest available date, i.e. early March 2024, this paper makes β estimates using the methods illustrated on a sample of listed companies based in Italy. The estimates were then compared to ascertain the economic impact of the different choices on the value of corporate equity using an equity-side approach. The temporal stability of the parameters was also analyzed and, perhaps most importantly, the results were disaggregated to construct subsamples based on the sectoral affiliation of the different firms in the sample.

The paper is structured as follows: The next section describes the dataset and the methods to determine equity β. The third section presents the results, while the fourth section examines the economic implications of the estimation choices on the value of firm equity. Finally, in the fifth and last section, after analyzing the implications of the study, the main conclusions are drawn.

DATA

The sample consists of all stocks listed on the Italian Stock Exchange as of March 2024. The initial dataset, obtained from Eikon Thomson Reuters, counted 460 companies. From these, companies were selected that are domiciled in Italy and have a monthly historical series of stock prices for a period of at least 24 months, reducing the sample to 435 observations. The latter criterion was introduced because it is a parameter recognized in the financial literature for obtaining reliable estimates, especially with respect to stock prices calculated on a monthly basis. To compare the estimates, stock returns were then calculated at daily, weekly, and monthly intervals based on daily prices. These three frequencies are normally applied by appraisers to determine the cost of capital for companies. Specifically, adjusted closing returns calculated from Monday's prices were used for weekly returns, and prices from the last trading day of the month for monthly returns.

To determine equity βs, different estimation periods were considered depending on the frequency of equity returns estimates: a one-year time series for daily returns; a two-year time series for weekly returns; and finally, a five-year time series for monthly returns. Once again, this choice was dictated by what practitioners normally implement when conducting a valuation. The market model used to estimate β is as follows:

$$r_{it} = + \alpha + \beta\, r_{mt} + \varepsilon_{it} \qquad t = 1, \ldots, T$$

where i is the i-th firm, m is the market index, ε is the error symbol and T is the period, which differs for daily, weekly and monthly estimates.
To verify the stability of the estimates, from 2015 the time series was extended by repeating the same methodology and calculating the βs of each company in the sample for each month starting in January 2020. However, it is important to reiterate that much of our work focused on the more recent estimation period. Once again, we compared the parameters we obtained.

To estimate β, we constructed a market index by calculating the simple averages of the returns of all securities over the three time periods. As a result, the index is equity weighted. In an influential study, Treynor (2005) elaborates on the clear superiority of this type of index, particularly for minimizing estimation errors. When using a value-weighted index, in fact, these errors are less likely to offset and may even cancel each other out, leading to inaccurate results. In concrete terms, the perspective is that of an investor who gives equal weight to small and large companies, considering size in terms of market capitalization. Using an equity-weighted index also makes it possible to limit the market capitalization bias by giving equal weight to each company in the index. Given these salient characteristics, including lower stock concentration, the choice of this type of calculation is essentially compulsory to obtain reliable estimates.

Next, by regressing the stock returns on the market returns, β was estimated by intentionally using an extremely simple econometric model, namely Ordinary Least Squares (OLS), since this is the most common approach for valuation estimates of companies operating in Italy. Therefore, no model correction was applied, for example, for the outliers, autocorrelation or volatility clusters. Consequently, the statistical significance of the estimates presented below refers to simple OLS models. Finally, we should add that the models are extremely parsimonious: there are no other explanatory variables or lags of market returns.

Note that the βs of a fixed effects panel model and a random effects panel model were first calculated using daily, weekly, and monthly data. For all models, a beta value of one was obtained, at least to the second decimal place and with high statistical significance. However, the model constants, which were calculated differently in the two analyses, did not significantly deviate from zero. These results seem to be a positive indication of the reliability of our data.

Finally, for each company, and again using Eikon Thomson Reuters, data were collected on the cost of debt and the weight of debt relative to equity based on the most recent balance sheets available. This

information also served to calculate the weighted average cost of capital (WACC), and then determine the equity value of a hypothetical firm with ten million euros per year at infinity as its only cash flow. The purpose of this extreme simplification is to provide an indication of the possible effects on value, if any, of decisions made by focusing solely on how equity β is estimated.

RESULTS

Figure 1 shows both the distribution of β estimates for the companies in the sample and the relationship between these βs and the respective coefficients of determination (R^2) obtained from OLS regressions designed to estimate each parameter. Indeed, R^2 is often used by practitioners to provide valuable indications regarding the quality of estimates. As

a reminder, this statistical coefficient, with values between zero and one, indicates how much of the change in the dependent variable (in this case stock returns) is explained by the change in the independent variable (in this case market index returns).

Specifically, the scatterplots in Figure 1 show the β and R^2 obtained using daily (first plot, red dots), weekly (second plot, purple dots), and monthly (third plot, blue dots) returns. In each graph, the R^2 cutoffs (10% and 20%) are indicated by the dashed lines; these are typically applied to assess the quality of the estimate and determine whether the parameter is adequate. Finally, we attempted to provide some indication of the statistical significance of the estimate associated with each β parameter. Betas with t-test p-values greater than 10% (not statistically significant) are marked with light shaded dots, while the remainder (statistically

FIGURE 1. DISTRIBUTION OF β AND RESPECTIVE R2 CALCULATED AT THE BEGINNING OF MARCH 2024 ON THE THREE DIFFERENT TIME FRAMES
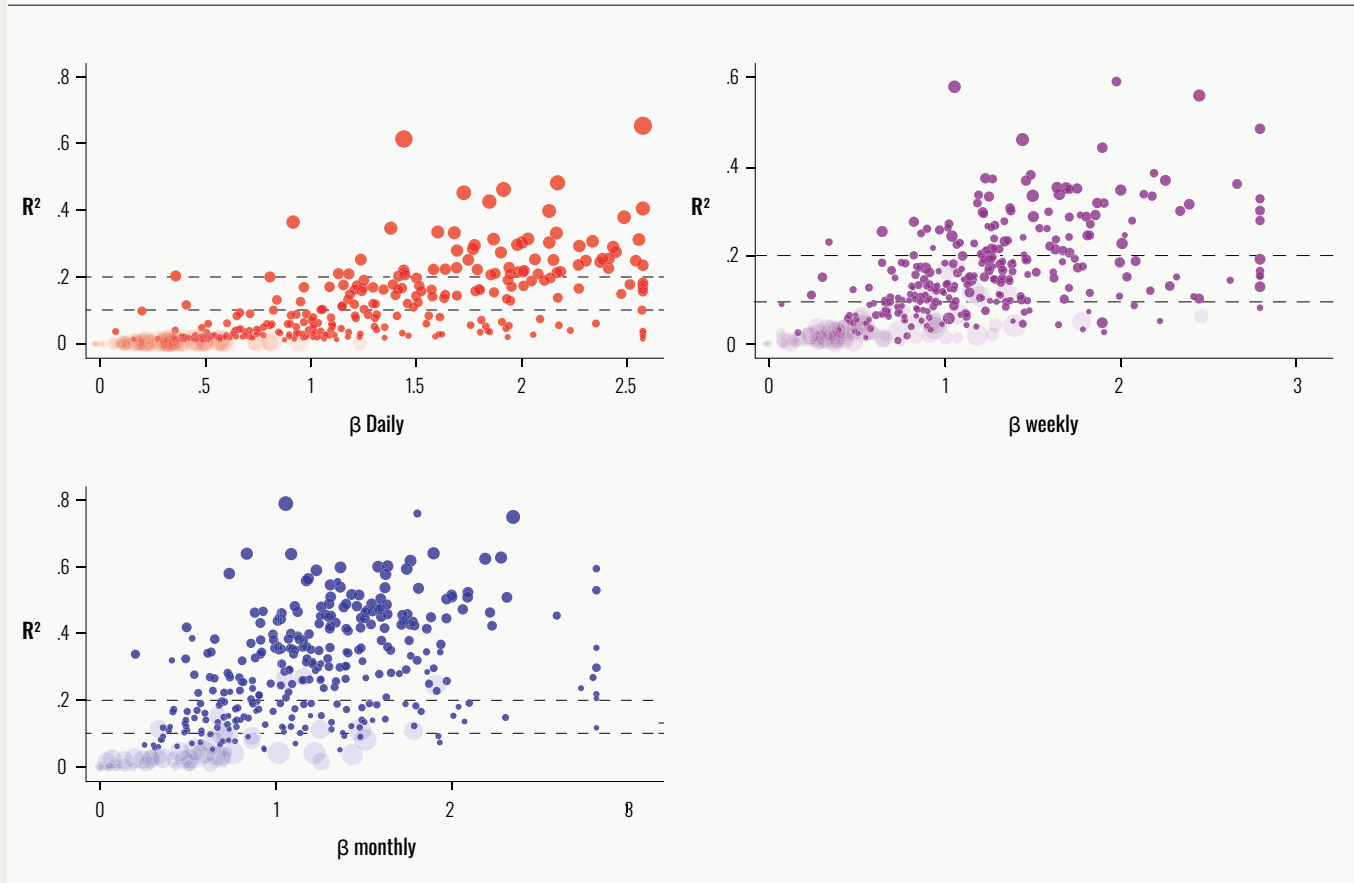
significant) are marked with colored dots; the size is inversely proportional to the p-value of the estimate. In other words, the larger the dot, the more statistically reliable the estimate.

Analyzing the three scatter plots, we note that the βs are always positive and that there are no stocks that systematically move in the opposite direction of the stock market. On closer inspection, we can see that the econometrically insignificant cases (light shaded dots), i.e. those that should not be considered in a rigorous valuation analysis, tend to cluster at extremely low β values and, of course, on equally low R^2 values close to zero. This initial observation suggests that a non-rigorous valuation, which would consider all βs equally regardless of the quality of the estimate, would lead to an underestimation of equity β and, consequently, to a low assessment of the firm's cost of capital, which then translates into an overestimation of the firm's value.

Comparing the three graphs, it is also clear that as the frequency of returns in determining β increases, so do the coefficients of determination (R^2). This suggests that, whenever possible, it is preferable to opt for weekly or, better still, monthly frequencies rather than daily frequencies. In general, Figure 1 shows that a 10% R^2 cutoff is a simple yet effective solution to discriminate the quality of β estimates, allowing us to select only the ones that are truly econometrically informative.

The last panel of Figure 1 also illustrates the three distributions of βs in the different time frames to confirm our initial findings. Indeed, the frequency distribution of βs computed on a daily basis (red dots) is more even than for weekly (purple dots) or monthly (blue dots) calculations. In fact, the latter tend to look more like a normal distribution, in contrast to the daily data. In all the distributions, however, the mode values tend to cluster around values slightly greater than one.

From the graphical analysis, we turn to Table 1 to examine the descriptive statistics of the three samples. For the 435 companies in the full sample whose βs were calculated using daily, weekly, and monthly frequencies, the average value of βs is around one across all frequencies. Specifically, the average β is 0.98 using daily data, 0.97 using weekly data, and 0.99 using monthly data (column 3).

The average β values are quite similar across the three samples. However, the second column of Table 1, which reports the percentage of statistically significant coefficients with respect to the 10% p-value cutoff associated with the parameter t-test, highlights a greater adequacy of the βs calculated on a monthly basis, with 75% of the estimates being statistically significant. On the other hand, the daily βs are the least adequate in this dimension, as only 70% are significant and therefore statistically

TABLE 1. DESCRIPTIVE STATISTICS OF β BY FREQUENCY OF CALCULATION OF YIELD

|	n	pvalue(t-test)>10%	μ	σ	med
Entire sample:					
daily	435	70.34%	0.98	0.79	0.87
weekly	435	71.26%	0.97	0.74	0.96
monthly	435	75.40%	0.99	0.68	1.01
R2>10%:					
daily	128	100.00%	1.75	0.59	1.81
weekly	220	96.82%	1.31	0.69	1.25
monthly	315	94.92%	1.22	0.59	1.19
R2>20%:					
daily	64	100.00%	1.86	0.63	1.98
weekly	94	100.00%	1.45	0.75	1.47
monthly	220	96.82%	1.32	0.59	1.28

acceptable. The information on the mean square deviation (σ) measured for the βs in the three samples suggests that the estimates are more homogeneous for the data with monthly frequency (σ=0.68), registering less dispersion than for the weekly (σ=0.74) and daily (σ=0.79) data, similar to what already emerged in the frequency distributions in Figure 1.

The remainder of Table 1 reports the same statistics with respect to the subsamples obtained using R² cutoffs at 10% and 20%. As we can see, the sample size is significantly smaller, particularly with respect to the βs obtained using daily returns: with a 10% cutoff, the sample is reduced from the previous 435 observations to 128, while with a 20% cutoff it decreases further to 64 observations. This represents a roughly sevenfold reduction from the original sample. At the monthly frequency, the decrease is somewhat smaller: from 435 to 220 observations using the 20% cutoff, so the sample is nearly halved.

In other words, β estimates made with monthly data have a higher econometric quality.

Worth noting is the obvious consequence of using these cutoffs: the consistent increase of the average βs, in line with what we previously observed in a simple graphical analysis. In fact, non-significant βs tend to be concentrated at much lower values, around zero, which is why when they are factored in, the result is an underestimation of the cost of corporate capital. Again, the monthly frequency least is discriminated by the choice of R² cutoff. This initial evidence shows that, also from a methodological point of view, it is indispensable to apply some statistical indicator, such as the coefficient of determination, R², to ascertain the quality of the estimates and pinpoint which ones should be considered. The critical consequence of neglecting this aspect is an underestimation of the cost of capital, which in turn results in an overestimation of the value of the company. At the

FIGURE 2. STABILITY OF STOCK β CALCULATED FROM JANUARY 2020 TO MARCH 2024 IN THE THREE DIFFERENT TIME FRAMES
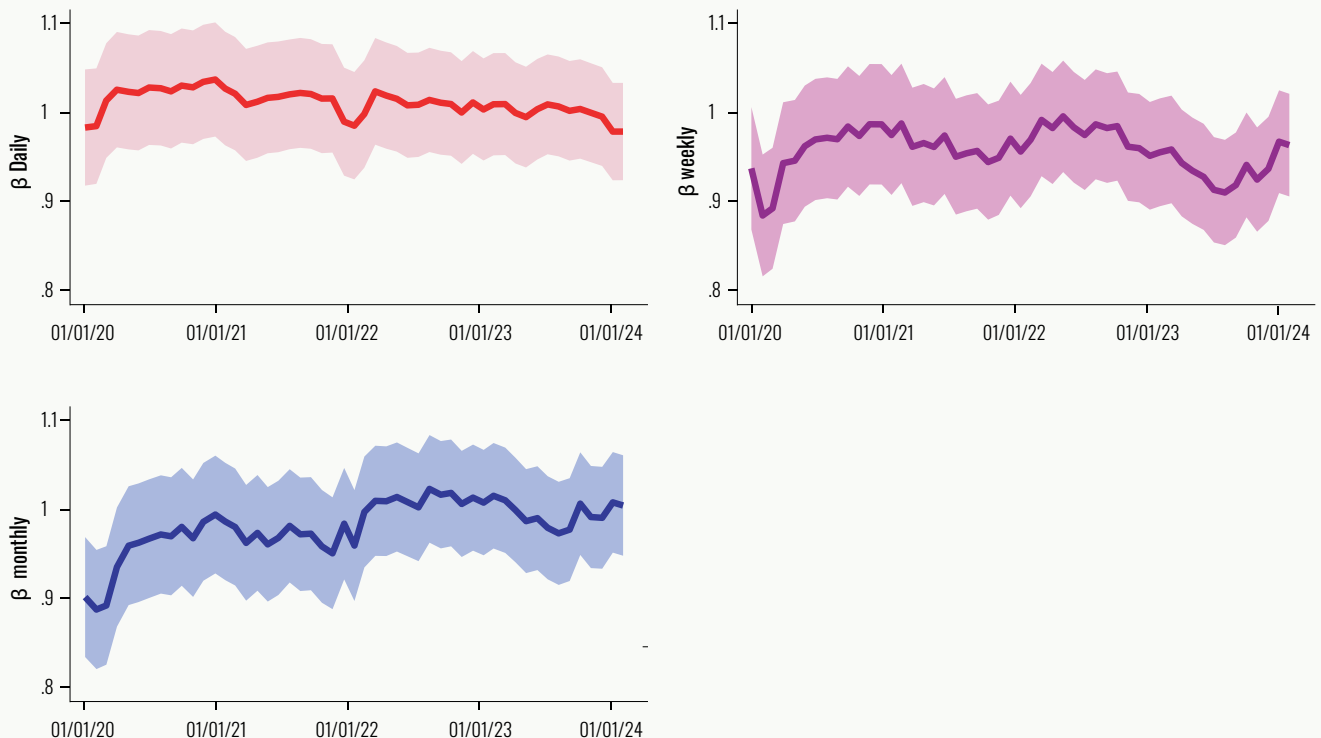
same time, the drastic reduction in the number of companies that can serve as benchmarks for estimates, particularly using daily data, becomes equally evident. In other words, we see the classic dilemma practitioners face every day when valuing an Italian company: they have no choice but to rely on parameters of poor econometric quality as the basis for their estimates.

Since the statistics discussed so far refer only to the sample of parameter estimates from the most recent period (March 2024), Figure 2 provides the results obtained to check the stability of these estimates over time if they were calculated in a different reference period. To do this, βs were recalculated using the same methodology, but placed at the beginning of each month starting in January 2020. In other words, for each month in the window

from January 2020 to March 2024, we attempted step into the shoes of a hypothetical appraiser by repeating the exercise we already proposed.

Figure 2 gives the time series of mean (*cross-sectional*) βs for each month of the estimate over the period in question. In particular, the area shown in the graph highlights the 90% confidence interval of each monthly estimate, that is, the range in which 90% of the β values fall, providing a measure of the reliability of the estimates throughout the period. As we can see, the βs remain quite steady over time, even considering the highly uncertain and unstable context of the pandemic and post-pandemic period, which began impacting the financial markets in March 2020.

It is common practice, especially when valuing unlisted companies, to refer not a single comparable

FIGURE 3. SECTOR-AVERAGE β OF RETURN CALCULATIONS ON THE THREE DIFFERENT TIMEFRAMES FOR THE ENTIRE SAMPLE (WHITE), THE SAMPLE WITH R2 > 10% (LIGHT COLOR) AND FINALLY THE SAMPLE WITH R2 > 20% (DARK COLOR)
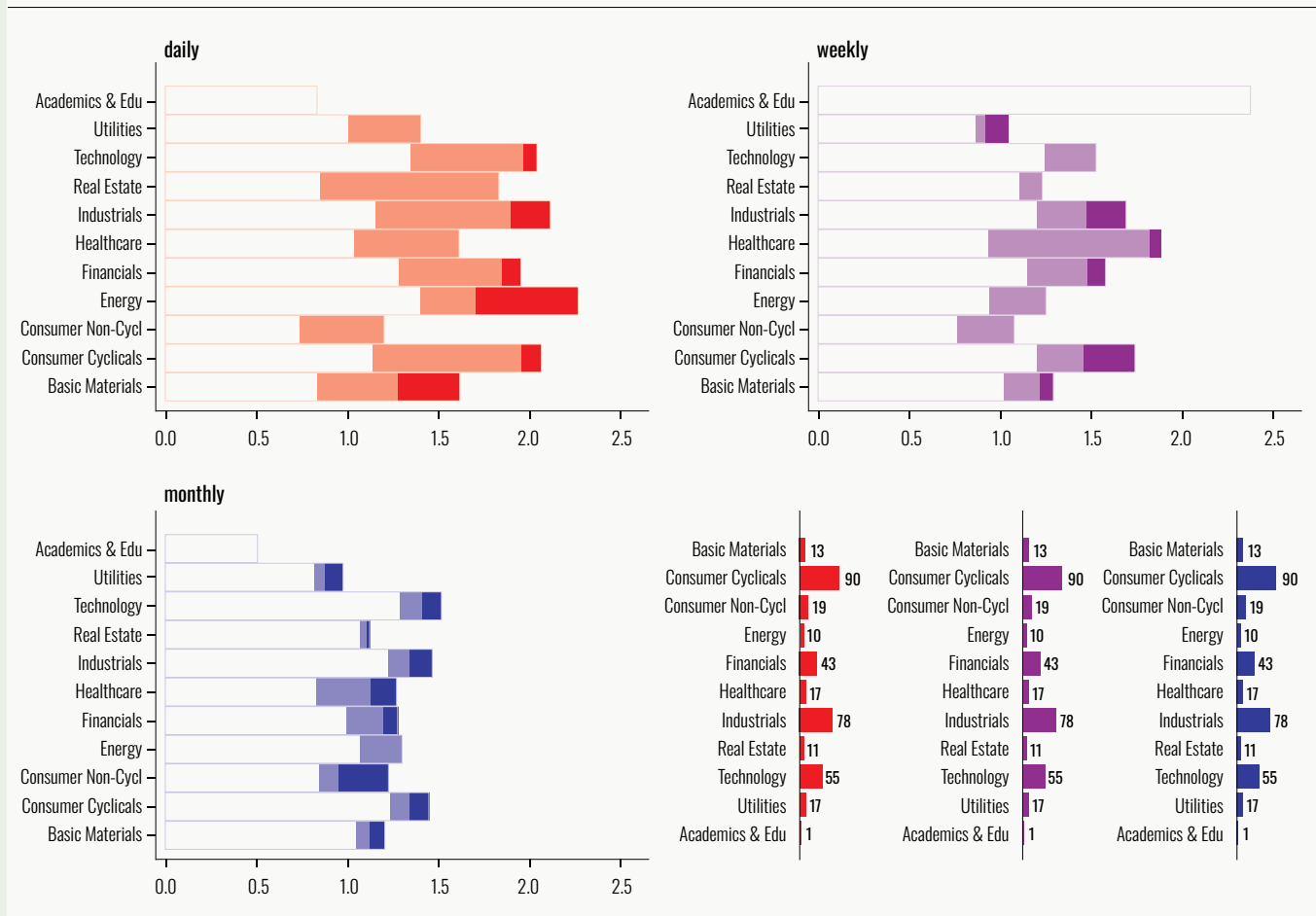
company but a sample of benchmark companies with similar characteristics (e.g., doing business in the same sector) to calculate the company's riskiness, and the cost of capital. Therefore, an appraiser would typically consider the industry to identify systematic risk. For this reason, as shown in Figure 3 and Table 2 (which contain the same information), the sample companies were classified by industry according to the Refinitiv Business Classification (TRBC). This serves as a standard industry classification

to categorize companies at different levels based on similar industries. At the first level, companies are assigned to eleven business sectors: *Basic Materials, Consumer Cyclicals, Consumer Non-Cyclicals, Energy, Financials, Healthcare, Industrials, Real Estate, Technology Utilities, and Academic & Education.* In our study, we limited ourselves to this first level because, even with this breakdown, the *Academic & Education* sector would be excluded once a minimum cutoff is introduced to discriminate the quality of

TABLE 2 DESCRIPTIVE STATISTICS OF β BROKEN DOWN BY SECTOR OF ACTIVITY

|	daily		weekly		monthly	
	N	μ	N	μ	N	μ
entire sample						
Basic Materials	13	0.84	13	1.01	13	1.05
Consumer Cyclicals	90	1.14	90	1.18	90	1.24
Consumer Non-Cyclicals	19	0.74	19	0.75	19	0.86
Energy	10	1.39	10	0.97	10	1.08
Financials	43	1.28	43	1.13	43	1.00
Healthcare	17	1.04	17	0.92	17	0.84
Industrials	78	1.16	78	1.18	78	1.23
Real Estates	11	0.86	11	1.09	11	1.07
Technology	55	1.34	55	1.23	55	1.29
Utilities	17	1.00	17	0.86	17	0.82
Academic	1	0.84	1	2.35	1	0.51
R2 > 10%						
Basic	4	1.27	9	1.21	12	1.12
Consumer Cyclicals	26	1.95	51	1.44	74	1.34
Consumer Non-Cyclicals	2	1.21	8	1.07	15	0.96
Energy	4	1.70	4	1.24	7	1.30
Financials	25	1.85	29	1.47	35	1.20
Healthcare	6	1.62	6	1.82	10	1.13
Industrials	25	1.89	45	1.42	66	1.34
Real Estates	1	1.83	3	1.22	9	1.12
Technology	17	1.96	28	1.51	45	1.41
Utilities	9	1.40	11	0.91	12	0.88
Academic			1	2.35		
R2 > 20%						
Basic	1	1.61	6	1.28	9	1.21
Consumer Cyclicals	15	2.07	19	1.72	56	1.44
Consumer Non-Cyclicals			1	0.93	8	1.23
Energy	2	2.26			4	1.14
Financials	17	1.94	24	1.57	29	1.28
Healthcare	1	1.48	3	1.87	4	1.27
Industrials	12	2.11	17	1.67	48	1.47
Real Estates					5	1.13
Technology	7	2.04	6	1.49	26	1.51
Utilities	2	1.37	3	1.03	9	0.97
Academic						

the estimates. In fact, this would make it somewhat laborious to then determine the cost of capital for companies in this sector, and in turn make a valuation.

Again, the three graphs in Figure 3 illustrate the average βs calculated from daily (in red), weekly (in purple), and monthly (in blue) returns. The colors of the bars reflect the cutoff used to select the estimates: white bars identify the average βs obtained using all firms, light-colored bars correspond to a 10% cutoff, and dark-colored bars a 20% percent cutoff. The fourth graph shows the frequency distribution of the betas for each industry. Looking at Figure 3, the first clues that emerge are the divergencies between the average estimates calculated with the different cutoffs, which are more apparent when we apply a daily rather than a monthly frequency of returns. For example, recalling the data in Table 2 for the *Industrials* sector, which represents the second largest subsample (78 observations), the average βs

from daily returns are, depending on the cutoff, 1.16 (full sample), 1.89 (10% cutoff) and 2.11 (20% cutoff), respectively; the differences are 0.73 (1.89-1.16) and 0.95 (2.11-1.16). On the other hand, using monthly returns for the same sector, the average βs are 1.23, 1.34 (10% cutoff), and 1.47 (20% cutoff), respectively, so the differences are somewhat less pronounced: 0.11 (1.34-1.23) and 0.24 (1.47-1.23). In general, with monthly data, the divergence using different cutoffs does not seem significant. For the *Real Estate* sector, it is almost zero (1.12 versus 1.13), while for the *Consumer Non-Cyclicals* sector, which appears to demonstrate the most marked variation, it still does not prove to be very significant (0.96 versus 1.23).

In general, if we analyze the averages in Table 2 with respect to, for example, returns calculated on a monthly basis, the most aggressive sectors for each cutoff level are (as we would logically expect) *Technology*, *Consumer Cyclicals*, and *Industrials*, with average βs of at least 1.2. The most defensive sectors

FIGURE 4. COMPARISON OF SECTOR AVERAGE βS, USING THE THREE DIFFERENT TIMEFRAMES AND DIFFERENT CUTOFFS
THE SIZE OF THE CIRCLES REPRESENTS THE AVERAGE SECTOR βS CALCULATED ON A DAILY BASIS
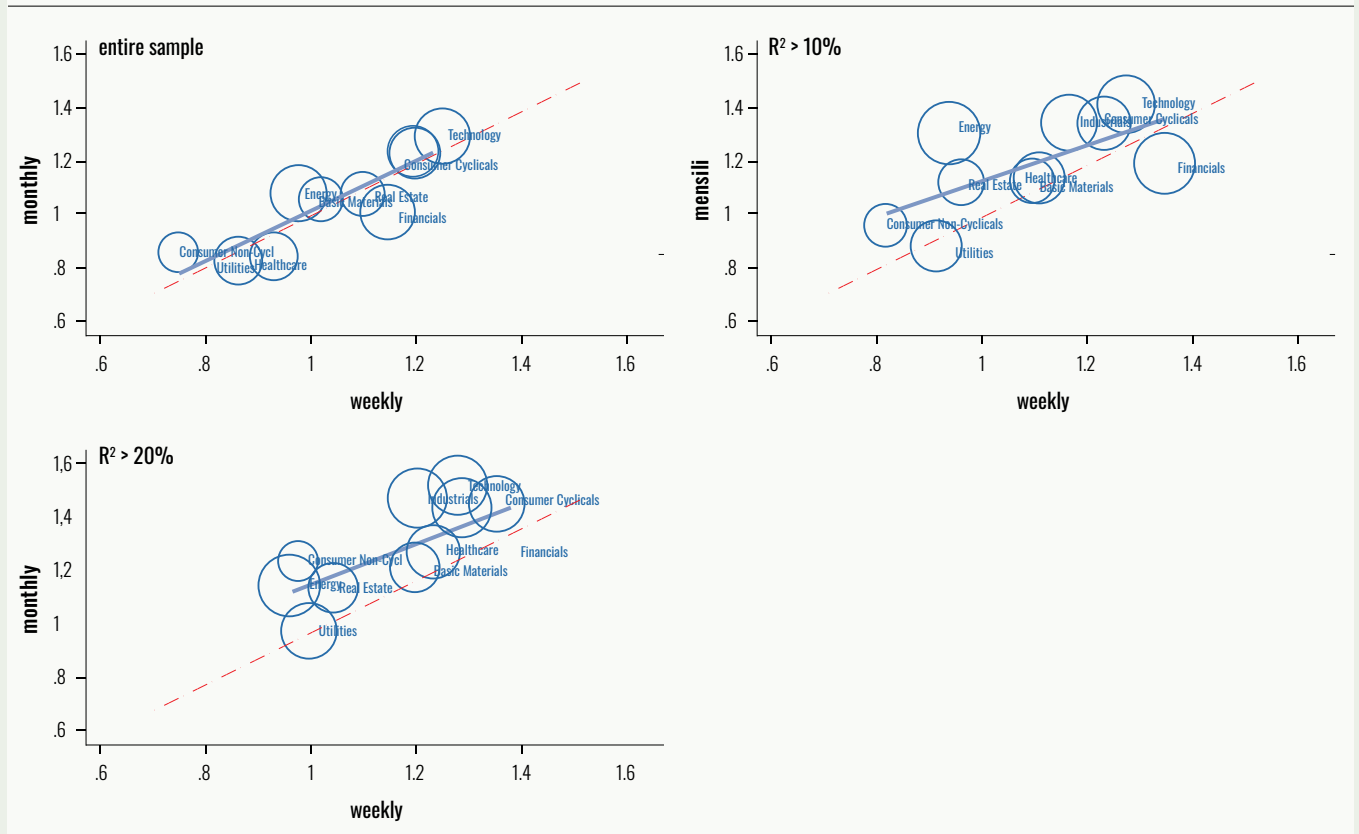
are, again predictably, *Utilities* and *Consumer Non-Cyclicals*. Overall, for the purposes of this study, clearly at the sector level, if the discriminant is whether the statistical quality of the estimates is used, this tends to have significantly more weight with higher frequency (daily) returns lower frequency (monthly) returns.

Figure 4 summarizes this underlying evidence and compares the sector average βs calculated on the three different timeframes (daily, weekly, and monthly) and for the different cutoff levels. According to industry, the x-axis shows the average β values calculated on a weekly basis, while the y-axis shows monthly calculations. The size of the circles represents the sector average βs calculated daily. The points should ideally lie along the bisector of the first quadrant, indicated by the dashed red line, if weekly data and monthly give similar results. With respect to daily data, this ideal situation should lead to circles with diameters growing gradually larger as we move to the right of the graph (i.e. as weekly average βs increase) and upward (i.e. as monthly average βs increase). Instead, the parameters generally lie above the bisector, indicating that monthly βs tend to overestimate weekly βs and in turn the cost of capital. In fact, the thicker blue line, representing the interpolation line of the points, always runs above the bisector. This phenomenon seems to intensify as the statistical quality of the estimate increases, i.e. from the first to the third graph in Figure 4. In fact, the bisector and the estimated line interpolating the points tend to diverge more and more as the quality of the estimate improves in the three graphs. In general, however, there seems to be more agreement between weekly estimates than monthly estimates, but much less agreement when looking at the daily data, where estimates seem to diverge quite significantly.

AN ATTEMPT TO ESTIMATE THE IMPACT ON THE VALUE OF COMPANY EQUITY

Based on the β estimates, next we attempted to track the effects of the different methodologies on the value of the company's equity. For this reason, and for simplicity's sake, we made several assumptions in an attempt to adopt solutions that were as illustrative as possible and focused only on aspects related to the methodology for determining βs. First, we determined the cost of equity capital from the various equity βs, applying the cost the Capital Asset Pricing Model (Sharpe, 1964; Lintner, 1965; Mossin, 1966), which relates the systematic risk measured by β to the return expected by shareholders investing the company's equity. The formulation and parameters in the analysis are as follows:

$$r_E = r_f + \beta_E \cdot premium = 3.73 + \beta_E \cdot 5.6$$

where r_f is the risk-free rate and *premium* is the market premium, that is, the premium that investors have historically demanded to invest in equities rather than risk-free securities. The 10-year BTP rate at the beginning of April 2023 of 3.73% and the historical market premium of 5.6% served as parameters for the two variables. The latter is the value obtained by Panetta and Violi (1999) in a well-known paper by the two former Bank of Italy researchers. βE is the previously calculated equity beta for each firm. To provide additional evidence, the return to shareholders was also computed using a prospective rather than a historical β following the approach of Blume (1975), which consists in adjusting the β coefficient by making it revert to the mean, which is generally considered to be equal to one. This adjustment is necessary because, as the author demonstrated, there is a systematic tendency for the extreme βs relative to a given period not to register outliers even in the subsequent period. The formal formulation of the adjustment is as follows:

$$\beta_{adjusted} = \beta_{historical} \cdot \frac{2}{3} + \beta_{prospective} \cdot \frac{1}{3}$$

where βprospective is assumed to be one. This method is also sometimes used in practice by appraisers. Finally, the weighted average cost of capital was determined for the different companies in the sample, using the data in the Eikon Thomson Reuters database when available as parameters. These are

represented by the cost of financial debt, r_D, and the weights assigned to debt, w_D and equity, w_E, the latter being simply a complementary value to one of w_D. The formulation is as follows:

$$WACC = r_D \cdot (1 - \tau_c) \cdot w_D + r_E \cdot (1 - w_D)$$

where τ_c is the marginal corporate tax rate. The corporate income tax rate (IRES) served as this parameter because it is the only tax that allows full deductibility of borrowing costs, providing the tax shield on debt that reduces the cost of corporate debt. Finally, a company was assumed to produce a cash flow for shareholders of β10 million per year, a cash flow that is constant indefinitely, representing to some extent a business operating in a mature industry with extremely stable cash flows. It should be noted that this is quite a strong assumption, especially given the varying impact this choice could have on different sectors. At the same time,

the idea is to capture the underlying aspects of how β is measured, rather than to draw a comparison across industries. In any case, with the Gordon and Shapiro (1956) model, the equity value of each firm in the sample was assessed as a function of the cost of equity capital previously estimated with the two different methods.

The results for equity returns and relative value are provided in Figure 5. The three graphs above illustrate daily, weekly, and monthly equity returns. The y-axis shows equity returns calculated using prospective β (Blume, 1975); the x-axis, historical β. The size of the dots, on the other hand, is a function of the WACC, which grows linearly as β increases. For example, as βs escalate and prospective rather than historical βs are used, the estimates of the cost of capital tend to rise. We can see this when comparing the cluster of points around the bisector of the first quadrant, which assumes that the two estimates (prospective and historical) lead to the

FIGURE 5. RETURNS (THREE UPPER GRAPHS) AND EQUITY VALUE (THREE LOWER GRAPHS)

The y-axis plots predicted βs (Blume, 1975); the x-axis, historical βs. In the first three graphs, the size of the points depends on the value of WACC. The red dashed line represents the bisector and accordingly indicates the values that result when the estimates obtained with predicted (Blume, 1975) and historical βs coincide.
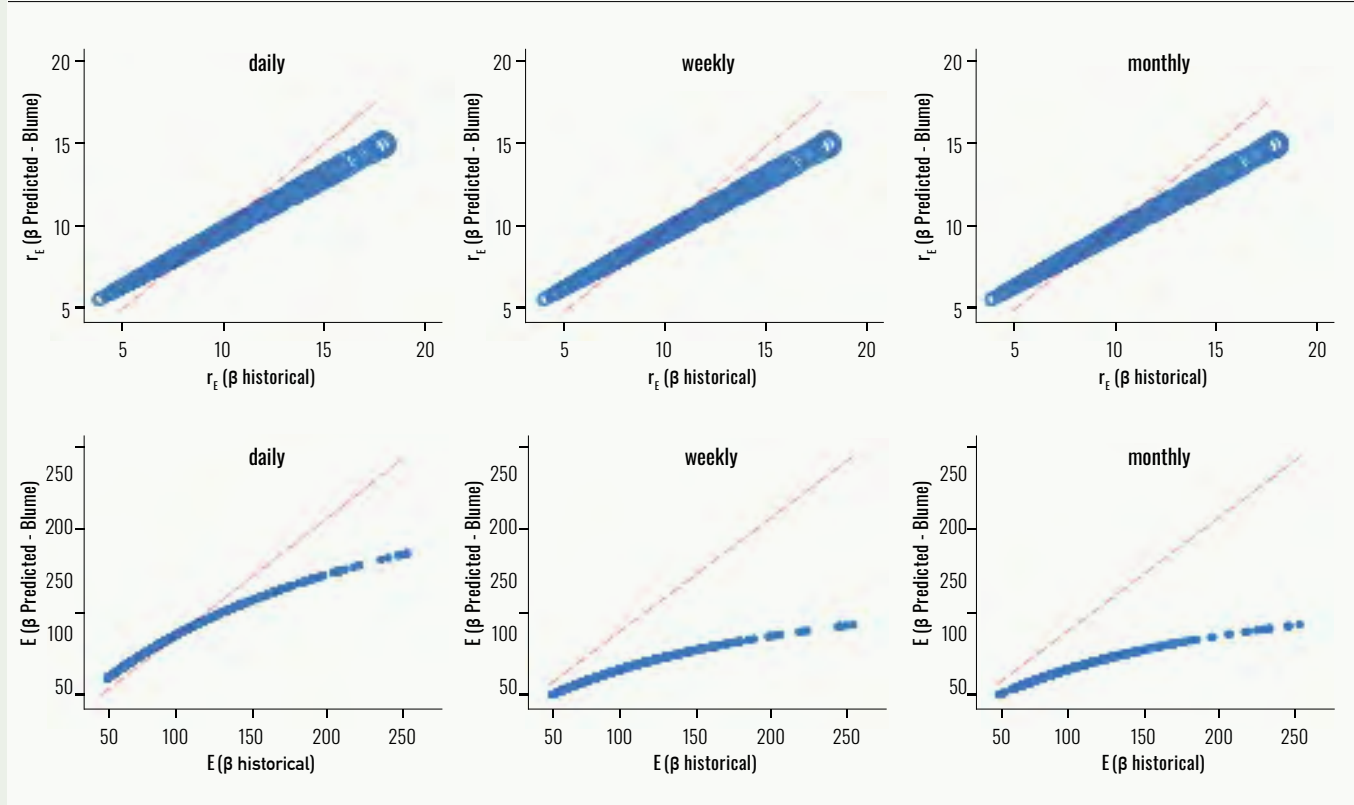
same result. In general, except for rather small β values, the two approaches generate lower estimates of the cost of equity, with an inverse effect on the value of the company's equity.

In the bottom three graphs in Figure 5, we focus on this specific aspect and instead represent the equity estimated using prospective β (y-axis) versus historical βs. Again, as the value of β rises, and with it business risk, the preference for one calculation method over another becomes relevant. As we would logically expect, with prospective βs, the riskier the firm's equity, the more conservative the estimates tend to become.

The aggregate distributions of returns obtained with the historical β estimates and the corresponding equity values are given in Figure 6, where the left graphs depict the distributions of the cost of equity capital using data from the three frequencies, i.e., daily, weekly, and monthly. The

synthetic distribution values, represented in the graph by the vertical solid lines, are 10.14%, 10.00% and 10.10% respectively, so the values are quite similar. The graphs also show the μ ± σ interval (blue dashed lines) to give an indication of the dispersion of the estimates. In this respect, as the frequency of the returns used to calculate β increases and the cost of equity capital rises, the latter tends to show more dispersed distributions, as a result of what we discussed above. The mean square deviations of the three distributions are 4%, 3.34% and 3.13%, respectively.

On the right side, again in Figure 6, the distributions of the equity value are shown instead. The mean values are €116 million, €111 million, and €110 million respectively, depending on whether daily, weekly, or monthly data are considered, and there is no reference cutoff for R^2. In other words, the values do not appear to be all that

**FIGURE 6. DISTRIBUTION OF THE COST OF CAPITAL OF EQUITY (LEFT) AND EQUITY ITSELF (RIGHT)
ALSO SHOWN ARE μ (SOLID LINE) AND RANGE μ ± σ (DASHED LINES)**
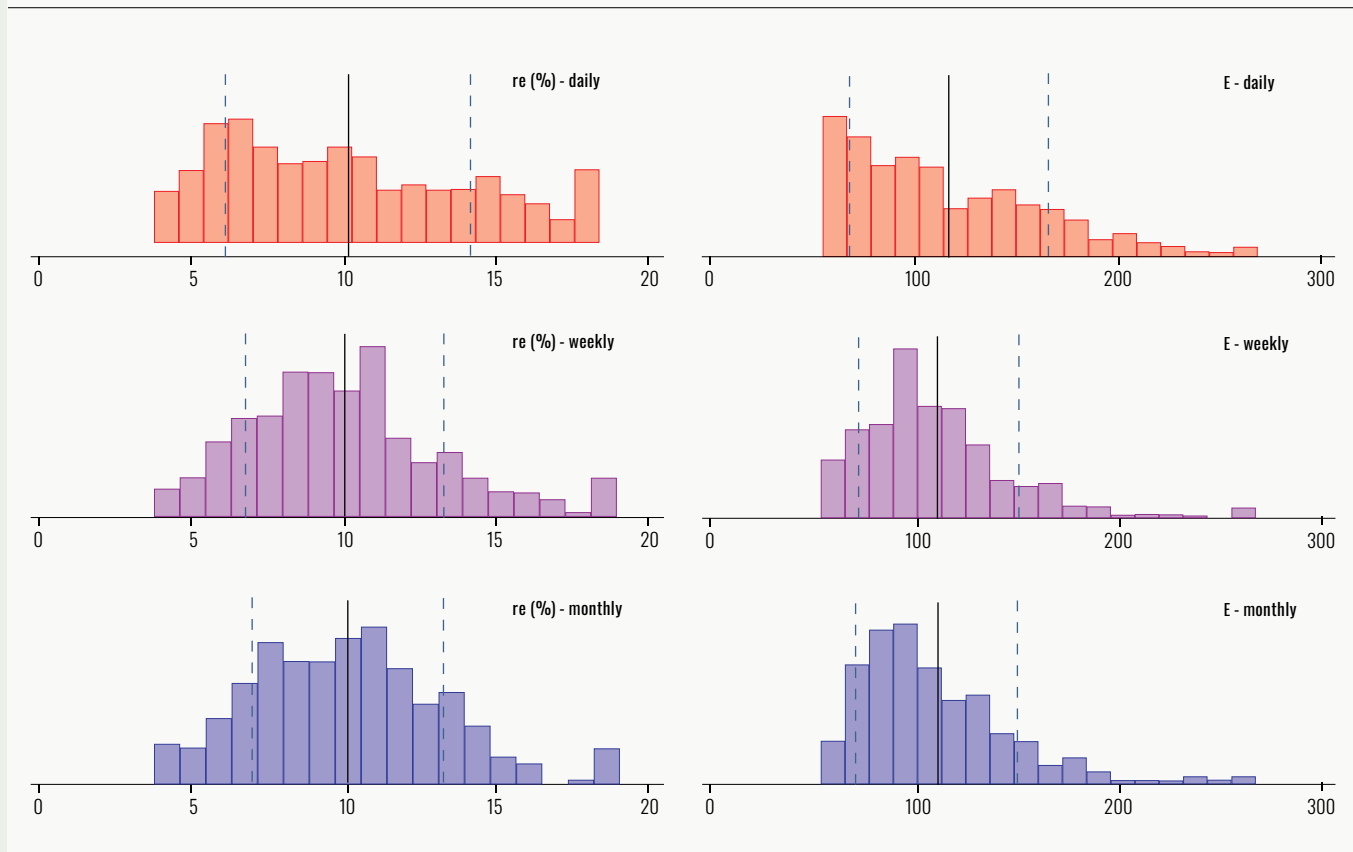
different, at least based on a synthetic indicator of distribution such as the mean. In fact, the values are quite similar despite the fact that daily data provide less conservative estimates of stock values than weekly or monthly data. Again, as we would logically expect, using a daily frequency as opposed to a weekly or monthly frequency reduces the variability of the estimates. In fact, the standard deviation in the three cases goes from €49 million for daily to €39 million for weekly and monthly.

Finally, Table 3 shows equity values broken down by business sector. The top panel gives values based on daily estimates; the middle panel, weekly estimates; the bottom panel, monthly estimates. To make the table easier to read, histograms based on the values in the table are on the right. In particular, the column "Comparison based on R^2" measures up the estimates based on the previous three columns, i.e. the entire sample, the sample with βs that meet the requirement of R^2 greater than 10%, and finally those with R^2 greater than 20%. Clearly, the most conservative estimates are

TABLE 3. ESTIMATED AVERAGE EQUITY BY INDUSTRY
The top column is based on daily returns, the middle column is based on weekly returns, and the bottom column is based on monthly returns.
The last three columns show the daily-weekly-monthly (d-w-m) comparison.

	full value	R^2>10%	R^2>20%	comparison based on R^2	full d-w-m	R^2>10% d-w-m	R^2>20% d-w-m
Basic Materials	128.53	93.01	78.29				
Consumer Cyclicals	118.59	69.84	66.02				
Consumer Non-Cyclicals	141.88	98.52					
Energy	98.48	80.68	61.97				
Financials	115.00	73.57	69.95				
Healthcare	115.27	79.60	83.38				
Industrials	115.62	72.30	65.20				
Real Estates	138.76	71.52					
Technology	101.80	71.35	67.81				
Utilities	117.19	87.23	87.75				
Academic	118.87						
Basic Materials	113.58	95.74	92.19				
Consumer Cyclicals	106.21	88.38	78.05				
Consumer Non-Cyclicals	134.53	106.15	112.01				
Energy	122.61	98.86					
Financials	116.38	87.94	82.83				
Healthcare	136.00	76.55	74.10				
Industrials	106.33	89.96	78.44				
Real Estates	107.61	97.58					
Technology	103.46	87.07	83.65				
Utilities	121.18	115.11	105.12				
Academic	59.17	59.17					
Basic Materials	110.65	102.96	96.91				
Consumer Cyclicals	101.86	94.75	88.70				
Consumer Non-Cyclicals	133.43	120.69	106.07				
Energy	112.41	95.27	103.49				
Financials	122.08	99.58	94.48				
Healthcare	136.18	111.44	98.38				
Industrials	103.86	94.74	87.64				
Real Estates	109.07	107.42	104.20				
Technology	100.15	90.75	85.42				
Utilities	126.58	120.05	112.64				
Academic	151.28						

obtained using progressively more stringent cutoffs in all sectors. In the last three columns, however, the comparison concerns equity estimates using betas calculated at daily, weekly, and monthly (d-w-m) frequencies, depending on the cutoff. In general, it appears from this comparison that equity estimates tend to be more conservative with daily data as compared to weekly or monthly. For example, considering for the *Basic Materials* sector and a cutoff of 20% (last column), the equity value increases from €78 million for daily estimates to €92 million for weekly estimates and again to €97 million for monthly estimates. This clearly shows how the discriminant of the frequency of estimation decisively affects the final value of the company's equity. Specifically,, there is a reduction in equity value of about 20% when moving from monthly to daily estimates. Similar behavior is found for the *Consumer Cyclicals* sector. An overall reading of the values confirms the idea that the more we move toward more reliable estimates by responding to stricter cutoffs, the more we tend to underestimate firm equity. Instead with higher (daily) return frequencies for calculating β, we get progressively higher and less conservative equity estimates than what we would find with weekly or monthly frequencies.

CONCLUSIONS

The main objective of this paper is to provide updated evidence on the topic of empirical estimation of equity βs of firms operating in Italy, highlighting the differences in the values obtained depending on the methodological choices that the appraiser adopts. While the valuation of a company is, in general, an inherently complex task, in Italy this exercise appears even more problematic due to the often inadequate information practitioners are forced utilize. Moreover, the few empirical studies in the literature that have sporadically appeared mostly focus on contexts far removed from the Italian one, making the job even more difficult. Therefore, the present study examines the

consequences on the value of the company's equity of two main methodological options for estimating equity from the practitioner's point of view. On the one hand, we can employ estimates of β with varying levels of econometrically reliable; on the other hand, we can apply various time frequencies (daily, weekly, monthly) for the calculation of equity returns to compute the parameter. In practice, there is no consensus on either choice. Our work has also shown the impact on value of using estimates based on prospective β (Blume, 1975) in contrast with purely historical β.

Therefore, this study has sought to highlight the implications of using one methodology over another. First and foremost, the analyses provide evidence on the estimates of β across sectors, stressing how these can vary considerably depending on methodological choices. At the same time, it is apparent that a more rigorous methodological strategy, while seemingly preferable, may unfortunately be hampered by the lack of available data. This means that such a methodology may not be fully applicable in some sectors. This being the case, our study also strived to underscore the impact on company value of adopting methodologies that, while potentially suboptimal, are used for lack of better alternatives.

In general, the significant differences between the results are influenced by the effects of different methodological choices. This fact accentuates how crucial it is to establish the valuation methodology to be adopted by the counterparties involved in a corporate transaction from the outset. This could be done, for example, at the time of acquisition, and should even encompass aspects that may seem unimportant. Through a detailed analysis of the issue at hand, this research provides an in-depth overview of the calculation of equity βs in business valuation and suggests interesting lines of research to pursue in the near future. Using estimates provided by well-known financial sites, such as *Yahoo Finance*, means running the risk of relying on black-box estimates. Although these are based on monthly observations over a three-year (36-month) horizon, they have the obvious limitation of using

prices that are not adjusted for capital transactions to calculate returns. As if this were not enough, we must remember that the S&P500 market index, which consists almost exclusively of US large cap stocks, is used to estimate β.

Finally, it is important to point out that if we really want to study the peculiarities of the Italian context in terms of the cost of capital, an unquestionably fruitful line of research to explore in the near future is the cost of capital for non-diversified investors, who usually own and control the companies that typify the national context. Well-known authors (Kerins, Smith and Smith, 2004) assert that the cost of capital for such individuals could be anywhere from two to four times higher. Therefore, the hope is that future studies will delve into this aspect to enrich and broaden our understanding of the phenomenon. This would contribute developing effective research streams that would serve to assist entrepreneurs and practitioners in the vital and arduous task of estimating company value.

MANAGERIAL IMPACT FACTOR

- **Theoretical knowledge**: Managers need a solid understanding of corporate finance theories to effectively apply valuation methods and make informed decisions.

- **Contextual adjustment**: Risk factors such as equity beta (β) must be tailored to local market conditions, as reliance on foreign studies may misrepresent regional dynamics.

- **Data quality**: The accuracy of valuations depends on quality data. Managers must critically assess external sources to avoid misleading benchmarks.

- **Methodological balance**: Managers face a trade-off between rigor and practicality, often having to choose less-than-ideal methodologies due to data limitations while still producing reasonable estimates.

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DI DIO ROCCAZZELLA
SAVIOLO

Signature Experience: An Augmented Customer Journey
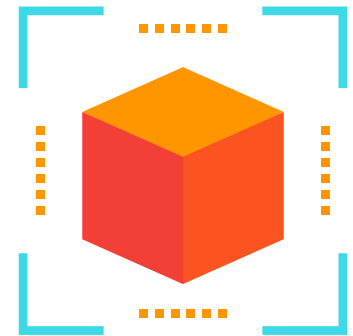
Customer experience has become a battleground for brands across all industries. Engagement, inspiration, personalization, and co-creation are the buzzwords in discussions on the concept of experience in companies today. In this article, we present an innovative framework: the Signature Experience. This brings together the customer experience and the levers that enable it at the organizational level. On the one hand, the customer experience must become signature, that is, "signed" by the brand in a way that reflects its identity codes and its purpose. On the other hand, in an "augmented" scenario, read unpredictable and ambiguous, the customer experience must be shaped by data, insights, and technologies that help the organization achieve greater efficiency and effectiveness.

CUSTOMER EXPERIENCE//BRAND MANAGEMENT//ACCOUNTING AND CONTROL//ARTIFICIAL INTELLIGENCE//DATA DRIVEN INSIGHTS

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Since 2018, in collaboration with JAKALA and other partners, SDA Bocconi has been researching the topic of customer experience, analyzing over the years the context in which it takes shape.[1] The "signature experience," a definition first introduced by our research, is the unique and personalized approach that every company should take to design all customer touch points (human, physical and digital). Inspired by Maslow's well-known Hierarchy of Needs, the Signature Experience model we created proposes three macro steps to take along the entire customer journey (Figure 1) to engage and satisfy customers through unique, signature experiences, i.e. in line with the brand identity:

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[1] The results of our research have been published in Saviolo, S. (ED.) (2018). *Signature Experience: art and science of customer engagement for fashion and luxury companies*, EGEA, Milan; Pedersoli, P., Saviolo, S. (2019); *Signature Experience: people at the center*, Economics & Management, no. 3, pp.86-91; Saviolo, S. (ed.) (2021); and *Contactless Signature Experience. The future of the relationship with the customer between physical and virtual*, Egea, Milan. This article summarizes the contents of our last book: Saviolo, S., Di Dio Roccazzella, M. (2023). *Augmented Signature Experience*, Egea, Milan.

- **Simplify** (one to all): lThe first phase aims to make interactions easier for consumers by simplifying activities such as visiting a store or browsing an e-commerce site. This is done by sharing salient information about products and services, speeding up registration processes for engagement programs, simplifying payment methods, and optimizing omnichannel management (e.g., through services such as click and collect, returns management, online booking for in-store visits, etc.). As in Maslow's model, the customer's basic needs for speed, simplicity, information, and access must be met before any other engagement initiative.

- **Delight** (one to many): In this second phase, the opportunity to make the experience distinctive begins. The goal is to delight different groups or homogeneous segments of consumers by delivering emotional experiences that reflect brand-specific values, tone of voice, and touch and feel, with the goal of boosting acquisitions, purchase frequency, cross-selling, up-selling, and loyalty. The additional layer of one-to-few personalization is not limited to data on consumers' transactional and digital behavior, but also integrates analysis of their sociodemographic and psychographic characteristics (e.g., Tourist, Gen Z, Millennial, High Spender or Focused Icons).

- **Inspire** (one-to-one): The final phase aims to create a hyper-personalized relationship with the goal of inspiring the individual consumer. In this phase, the role of digital, and more importantly in-store staff is key to delivering a tailored, unique, and memorable experience.

THE SIGNATURE EXPERIENCE BECOMES AUGMENTED

Today, we operate in a context where transformative forces have "augmented" the scenario for people,

FIGURE 1. THE SIGNATURE EXPERIENCE MODEL

INSPIRE

DELIGHT

SIMPLIFY
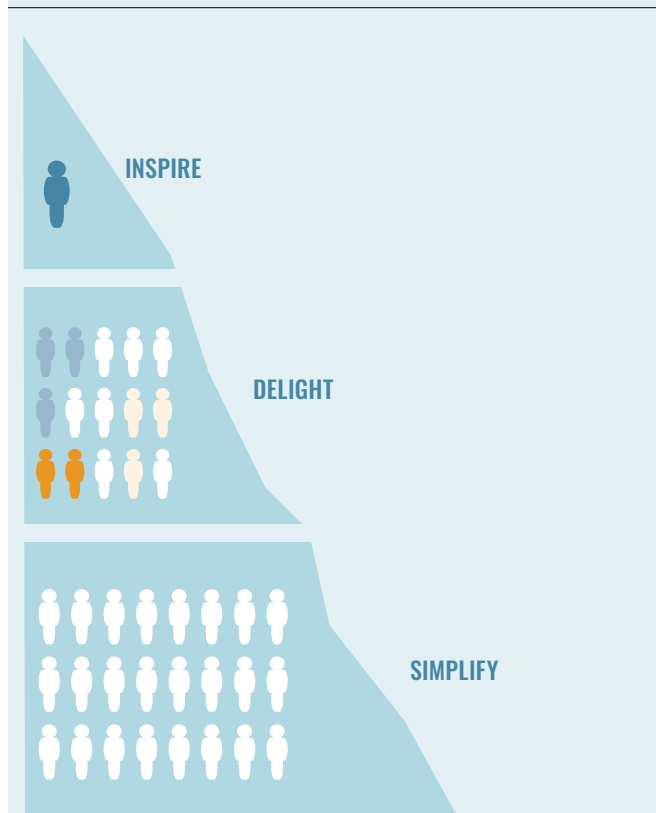
BRUNELLO CUCINELLI:
DIGITAL AT THE SERVICE OF CUSTOMER EXPERIENCE

Customer service at Brunello Cucinelli is not limited to solving customer problems. Instead it becomes an opportunity to "open a door" to the next stages of a signature experience, namely to delight and inspire the person who has contacted the company by practicing active listening, proposing unexpected branded activities, "warming up" the relationship, as would happen in the physical store.

Ilaria Sebastiano,
Global Head CRM
Brunello Cucinelli

This attitude derives directly from corporate values. Digital, for example, is seen not only as a functional tool, but also as a means to manage relationships with customers and partners in a respectful and personalized way, understanding their expectations and modulating time, mode, channels, and content on a case-by-case basis. At Brunello Cucinelli, this attention to detail is described with the expression "artisans of the Web."

brands, and retailers. Competition among customer experiences is gradually shifting focus to the effective ability to combine new technologies, such as the power of Generative AI, with human talent and creativity (Eapen et al., 2023). These evolutions have led us to conceptualize the new augmented signature experience model.

The term "augmented," popularized thanks to the proliferation of augmented reality, in our research goes beyond simply referring to technology. "Augmented," in fact, extends to other areas of the social and competitive environment in which people and companies operate. It's a concept that brings together the characteristics of acceleration, contamination, and intensification, which can be interpreted in two ways: In a positive sense, they represent expansion and development; in a negative sense, they indicate the sharpening and exacerbation of certain phenomena. Figure 2 illustrates the transitions that have "augmented" the current context, many of which have been accelerated by the pandemic.
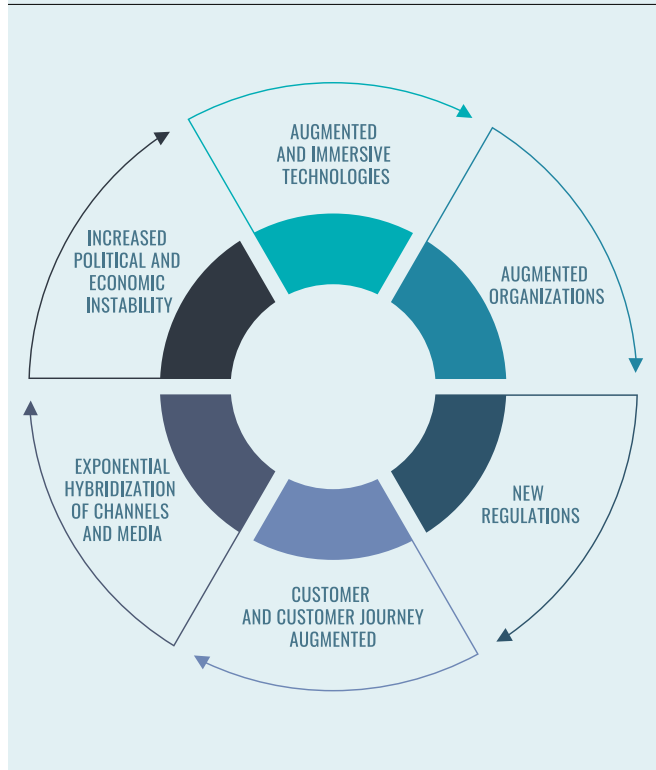
New digital technologies and artificial intelligence are not only creating new "augmented" worlds and innovative customer engagement models, but also offering retailers unprecedented opportunities to transform the way data is generated and used in their businesses. However, these same technologies are frequently subject to regulatory initiatives by national and international authorities seeking to establish legal and ethical frameworks that can ensure respect for inalienable values such as privacy, security, accountability and human rights. Moreover, at the macro level, geopolitical instability has impacted operating costs, resulting in margin pressures that are difficult to offset through price increases. At the same time, the hybridization of retail channels and formats has accelerated, with escalating integration between physical, digital, local and global, and a proliferation of customer touch points.

Partly out of necessity, partly out of opportunity, customers have become augmented too. They're capable of taking on different roles depending on the needs and attitudes they've formed in a multichannel environment. These "augmented" customers have also become more demanding in some ways, looking to brands for a lifestyle, authentic values, the thrill of novelty, and the opportunity to get a good deal. Brands no longer appeal just to consumers, but to real communities of fans who may passionately follow the brand or, on the contrary, ignore or even boycott it.

The augmented customer journey is a rather erratic one. The customer often starts on social platforms such as YouTube or TikTok, gathers reviews and compares comments with other users

FIGURE 2. THE DEFINITION OF AN AUGMENTED SCENARIO

- AUGMENTED AND IMMERSIVE TECHNOLOGIES
- AUGMENTED ORGANIZATIONS
- NEW REGULATIONS
- CUSTOMER AND CUSTOMER JOURNEY AUGMENTED
- EXPONENTIAL HYBRIDIZATION OF CHANNELS AND MEDIA
- INCREASED POLITICAL AND ECONOMIC INSTABILITY

The term augmented brings together the characteristics of acceleration, contamination, and intensification.

online, and then perhaps goes to the store and interacts with a salesperson or goes back online and continues the search, using advanced technologies such as virtual fittings. So we asked ourselves some questions: What's the impact of an augmented scenario on the Signature Experience model? Is it possible that the inspiration (one-to-one) phase is too one-sided in its brand-to-consumer dynamic? And how can we account for the new active role of customers in co-creating experiences, which they can now do thanks to immersive technologies?

Considering the emergence of new media, NFTs, brand ambassadors, and co-creation processes (as in Roblox or Minecraft), as well as intensifying personalization and continuous feedback in an omnichannel context, we need to redefine the role of the consumer, traditionally considered as a simple recipient. That means we have to add another phase when it comes to inspiration: the brand and the customer co-creating experience (Figure 3).

ENABLERS OF THE AUGMENTED SIGNATURE EXPERIENCE

In an augmented context, designing the customer experience is rarely being relegated to the last mile of initiatives anymore, in the hands of the CDO, CRM, Retail or Marketing. Instead, it's a strategic process that must involve all business stakeholders, based on a unified view of customers that fosters a deeper understanding of their needs, enabling more relevant, targeted responses.

In the past year, we've not only redefined the concept of the Signature Experience, adding the term "augmented" and introducing the brand-customer co-creation phase. We've also explored the strategic and organizational determinants that enable all this, "behind the scenes" as it were (Saviolo and Di Dio Roccazzella, 2023). While we previously used a pyramid to represent the signature experience, for the new augmented

FIGURE 3. THE EVOLUTION OF THE SIGNATURE EXPERIENCE
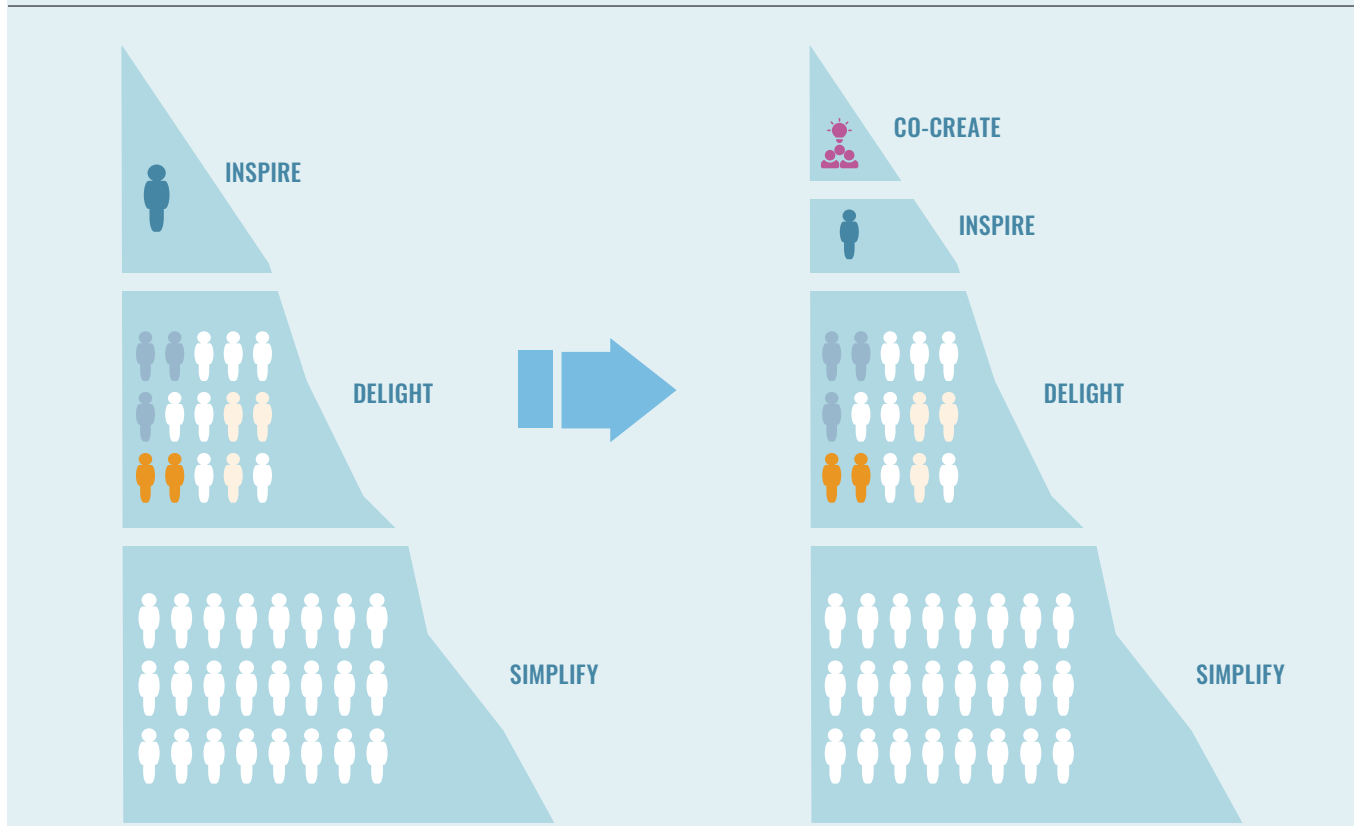
signature experience model we chose the image of an iceberg, as shown in Figure 4.

In this model:
- The signature experience pyramid becomes the emerged tip of the iceberg, which still represents the interaction between the brand and the end consumer (or middle customer in B2B) through four stages: simplify, delight, inspire, co-create.
- The base and the rest of the submerged part of the iceberg represent the five enabling factors of the augmented experience: creativity and content, data and insights, technology, organization, and purpose.
- The surrounding sea and the currents that move and reshape the iceberg, in terms of their impact on the economy and brands, are represented by the five transitions of the augmented scenario: demographic and social, technological,

occupational, and regulatory.

The proposed iceberg model should be considered alive and dynamic because of the different currents that organizations face. Most importantly, it provides a holistic view of the augmented signature experience, giving us a way to understand how the various components interact with each other. In business practice, companies must effectively and consistently manage all the different dimensions of the iceberg to define and maintain their signature experience, while ensuring the right balance between organization, data and technology, particularly artificial intelligence.

So now let's begin to explore the sea in which the augmented signature experience iceberg moves by introducing the currents that represent the four transitions of the augmented scenario.

FIGURE 4. ICEBERG MODEL OF THE AUGMENTED SIGNATURE EXPERIENCE
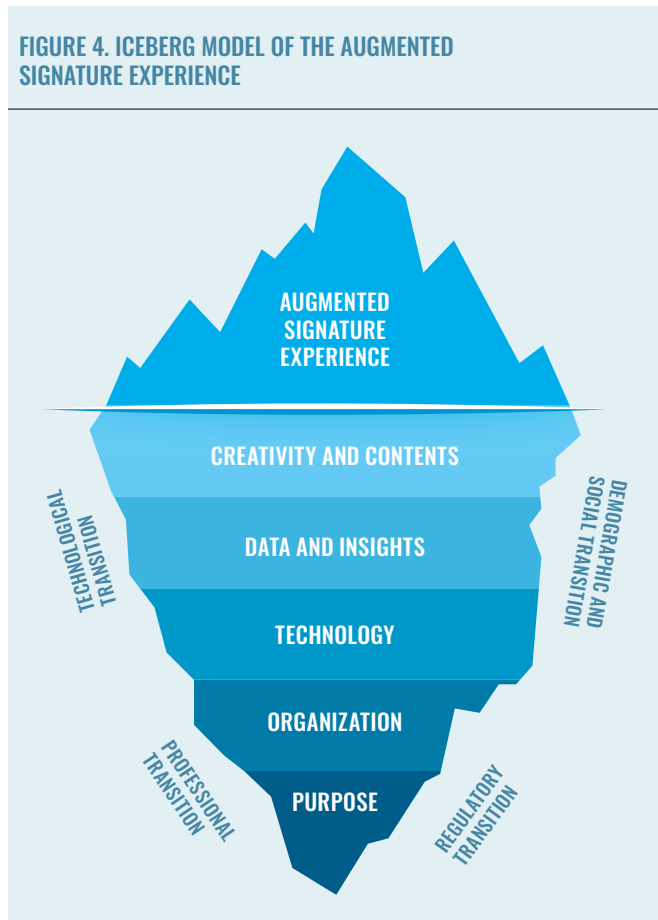
SILVERSEA CRUISES: CO-CREATED EXPERIENCES FOR AN AUGMENTED SIGNATURE EXPERIENCE

With a background in tailor-made luxury cruising, Silversea Cruises, part of the US-based Royal Caribbean Group, is entering the fast-growing experiential travel category and adding its own distinctive signature. What makes the company's offerings unique is its approach to the destination: guests can choose from a wide menu of experiences, ranging from activities already included in the offer, to customized and immersive proposals, to an entirely co-created experience. To describe this approach, the company developed the acronym SALT, which stands for "Sea and Land Taste." Cinzia Amadio, SVP of Global Marketing at Silversea Cruises, explains:

Each area has its own traditions, and we present them to guests through different experiential touchpoints: we offer master classes in cooking where they can learn traditional dishes, then we have the SALT Bar, the SALT Restaurant and SALT Experiences led by experts from different locations.

THE FOUR TRANSITIONS OF THE AUGMENTED ORGANIZATION

Demographic and social transition

This type of transition relates to changes in the composition of the population (including the aging demographic in some regions of the world) and the diversification of consumer preferences in different markets. On the one hand, the rise in the number of seniors has led to a greater demand for products and services related to the silver economy; on the other, multinational brands have to deal with the emergence of new geographies of young consumers and high spenders (think of China and Saudi Arabia, for example). So the real challenge for the future is not only to figure out how to attract and adapt to these new types of customers, but also how to create a "one brand, one voice" signature experience that resonates with consumers of different generations (GenZ, Millennials, Gen X, etc.), while taking into account heterogeneous cultures and reference models.

The technological transition

The technology transition has completely redefined the way customers interact with companies. New digital channels, omnichannel, artificial intelligence, automation, and data analytics have morphed customer expectations for speed and efficient service. Companies must adapt to these new technologies to deliver a seamless, personalized customer experience. Implementing data lakes; using Unified Commerce systems, CRM, and loyalty programs; adopting AI models, advanced analytics, chatbots, virtual assistants, self-service platforms; integrating technologies such as Web3, NFT, blockchain, and metaverse: these are all ways to greatly improve customer interactions and enhance overall satisfaction.

The professional transition

This type of transition is characterized by expanded workforce flexibility and new employment models, such as remote working and freelancing. Brands need to ensure effective and efficient customer experience, regardless of the position or contract type of employees who handle customer interactions. This comes in addition to changes brought about by new attitudes in the labor market, such as the concept of "You Only Live Once" (YOLO), which reflects a greater sensitivity among young people with respect to finding meaning in their work. Elements such as purpose, diversity, and inclusion provide the fuel for an authentic and engaging signature brand experience. The enhanced professional context expresses a strong and as yet unmet demand for both skilled personnel in AI and digital, and new Martech technologies in general, as well as experiential retail professionals such as store managers, sales associates, and sales consultants.

The regulatory transition

The regulatory transition is increasingly complex and constantly evolving. Companies must adapt to new laws on data protection, consumer safety, copyright, ethical use of AI, and other related issues that directly impact customer interactions. The regulatory landscape is still fragmented by expertise and geography, with different rules in Europe, the United States and China, but it's catching up with technological innovations, especially those related to AI, NFT, blockchain, Web3, and the metaverse.

NIKE SWOOSH: INNOVATION AND CO-CREATION IN TECHNOLOGICAL CHANGE

Nike has launched SWOOSH, a Web3 platform designed to empower athletes and redefine the future of sports by creating an inclusive digital community and space for Nike's virtual creations. The platform has a dedicated domain, welcome.swoosh.nike, to ensure a safe, trusted environment. On SWOOSH, members of the Nike community will be able to explore, collect and contribute to co-creating virtual objects, such as shoes or interactive digital jerseys.

In any case, compliance is critical to ensure customer trust and protect the company's reputation internationally. The AI Act recently passed in Europe is a significant example of regulation in the field of artificial intelligence. However, it remains to be seen whether this act will impact the competitiveness of European companies compared to their US and Chinese counterparts, where investments in AI are bigger and regulation is less stringent.

In the next section, we explain how to address these challenges by breaking down the iceberg organization into the different layers that correspond to the organizational enablers of the augmented signature experience.

THE FIVE ENABLERS OF THE AUGMENTED SIGNATURE EXPERIENCE

According to our research the organization can be interpreted as an iceberg defined by five layers, each of which represents an enabler of the signature customer experience in the new augmented scenario.

Creativity and content

Content plays a key role in the customer experience, as it helps tell an authentic, signature, and engaging story that connects with customers' values and aspirations. The skillful use of creativity, tone, and content can transform a simple product or service into a memorable experience that turns the customer into a true brand advocate. Technologies such as AR/VR and Generative AI, combined with new skills to support creative activities, offer organizations veritable "superpowers" to enhance the signature experience, always centered on the human aspect and a sense of community.

> It is necessary to consider how the four transitions affect the organization.

Data, analytics and insights

Collecting, orchestrating, and analyzing data is vital to gaining a deep understanding of customer preferences and needs, and enabling creative delivery of relevant, personalized content. Through the strategic use of data and analytics - the so-called "single view of the customer" - companies can gain a clear picture of customer behavior, market trends, and areas for improvement. Then by integrating data from multiple sources, such as physical and digital store transactions, customer feedback, digital channel interactions, and demographic data, companies can create detailed customer profiles and personalize the experience based on individual preferences. Statistical machine learning models (cluster analysis, decision trees, propensity models, next best action, etc.) are now being adopted by many brands. The advent of Generative AI, thanks to semantic and visual recognition technologies, has further revolutionized the personalization of campaigns, text, images, and communications, making consumer interactions increasingly human. In this way, the signature customer experience is being transformed into an augmented experience, powered by data and AI, the new "fuel" of the digital world.

ZALANDO: MARKETING OPTIMIZATION WITH MACHINE LEARNING MODELS

One of Germany's leading car manufacturers has developed predictive models that can estimate the impact of tactical marketing efforts, such as customer discounts and rewards, on sales volumes, enabling it to optimize the allocation of commercial contributions, taking into account budgets, market trends, and set targets. Similarly, Zalando has implemented unsupervised machine learning (UML), clustering algorithms to group users based on the products they view. This audience segmentation makes targeted campaigns possible, activated with personalized recommendations and direct email marketing tools based on the products users have viewed or purchased.

GENERAL: INNOVATION AND CUSTOMER PROTECTION IN THE AGE OF AI

According to Davide Consiglio, Country Data Officer at Generali, there is a heightened perception of risk and a need to protect customers, while interactions in the insurance industry are increasingly digital.

We want to ensure the best customer experience with more services and technology and a consulting business that is valuable and multichannel. We now have a large data lake in the cloud, technologically advanced and secure, which enables integrated analysis of different business data as well as data from external sources, to help us know our customers *better and understand their needs during the changes that occur in their lifecycle, given the longevity of their relationship with us. The increasingly widespread use of artificial intelligence to support business opens up new scenarios in which we also need to pay particular attention to the ethical aspects inherent in automated data processing.*

VÉGÉ GROUP: EXCELLENCE IN RETAIL THROUGH THE PEOPLE SIGNATURE EXPERIENCE

Retail has always been about people, but today's store personnel are different from before. In the grocery sector, especially in assisted sales, customers now demand a professional figure who plays the role of an advisor, a kind of personal food shopper. According to Giorgio Santambrogio,

CEO of the VéGé Group and Vice President of Federdistribuzione, promoting a culture of fresh food management, whether it be seafood or cold cuts, is a way to take the relationship with the customer to a deeper, more intimate level. Although customer orientation is a well-established

practice, it is necessary to invest in the training and empowerment of sales staff, deepening their knowledge of product specifications and food culture. In addition, it is essential to clearly define and communicate the new role of the *personal food shopper.*

NESTLÉ: ACTIVATING PURPOSE THROUGH AN INTEGRATED APPROACH

For Nestlé, corporate purpose, *Good food Good life*, represents a cross-brand value axis encompassing all brands in the portfolio around the themes of safety, quality, innovation, and regeneration. How to activate the corporate purpose? According to Marco Travaglia, President and CEO Nestlé Italy and Malta:

First and foremost, you need to set the "tone from the top" to drive the process and consolidate a certain culture in people; purpose must be a belief that starts at the top. But while there is a top-down push from the leadership team, the bottom-up experience of people, supported by agile working, test & learn processes, continuous training, *proximity to consumers and communities affected by direct experience, must also be taken into account.*

The purpose is a statement of what the brand wants to accomplish in the world.

Organization

Can the Signature Experience model also be applied to the company-employee relationship? Critical to success, in fact, is a customer-centric culture where every employee is motivated, engaged and committed to delivering exceptional service. Collaboration across silos and departments (Branding, Marketing and Communications, Retail, Information Technology) along with the sharing of purpose, data and insights is essential to ensure a cohesive and seamless experience throughout the customer journey.

The Signature Experience framework can serve as a starting point for defining the concept of People Signature Experience, understood as the distinctive approach by which every organization should shape and curate the experience of its employees. Facilitate, Develop, Empower are the three stages of the People Signature Experience that we propose in our research (Saviolo and Di Dio Roccazzella, 2023).

Purpose

In the feedback economy, the reputation of a brand or a company is "the currency of the future." A reputation that is perceived as strong, positive, and consistent is often the result of a clear, powerful purpose that can guide the organization and its target communities over time.

The purpose is a statement of what the brand wants to accomplish in the world and how it intends to make a difference in the lives of its customers and society as a whole.

The customer experience should reflect the company's purpose, ideally at every touch point, demonstrating to customers and all stakeholders a genuine commitment to a greater cause or goal.

MANAGERIAL IMPACT FACTOR

- Every brand should have its own unique, distinctive point of view, its own "signature" when designing the customer experience and all human, digital, and physical touchpoints.

- This is even more relevant in an augmented scenario, i.e. one that is increasingly hybrid and accelerated by ongoing demographic, social, occupational, technological, and regulatory transitions.

- Several internal factors must be orchestrated to arrive at an augmented signature experience; it's not just a last-mile issue. Building an augmented signature experience is a cultural and strategic process that involves all business stakeholders, starting with creating the internal people experience that is the prerequisite for designing authentic, relevant and memorable customer experiences.

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Saviolo, S., Di Dio Roccazzella (2023), Augmented Signature Experience, Egea, Milano.

Artificial Intelligence and the Administrative Side of Public Healthcare

Clinical applications of AI in healthcare are very promising, although many ethical, legal, organizational, and governance issues need to be addressed. Below, we provide a general introduction to AI in healthcare and identify some administrative applications that could be implemented relatively quickly, with significant benefits in terms of efficiency and effectiveness, and in compliance with the law. Our recommendation is to proceed with local experimentation and public-private collaboration.

ARTIFICIAL INTELLIGENCE//HEALTHCARE//ADMINISTRATIVE FUNCTIONS//PUBLIC PROCUREMENT//PERSONNEL MANAGEMENT

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There is no doubt that technological innovation in the digital domain is accelerating, and that applications of artificial intelligence (AI) could have a profound impact on society. The future holds the prospect of a different way of life from the one we know today, with potential changes in the way we are citizens (e.g., how we engage in political life or use public services), consumers (digital marketing, already a reality, will continue to evolve), and workers (we can expect further automation and a major redefinition of job skills). While technological innovation advances rapidly, its practical adoption lags behind.

But sooner or later, radical change will happen. In fact, it's unlikely that cultural, organizational and political resistance will be able to stop a

system of businesses, both local and global, from investing in applications that can boost productivity, improve the quality of products and services, and hopefully contribute to solving major global problems such as the risk of pandemics or a warming climate. Conversely, these innovations also pose major risks: security, manipulation of behavior, the harms of monopolistic concentration, and even the apocalyptic scenario of a world where machines rule humans. For all these reasons, public governance of AI, i.e. rules that balance the potential for innovation and risk mitigation, is being considered in many countries.

Within this overall framework, our paper offers a contribution on a concrete topic: the use of AI in public health, specifically in administrative functions. The aim here is to present the very real potential of AI in a specific area (which has a scope that goes beyond public health), and to discuss the relative opportunities and conditions for successful implementation.

AI IN HEALTHCARE

AI is particularly promising in medicine and healthcare because the diagnostic-therapeutic process is essentially informational in nature. When doctors take a patient's medical history, they are gathering information from that person; when they prescribe tests, they are doing so to obtain information to make a diagnosis; and based on the diagnoses, which are a list of conditions (a kind of catalog), they decide on a treatment, which in turn they have chosen based on information produced by the scientific community and interpreted on a case-by-case basis.

Some AI applications in medicine are at a very advanced stage (Bohr & Memarzadeh, 2020). Perhaps the clinical area with the most concrete potential is radiology. It's not hard to imagine that a well-trained machine could detect an abnormality as well as or even better than a radiologist, mainly thanks to the quantity and quality of the data used for training. Indeed, several studies show

encouraging results, although there is no shortage of controversy. Other noteworthy areas where AI research is making great gains include cardiology, neurology, some genetic diseases, and dermatology.

However, several experts caution against easy optimism about the use of AI in clinical settings (Davenport & Kalakota, 2019). There are questions about access to data of sufficient quality and quantity to train machines (Ferryman et al., 2023), and salient legal questions remain unresolved, including liability for potential errors (Morley et al., 2020). Moreover, the importance of the physician-patient relationship as an indispensable component of the care process continues to be emphasized and, not least, strong professional resistance has been noted, particularly from physicians themselves (Davenport & Glaser, 2022). All these factors could lead to a significant time lag between the availability of new technological applications and their implementation. For this reason, we decided to present an area that has been less explored, but that we believe has more potential for success in concrete implementations: back-office administrative functions.

THE ITALIAN PUBLIC HEALTH SECTOR AND ADMINISTRATIVE STAFF

In Italy, approximately 75% of healthcare spending is publicly funded through the National Health Service (SSN in Italian). Healthcare services are provided by local public authorities and independent hospitals (public and accredited private healthcare clinics). The public Local Health Authorities (ASL in Italian), about 250 in total, have an average of 3,000 to 4,000 employees and can reach a turnover of 1 billion euros. Due to the size and complexity of these ASLs, they need the support of administrative and management services that function smoothly to ensure efficient operations. Of the approximately 703,000 permanent employees in the SSN, about 63,000 serve in administrative functions.

The dynamics, in terms of total staff and

administrative staff, have varied considerably over time. While there has been a steady decline in total staff for more than ten years, with a strong recovery in 2020/2021 that brought the number back to 2013 levels, administrative personnel experienced a 20% drop over the same period, mainly due to a failure to replace retiring staff. On the one hand, this figure can be read as the result of an efficiency policy on the administrative side, thanks in part to the progress of digitalization in public health.

On the other hand, this decline highlights the significant increase in the average age of the workforce, which on average is 52 plus. The issues of age and skill trends will be addressed later. For now, suffice it to say that the use of digital technologies in general and AI applications in particular requires professional skills that are currently in short supply in the SSN.

AI IN ADMINISTRATIVE FUNCTIONS

In Italian ASLs, administrative functions in the narrow sense (accounting and budgeting, human resources, purchasing, general affairs, etc.) can be distinguished from management functions introduced with the corporatization process (management control, information systems, operational management, personnel evaluation, etc.). Here we'll try to describe the use of AI by focusing on traditional administrative functions, characterized by approaches and practices that mandate compliance with procedures, in order to assess the potential of AI in terms of process performance and overall pursuit of results.

Healthcare organizations, which are subject to administrative law, enact measures that publicly justify and manifest their actions. The possibility of introducing AI in this field derives precisely from the transparency of the administrative function, which does not face the typical obstacles of confidentiality in its actions.

In order to understand what spaces are open to AI in administrative functions, we propose below pertinent examples of typical activities of public health authorities that require legal knowledge, technical expertise, transparency and public notification of the actions taken.

Based on these criteria, we identified the following: the adoption of resolutions and decisions, the public procurement of goods/services, and the recruitment of personnel through an open, competitive selection process.

RESOLUTIONS AND DECISIONS

Resolutions and decisions are the means by which the administration formulates its actions. Resolutions are the administrative acts that authorize the general director to carry out the planning, programming, directing, controlling, and general management of the health authority. Decisions are the administrative acts that allow middle managers to carry out specific management activities within the scope of competencies related to their particular office. In a medium/large healthcare organization, more than 3,000 resolutions and decisions are implemented annually.

In order to be valid and legitimate, resolutions and decisions must be drafted according to a logical sequence that legally justifies their adoption based on the relevant factual and legal elements. This is the last step in a process that transversally involves several administrative functions: from the person in charge of the procedure, to the head of the office making the proposal, to the budget manager (if an act involves costs/revenues). Resolutions are made by the directors of administration, health and, if applicable, health & welfare, and are escalated to the general director for approval. Of course, resolutions and decisions are the public manifestation of the organization's will to begin or end a particular process.

The functions most engaged in the adoption of these acts, precisely because they implement open, public procedures, are Purchasing and Personnel; Budget is involved in all initiatives that entail a commitment of expenditure, while General Affairs

usually verifies the formal regularity of the act and the path to its adoption.

The entire process of drafting and adopting resolutions and decisions has been digitized in the majority of public health authorities. As a result, the document flow is managed by ad hoc programs that allow opinions and digital signatures to be added when necessary.

HOW CAN AI SUPPORT THIS ACTIVITY?

AI could be usefully applied to the drafting of the proposed act (resolution or decision), using generative technologies to check the consistency of the formal and substantive elements of the content. By examining and comparing the acts put into effect by the healthcare organization or, even better, by several such organizations (pooling regional or even national data), generative AI could identify the most virtuous patterns, consulting the norms of reference and proposing a resolution/decision text adapted to an evaluation of the interests pursued by the ASL in question. Obviously, the content of the act, with all its essential elements (header, subject, preamble, motivation, body), will depend on the proposed structure. In other words, it may concern the launch of a tender procedure, the publication of a call for candidates, the adoption of the operating budget, etc. Below we try to describe how AI, having helped to initiate these activities, can support their implementation.

PUBLIC PROCUREMENT PROCEDURES

The procurement of goods and services by local health authorities is regulated by the Procurement Law (Decree Law 36/2023). Without going into the details of the regulations and all the evolutions that this area has undergone, including the centralization of purchasing at the national and regional levels, we'll focus on how public tenders are carried out. We'll look at the following stages: identifying needs, preparing tender documents,

evaluating bids and finally awarding the procurement contract.

Identifying needs in terms of types and quantities of goods/services calls for an audit of activities and, hopefully, an assessment of the impact of what has been used over time. This phase requires the analysis of quantitative data on past consumption and the formulation of forecasts, combined with the qualitative evaluations that can be produced by internal experts (suppliers, pharmacists, engineers, clinicians, technicians, etc.), together with input available in the market and in specially created databases.

Once the quantitative and qualitative needs have been defined, the tender documents are drafted by the technical team, including the specifications of the characteristics that the product/service must have and the related evaluation criteria.

The final stage is carried out by the selection committee, which evaluates the bids based on predefined criteria (which may be exclusively economic or qualitative/economic). For example, if the criterion is the most economically advantageous offer, the best price/quality ratio is favored, and a ceiling is set for the economic score. The evaluation in this case includes both quantitative elements, which can be automatically translated into numerical scores, and qualitative elements, which are supported by the review of data sheets and, if necessary, by "real life" tests. Each of the phases described above leverages different multidisciplinary skills, which, of course, must not overlap to guarantee impartiality and process transparency.

It's easy to see that AI can be grafted onto each of these activities, first and foremost by automating the process of making objective assessments and identifying the quantities and characteristics of the goods/services to be purchased. Next, the functions of the technical group could be supported by AI. Specifically, based on the timely definition of the organization's needs, AI would generate the technical specifications in compliance with applicable standards, any safety rules, and

the technical functionalities and requirements of the goods/services to be tendered. Ultimately, AI could establish the optimal price/performance ratio and the evaluation criteria to pinpoint the bid with the characteristics that best meet the needs in question. Finally, the jury awarding the procurement contract would use AI for evaluation, while preserving a monitoring function and the execution of phases dedicated to more complex aspects, such as "real life" testing.

OPEN SELECTION PROCESSES

Employees in public health organizations are usually recruited through open, competitive selection procedures. Apart from the current situation, which has led to the increased use of atypical contracts and service cooperatives for the provision of medical and health services, the vast majority of staff working in the SSN are employed under permanent contracts.

The most common form of public selection process, regulated by Presidential Decree 487 of 1994, is based on qualifications and examinations. The stages of the process can be briefly described as follows:

- Processing of staffing requests (review of staffing needs in relation to business performance).
- Preparation of the call for candidates in accordance with the desired profile and the applicable rules (Presidential Decree 487/94).
- Appointment of the selection committee.
- Preparation of the tests (written, practical, and oral).
- Correcting the written/practical tests and conducting the oral test.
- Determination of the winners by the committee.

Again, as in the case of procurement, the first step is to review the staffing needs based on the activities the ASL performs in line with the organization's policies. This step calls for an assessment of the alignment between the actual operational staffing and what is outlined in the Three-Year Staffing Plan (a document that is mandatory for public entities).

Once the needs have been determined, the public notice is prepared, which contains mandatory (normative) and supplementary licensing requirements specific to the organization in question. The notice also contains information on how the tests will be conducted: topics covered, mandatory qualifications for the position, and how they should be presented. The examination committee, usually consisting of three people and a secretary, prepares the written tests and admits candidates who subsequently pass the oral test. At the end of the selection process, a ranking is established based on the scores obtained in the three tests and the qualifications submitted by each candidate.

The stages of an open selection process summarized above can all potentially benefit from AI. From the definition of needs, based on the quantitative analysis of human resources by profile, in relation to the activities to be carried out; to the drafting of the call for candidates in accordance with the required profiles; to the preparation of the tests and the corresponding automatic correction. In this case, the selection board would be able to devote itself exclusively to the oral part of the examination, taking a reasonable amount of time to study the candidates' skills.

Returning to the process of adopting resolutions and decisions, we can point out that the different phases of open selection processes are the subject of a specific administrative act by which the organization publicly manifests its intention to recruit new staff. In the case of an open call for candidates, for example, there is an initial resolution to publish the notice, a resolution to appoint the selection committee and, finally, a resolution to acknowledge the work of the committee and approve the ranking list. Again, the input of AI seems intuitive: the automatic formulation of the content of the acts as the stages of the competition are carried out.

THE BENEFITS OF AI IN MANAGING TRADITIONAL ADMINISTRATIVE FUNCTIONS

The benefits of using generative artificial intelligence applications to support administrative functions are numerous and substantial.

First, these applications can enhance efficiency by drastically reducing the amount of human labor required to perform activities that are already highly standardized and digitized. AI would also significantly compress overall turnaround times by making the transfer of documents between offices smoother and more secure, minimizing, if not eliminating, material errors.

The automation of document creation processes would then lead to impartiality and process transparency, greatly diminishing the opportunity for improper intervention. Impartiality, transparency, and the elimination of material errors are all elements that would help reduce litigation, with positive implications for cost and business functionality.

Finally, and more generally, the use of AI for these functions would free up resources for activities that are traditionally understaffed, such as monitoring and evaluating business decisions.

It is important to emphasize the dynamic nature of the AI applications described above. Feedback from process owners, as well as amended laws and regulations, would cause automated systems to be updated over time, potentially highlighting critical issues that need to be addressed at an administrative or policy level. What's more, by adopting a broader, enterprise-wide perspective, these applications should lead to greater homogeneity in the form of administrative policies, facilitating the functions of external oversight (e.g., by the Court of Auditors) and governance of the enterprise system at the regional and national levels.

WHAT ARE THE CONDITIONS FOR IMPLEMENTATION?

To achieve such an extensive use of AI in the administrative functions as described above, organizations obviously must develop IT tools with trained systems, and they need usable data. In terms of IT tools, this would require ad hoc investments, the positive effects of which can be understood immediately.
For data, instead, it's a matter of tapping into sources that are normally accessible: resolutions and decisions are published on the public notice board of every health authority; in addition, tenders and competitions can be found in the "Transparent Administration" section, which public bodies are obliged to update constantly.

Completing the digitization of administrative functions is clearly a prerequisite for the adoption of AI solutions.

The situation varies from region to region, and even within the same region, but many ASLs have digitized most administrative processes. More critical is designing the algorithms needed to use data in an "intelligent" way. In this regard, we would like to make two recommendations. The first is to test the different applications in a few ASLs, initially on a few processes, within the framework of experimental projects.

A small number of organizations with advanced digital systems and the motivation to innovate: this is where AI solutions should be developed and tested.

These experiments should then be rigorously evaluated to trigger processes of continuous improvement and possible expansion to other ALSs. The second recommendation concerns the need to activate public-private cooperation.

Health authorities do not have the technical expertise to develop AI applications on their own. Therefore, the involvement of external actors with the necessary know-how, be they start-ups or even more mature companies, is necessary.

CONCLUSIONS

AI applications are becoming more widespread, and healthcare is certainly a promising area. However, clinical applications have noteworthy critical issues that slow down their implementation to some extent. In this paper, our aim was to present some areas of non-clinical AI applications precisely because they seem to present fewer issues of this kind, for example those related to data ownership (a particularly sensitive question in healthcare) or discrimination risks (for algorithms that do not adequately represent ethnicity, gender, etc.).

The public nature of administrative acts, their immateriality, the transparency required by law, as well as the possibility of standardizing a large part of these act measures, make them excellent candidates for smart technology applications. As we have tried to show, these applications would bring very significant benefits to health authorities, which we hope will seize these opportunities.

However, we would like to point out one major sticking point: the lack of adequate staffing. As mentioned above, the administrative staff of healthcare companies tend to be older, and over the past 12 years, strict personnel policies have virtually blocked entry to young people.

This is also true for technical profiles (e.g., engineers). Without bringing in young people who are adequately trained, not so much to design algorithms as to understand their logic and interface with software developers, it will be difficult to carry out successful projects. In this sense, it is critical that companies recruit at the right level and find ways to attract talent in terms of economic compensation, job content, and career advancement.

The economic space is there because most administrative employees will retire in the coming years, freeing up resources for new hires.

MANAGERIAL IMPACT FACTOR

- **Benefits of AI in healthcare:** Applications can bring extraordinary benefits to health administration in terms of efficiency, effectiveness, and compliance.

- **Priority focus areas:** Among various focus areas that lend themselves to AI solutions, good examples include purchasing, personnel, and the general formalization of decision-making activities.

- **Overcoming barriers to change:** Even though the technology is available, it will require significant change management within organizations.

- **Encouraging public-private collaborations:** Rather than waiting for national or regional policies to dictate the introduction of new technologies, healthcare authorities need to take an approach based on decentralized experimentation through public-private cooperation.

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Godfather Marketing: A New Approach with Risks and Rewards

In the not-too-distant future, as multinational corporations amass more and more power, marketing may mutate. But there's a chance that consumer relations could evolve in a positive direction, reflecting dynamics that resemble mafia organizations, with beneficial individual and societal implications. "Godfather Marketing" has the potential to thrive in a credibility economy where quality of information prevails over quantity, in contrast to the traditional knowledge economy. This article highlights the risks and benefits of such an approach, emphasizing that the effectiveness of the model depends on shared ethics as well as checks and balances inside and outside companies.

MARKETING//LOYALTY//TRUST//CUSTOMER LOYALTY//VALUE CREATION

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According to the prevailing academic definition, the strategic goal of marketing is to "create value" for both the firm and consumers (cf. Gundlach and Wilkie, 2009), where "value" is understood as something that is objectively beneficial to both parties. However, it could be argued that the ultimate purpose of firms is to sell products, while for consumers it is to fulfill their needs – needs that are often shaped by the firms themselves, especially when they have significant influence over consumer choices. In such markets, customer satisfaction may not necessarily correlate with the actual quality of the product or service. A consumer may feel satisfied even when purchasing something that experts might consider to be of low intrinsic value relative to its cost. This highlights the distinction between quality and satisfaction, suggesting that the goal of marketing is not

always to create objective value shared by both parties, but rather to generate satisfaction through perceived value (Guido, 2014). The underlying strategic objective is to foster loyalty, encouraging consumers to develop a lasting relationship with the company.

Today, with the concentration of power in the hands of a few holding companies and multinational corporations – veritable financial and business dictatorships operating on a par with democratic governments in many Western countries – influence over markets is no longer a possibility, but a certainty. In the future, marketing is likely to expand beyond the promotion of products and services to the provision of diversified solutions in various sectors. These solutions may be contingent on customers adhering to a shared "code of honor" that binds them to the company in a lasting way. From big tech to small and medium-sized enterprises (SMEs), each company could leverage its power and networks to address consumers' most pressing needs, while expecting some form of reciprocity in return. In an approach reminiscent of mafia organizations – albeit without the criminal intent – companies could offer customers "favors" even before selling products, in an attempt to satisfy their basic needs and desires in order to secure their unwavering loyalty.

THE EMERGENCE OF A NEW MODEL

Several factors in the current context could support the adoption of such a "Godfather Marketing" model (Guido, 2024). Global instability – driven by wars, pandemics, and financial crises – has intensified consumers' need for security (Gobrecht and Marchand, 2023). In addition, increasing societal fragmentation is exacerbating inequalities and weakening intergroup cohesion (Haidt, 2020), while rapid technological advancements such as artificial intelligence (AI) and smart devices are reshaping how individuals interact with themselves and others (Hoffman et al., 2022). In this climate of uncertainty, consumers may feel that time is running out to fulfill their life plans. The need for social recognition and self-esteem in a world where AI appears to perform tasks more efficiently, combined with the desire to connect with those who can help achieve personal goals, could lead to a profound shift in market dynamics, fundamentally reshaping the relationship between supply and demand. Consumers might approach companies as they would a Mafia godfather, willing to pledge absolute loyalty in exchange for the fulfillment of their most important needs.

CUSTOMER LOYALTY

While customer loyalty is already a central focus of today's marketing strategies, few studies have examined in depth the nature of loyalty and the ethical and strategic boundaries that companies are willing to cross to secure it. Consumers are considered "loyal" when they voluntarily or involuntarily limit their freedom by behaving in accordance with the company's expectations. Customer loyalty typically manifests itself in repeated purchases, positive word-of-mouth, and a reluctance to seek alternatives. So far, companies have sought loyalty through a generally accommodating approach based on the principle that "the customer is always right." They persuade consumers of the superiority of their products or services or incentivize repeat purchases with rewards. Coercive strategies such as exit penalties, cancellation fees, or refund restrictions are less common.

However, if companies were to adopt the Godfather Model in the future, these strategies of persuasion, reward, and punishment could be employed more systematically to retain customers. In this model, profit would become secondary to the primary goal of gaining power over consumers; it is this power – enabling firms to influence customer behavior to serve their own interests – that would become the true strategic goal of the godfather-company.

THE CREDIBILITY ECONOMY

In this context, the transfer of utility goes beyond mere value creation as outlined in the traditional transactional marketing logic, shifting to a model based on a sense of indebtedness and reciprocity (Watkins et al., 2006). The key difference is that those who create value and pay a price feel free of obligation, while those who receive a favor feel compelled to be grateful and, consequently, loyal. This marketing model seeks to create a deep, lasting bond between a select class of "quality" customers and the godfather-company that promises to support and protect them. The mafia it draws inspiration from is not the criminal kind, but rather a metaphorical representation – a "mafia spirit" (Nicaso and Danesi, 2013) – that reflects universal human values such as keeping promises, solidarity, and the importance of family.

Who wouldn't want a "godfather" to solve their most pressing problems, or to be part of a network of "friends of friends" ready to help in times of need? Godfather-company offers become indispensable not because consumers are forced to accept them, but because they are perceived as exclusive opportunities capable of satisfying needs at the top of their hierarchy.

In the coming decades, the real competitive advantage for companies will be their ability to access a network of credible interlocutors bound by a code of honor that ensures integrity and reliability.

This will become increasingly relevant in an environment where information is easily manipulated by technologies such as generative AI. While the traditional knowledge economy is built on the accumulation and processing of vast amounts of information, what I call the emerging "credibility economy" will prioritize the quality of information and mutual trust as the foundation of business-customer relationships.

A CODE OF HONOR

For a company to play the role of "godfather," it must adopt a code of ethics based on the principles of mutual protection and assistance. By facilitating a legitimate exchange of favors that is managed and coordinated by the company itself, this "code of honor" is designed to encourage cooperation among customers within the company's network. When customers request a favor, they are evaluated on the basis of their ability to reciprocate. Reciprocity can take many forms, such as purchasing the company's products, but the primary mode involves active participation in the customer network. This allows customers to offer favors to other members based on their expertise. Through this system, customers become more integrated into the company's operations, potentially evolving into "affiliates" who can share in the profits generated within the network. This approach not only strengthens the bond between the company and its customers, but also fosters a culture of cooperation and reciprocity within the organization.

In the Godfather Marketing Model, the granting of favors requires a careful assessment of both the quality of customers and the conditions under which these favors are granted. With regarding to customers, the firm must evaluate several key factors: the ability to fulfill commitments – since, contrary to what capitalism might suggest, nothing is truly free (Han et al., 2019); confidentiality, or "omertà" in Mafia terms, as the relationship between the godfather-company and customers is always dyadic, with the company being solely responsible for granting favors; and sincerity, which means that customers must abide by the rule of truthfulness within the organization, reflecting the Mafia's concept of "men of honor." As for the conditions under which favors are granted, four parameters (the 4Cs) should be considered: *complexity*, i.e., the level of difficulty for the firm in fulfilling the request; *context*, i.e., the scope of the favor, which must always comply with the law; *content*, i.e., the nature of the favor, which must be personalized and specific; and *channels*, i.e., the

manner in which the favor is granted, ensuring that it appears as a gift even though it still requires a quid pro quo. These parameters, according to *nudge theory*, function as subtle prompts (Thaler and Sunstein, 2024) that guide the customer toward the desired solution.

To achieve its objectives, the godfather-company will not limit itself to traditional strategies of persuasion and reward, but may also employ punitive mechanisms, including revenge, as tools of social regulation designed to ensure compliance with shared norms (Haidt, 2020). However, true leadership in this model is not derived from the exercise of formal authority but rather from attracting consumers through voluntary membership. Establishing a deep connection with the "soul" of consumers requires companies to accurately understand their expectations and perceptions. By leveraging this insight, companies can positively influence consumer behavior and encourage customers to respond favorably to the offers and benefits they receive.

AVOIDING EXTREMES

The primary risk associated with the Godfather Marketing Model is the potential for this approach to deteriorate in the absence of a robust ethical framework and adequate control mechanisms. Without these safeguards, the model may exploit the most vulnerable parties, similar to the practices of criminal organizations. A strategy that could promote mutual benefit and social cohesion risks evolving into a form of control and dependency that demands unconditional loyalty – a so-called "fervent attachment" (Guido, 2016), similar to that of a fan for their team or a devotee for their religion. Such an attachment could compromise consumers' autonomy and expose them to unwanted risks. While the exchange of benefits, persuasion techniques, and loyalty demands are already prevalent in contemporary marketing, the conditions favorable for Godfather Marketing could incentivize more powerful firms, particularly multinational

corporations, to seek the complete submission of customers to their corporate rules. In this scenario, satisfaction, rewards, and well-being would become contingent on this submission, leading to increased consumer dependence on the power structures established by these firms.

Consumers have long been treated as an undifferentiated set of individuals, "cows to be milked" for cash flows (Stern and Deimler, 2006), and for whom decisions are made "expediently," that is, effectively, efficiently, and profitably, without regard to equity or their actual well-being. In the future, even more than today, people may be increasingly driven to monetize not only their professional skills and knowledge, but also more intimate aspects of their personal lives, such as social relationships, friendships, their image, and in some cases even their bodies (a phenomenon already observed on digital platforms such as OnlyFans). In a dystopian scenario, where work will no longer be necessary since it will be performed by AI, it could be the same godfather-companies themselves that offer income to their customers, provided that their entire private sphere is made available to the company.

To avert the dangers of drift, a common ethic is needed, based on an individual's acquired awareness of the meaning of existence and one's role in society. Indeed, lack of clarity about one's identity and direction can lead to "educated" ignorance or, worse, to habitual behavior and fanaticism. Personal growth and the establishment of economic and democratic systems based on wisdom rather than opportunism therefore require both a solid knowledge base and the critical ability to evaluate it. Another element that needs to be explored is the idea that, the Godfather Marketing Model can be successfully applied to social interactions in general, with appropriate controls imposed from within companies and from outside through national and supranational regulatory bodies. In the perhaps distant but not entirely remote future, this approach could facilitate the management of entire local areas, in a kind of "new Renaissance" similar to the emergence of new grand duchies, courts and city-states (see Guido, 2002). This could, for example,

foster ecosystems of collaborative actors under the leadership of patrons, philanthropic entities, and cultural referents who would offer shelter and support to those who adhere to shared ethical rules and behaviors.

Recently, Runciman (2024) has pointed out how humanity has progressively delegated its control to impersonal structures, such as states, corporations and, more recently, multinational corporations and artificial intelligences. However, while dictatorial regimes are usually viewed with suspicion and criticism, multinational corporations, which often exceed the revenues of many sovereign states and operate on a global scale, are sometimes treated as democracies. This is despite the fact that the decision-making power within such organizations is held by a small circle of shareholders and oligarchs. Those who are outraged today at the idea that the mafia model could inspire the societies of the future should reflect on the fact that, if deprived of illicit means and founded on a code of ethics that rewards merit and sanctions abuse, this model not only poses no threat to the stability of markets but could even contribute to the construction of a solid social fabric. In this context, mutual aid and cooperation would become the basis for a more equitable and sustainable future.

MANAGERIAL IMPACT FACTOR

- **Strategic innovation**: Introducing a new marketing paradigm that moves away from the traditional logic of selling products.

- **Trust management**: The ability of companies to establish trusting and reciprocal relationships with consumers, thereby increasing their loyalty.

- **Adapting to global dynamics**: Recognizing and responding to the challenges posed by global instability, social crises, and rapid technological advances.

- **Ethical sustainability**: The importance of establishing a "code of honor" and shared ethics to prevent abuse and ensure a balanced relationship between the company and its customers.

- **The role of technology**: Using advanced technologies to improve interactions with customers and ensure the quality of information exchanged.

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PODCAST
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