CAPCO JOURNAL

The Capco Institute Journal of Financial Transformation

# Value dynamics

Disruptive forces reshaping financial services

**Technological transformations**

**Digital transformation in Brazilian companies: Recommendations to accelerate digital maturity**

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# JOURNAL

The Capco Institute Journal of Financial Transformation

## Recipient of the Apex Award for Publication Excellence

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# Value dynamics

Welcome to the 61st edition of the Journal of Financial Transformation.

I am delighted to announce our new partnership with King's College London, a world-renowned leader in education and research, marking a new chapter in the Journal's long and distinguished history.

In this edition focusing on Value Dynamics, we explore a critical – and ever more pressing – challenge: how institutions across financial services create, distribute and sustain value.

As Professor Crawford Spence, our editor from King's College highlights in his own introduction, the forces shaping value dynamics across financial services are myriad, encompassing technological transformations, secular shifts, political and social structures.

As a firm that has been at the cutting edge of innovation for over 25 years, these value drivers intersect directly with the work Capco does every day, helping our clients around the globe transform their businesses for sustained growth.

The integration of innovative new technologies including generative and agentic AI models, the digitalization of currencies and payments infrastructures, the reimagining of customer experiences, the relentless evolution of market ecosystems, the vital role of culture as a value driver: these imperatives are where we see – first-hand – clear opportunities for our clients' future growth, competitive differentiation and success.

We are excited to share the perspectives and insights of many distinguished contributors drawn from across academia and the financial services industry, in addition to showcasing the practical experiences from Capco's industry, consulting, and technology SMEs.

It is an immense source of pride that Capco continues to champion a creative and entrepreneurial culture, one that draws on the deep domain and capability expertise of thousands of talented individuals around the world.

We do not take our hard-earned status as a trusted advisor lightly, nor our responsibility to make a genuine difference for our clients and customers every single day – placing excellence and integrity at the forefront of everything we do.

I hope the articles in this edition help guide your own organization's journey as you navigate the many complexities and opportunities ahead.

As ever, my greatest thanks and appreciation to our contributors, readers, clients, and teams.

**Annie Rowland,** Capco CEO

2025, Edition 61

# Editor's note

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This 61st edition of the Journal of Financial Transformation is the first with a new editorial team in place, and is the product of a formalized collaboration between Capco and King's College London. This collaboration – a leading financial services consultancy and a prestigious academic institution – embodies the Journal's ethos: a balance between academic rigor and practical accessibility.

Traditional academic journals often deal with more prosaic conceptual matters. Even when they focus on more practical concerns, the timelines and mechanics of double-blind peer review processes can mean that the insights that they offer risk being out of date by the time they are published. Conversely, traditional op-ed articles in the financial press are all too often heavy on opinion and pre-conceived ideas and can lack the heft that comes with thoroughly researched pieces of work.

The Journal we've published strikes a vital balance between these two approaches.

This edition has an overarching focus of Value Dynamics. Specifically, the various articles look at how value is created, distributed and sustained across financial services. In turn, the submissions are grouped into three broad themes.

Technological transformations are explored in terms of how these can bolster or hinder value dynamics if not managed effectively. A number of secular shifts are also discussed – these being long-term changes that are impacting value dynamics in the sector. Finally, structural challenges are highlighted that emphasize the importance of sticky, tricky social and behavioral issues that surround the execution of financial services.

Overall, these themes highlight challenges and opportunities in the sector and encourage us to think differently.

It has been a pleasure working on this issue with such a fantastic and diverse array of different contributors.

**Professor Crawford Spence**
King's College London

# Digital transformation in Brazilian companies:
## Recommendations to accelerate digital maturity

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## Abstract

This article aims to explore the maturity of the digital transformation of Brazilian companies, based on a survey carried out in 2024, analyzing different strategic dimensions and the barriers that hinder the transversal digitalization of the Brazilian territory. Furthermore, it discusses Brazil's technological trends in relation to the global digital competitiveness landscape, offering recommendations on how the country can overcome its internal challenges and close existing gaps so that organizations can strengthen their digital initiatives and push Brazil toward a more competitive position in the global digital transformation arena.

## 1. Introduction

Digital transformation has become a key factor in the competitiveness and sustainable growth of companies around the world. The advance of new digital solutions, such as artificial intelligence (AI), automation, big data and cloud computing, has reshaped business models, boosted operational efficiency and redefined the customer experience. In Brazil, despite the growing recognition of the importance of digitalization, many companies still face challenges in implementing effective strategies and achieving more advanced digital maturity.

According to Acemoglu (2021), AI and other emerging technologies will transform jobs and markets over the next two decades, but their impacts on society and the economy will depend on how they are developed and implemented. He argues that the current trajectory automates work excessively while failing to invest in human productivity, potentially leading to workers being displaced without new opportunities being created. This situation also highlights the shortage of specialized labor and the inability of the workforce to keep pace with technological

advances, an issue that is particularly evident in Brazil. While government support has declined, corporate funding now plays a major role in shaping the direction of research on AI, machine learning and big data with leading technology firms, such as Google, Facebook, Amazon and Microsoft, setting the agenda and establishing norms through their academic and political influence. Therefore, it is necessary to question the current focus on automation and instead target its development toward complementing human labor, increasing productivity and creating new tasks and activities for workers.

Susskind (2020) reinforces these concerns by arguing that advances in AI and automation may lead to a structural decline in the demand for human labor, particularly in routine and middle-skill occupations. Rather than simply replacing specific tasks, these technologies have the potential to reshape entire industries, challenging traditional notions of employment and economic participation. Without parallel investments in education, workforce training, and inclusive innovation strategies, digital transformation risks exacerbating existing social and economic inequalities. This perspective is particularly relevant for Brazil, where many companies are embracing digital tools while simultaneously facing a shortage of skilled professionals.

Firm-level research on automation provides important insights into the broader implications of digital transformation for the labor market. Acemoglu et al. (2022), using data from the 2019 Annual Business Survey in the United States, found that automation adoption is more common among larger firms, particularly in the manufacturing and information sectors. These companies tend to have higher productivity levels and a more educated workforce, indicating that human capital is essential for successful technological adoption. However, the study also revealed that automation is often associated with reduced employment rate, suggesting that while it can enhance efficiency, it may also contribute to job polarization. This trend has significant implications for labor market dynamics and may exacerbate wage inequality.

Moreover, the successful adoption of new technologies requires complementary innovations in organizational processes and business models in order to fully benefit from them, reshaping entire value chains. Firms must redesign internal workflows, invest in workforce training and realign their business strategies to truly benefit from technology integration, according to Agrawal et al. (2023). This perspective is highly relevant to the Brazilian context, where many companies still focus on digital tools without implementing the broader organizational reforms needed to generate meaningful impact.

These challenges are embedded in Brazil's current political and economic landscape. At present, there is a strong focus on investment projects in the country's physical infrastructure, such as logistics, energy, and housing, at the expense of prioritizing digital infrastructure. The absence of a structured digital agenda within the Growth Acceleration Program (PAC) highlights a governmental gap in prioritizing digitalization as a driver of development.

In addition, national inflation has exceeded the 3% target set by the National Monetary Council (CMN), reaching 4.9% in 2024. This scenario impacts the profitability of Brazilian companies as well as their capacity for internal investment. As a result, the development of structured plans for digital transformation, automation, AI, and new digital platforms faces the challenge of high capital costs, making accessible credit scarce

and further penalizing small- and medium-sized enterprises that, under different conditions, could innovate more rapidly.

With this in mind, this article aims to explore the maturity of the digital transformation of Brazilian companies, based on a survey carried out in 2024, analyzing different strategic dimensions and the barriers that hinder the transversal digitalization of the Brazilian territory. Furthermore, it discusses Brazil's technological trends in relation to the global digital competitiveness landscape, offering recommendations on how the country can overcome its internal challenges and close existing gaps so that organizations can strengthen their digital initiatives and push Brazil toward a more competitive position in the global digital transformation arena.

## 2. Methodology

To better understand the digital maturity of Brazilian companies, we conducted a survey among 144 companies from various sectors of the Brazilian economy. The sectors analyzed were consumer and retail, healthcare, financial services, energy, information technology, industrial manufacturing, agribusiness, and consulting and services. The selection criteria for these sectors were based on their strategic relevance to national economic growth, as well as their demand for innovation, technology, and the modernization of services across the entire value chain. Additionally, executives from the automotive, construction, and infrastructure sectors were interviewed, however, these segments did not reach the minimum number of respondents required to be considered separately.

The survey included closed questions, using a scale from 1 to 6, to measure ten dimensions of the organizations' level of digital transformation, such as:

- **Strategy:** mapping opportunities and a clear vision of the future for both the company and the digital business, including short-, medium- and long-term plans and strategies to define the essential technologies for the transformation.
- **Governance:** adoption of structured governance and management mechanisms, such as the creation of forums and committees, definition of metrics and initiatives aimed at people management, organizational changes and strategic partnerships.
- **Digital processes:** the ability to adopt new business models and generate value through digital services and products, both internally, through digitalization and improved efficiency, and externally, through attracting new customers and partners.
- **People and culture:** promoting a culture geared towards digital transformation and the development of employees in this area, creating an environment that fosters innovation and digitalization.
- **Infrastructure:** the organization's ability to sustain the use of new technologies and large volumes of data through its IT infrastructure, ensuring adaptability and efficient integration of digital assets.
- **Data-driven decisions:** decision-making approach based on data and analysis, involving the collection, processing and interpretation of information to generate insights to guide strategies, operations and performance evaluations.

- **Technology strategy:** alignment between investments in technology and the organization's strategic objectives, ensuring support for innovation and transformation
- **Artificial intelligence (AI):** adoption and integration of AI into processes, services and products to increase company efficiency.
- **Digital customers:** collecting and analyzing customer data from various channels to personalize and improve the customer journey.
- **Technological frontier:** adoption of new emerging technologies and exploitation of innovations in the sector.

In addition, open questions were included regarding the main digital transformations that took place in the organizations over the past five years. Therefore, we generated the Brazil Digital Transformation Index, on a scale from 1 to 6, based on a quantitative analysis of the responses of the closed questions and conducted a qualitative analysis of the open questions to gain a deeper understanding of the key digital transformations highlighted by the executives in their organizations.

To generate the Brazil Digital Transformation Index, we employed the following specifications:

After tabulating the data, we proceeded to obtain the loads according to the distribution of dimensions. The loads were obtained by principal component analysis (PCA) using the statistical software IBM SPSS Statistics. PCA was used to find underlying dimensions in the data. PCA attempts to generate linear combinations of variables that capture as much of the variance of these observed variables as possible, and in PCA all of the variance is used. PCA is only concerned with determining which linear components exist in the data and how a specific variable contributes to the component [Dancey and Reidy (2006)].

PCA is conceptually less complicated than factor analysis and has several similarities with discriminant analysis [Field (2009)]. PCA was chosen because it generates an empirical summary of the dataset [Tabachinick and Fidell (2007)]. In this way, the principal component technique can be used to reduce the original variables to a smaller number of uncorrelated component. The adjusted model considering the factor scores as explanatory variables will no longer present the problem of multicollinearity, and all results and interpretations will now be based on the factors [Farrar and Glauber (1967)].

It is understood that the greater the correlation, the greater the weight. It is weighted by the correlation. Thus, the "Weight" data was calculated using the formula:

$$Weight_i = \frac{Load_i}{\sum_j^n \text{Load of the respective dimension}} \quad (1)$$

Once all the weights for each question and dimension were obtained, the "Base" data was prepared. A weighted average was calculated for each dimension and company using the following formula:

$$\text{Dimension per company} = (weight_{Q1} * data_{Q1C1}) + (weight_{Q2} * data_{Q2C1}) + (weight_{Q3} * data_{Q3C1}) + (weight_{Q4} * data_{Q4C1}) + (weight_{Q5} * data_{Q5C1}) + (weight_{Qn} * data_{QnC1}) \quad (2)$$

Where:

$Q_1$ = Question 1;
$Q_2$ = Question 2;
$Q_3$ = Question 3;
$Q_4$ = Question 4;
$Q_5$ = Question 5
$Q_1C_1$ = Question 1, Company 1;
$Q_2C_1$ = Question 2, Company 1;
$Q_3C_1$ = Question 3, Company 1;
$Q_4C_1$ = Question 4, Company 1;
$Q_5C_1$ = Question 5, Company 1;

In this case, a dimension index was created for each company.

## 3. Results

The results revealed a level of maturity that is still low, but which has evolved in relation to previous years, demonstrating managers' growing interest and concern about the issue. The majority of organizations (45.1%) adopt a cautious stance when it comes to investing in digital initiatives, allocating small amounts. On the other hand, 41% recognize digital transformation as a determining factor in their investment decisions, acknowledging its importance. However, only 13.9% consider digital transformation to be a strategic priority for the future of organizations, indicating a long-term vision that is still limited. In this way, it can be seen that a large number of organizations are adjusting and recognizing technology as an important factor in their strategy. The gains from digital transformation depend on complementary intangible investments, such as organizational restructuring, training and data infrastructure, which take time to develop [Brynjolfsson et al. (2021)]. This may explain the current gap between intent and execution when it comes to capturing value from new technologies in Brazilian firms.

The Strategy dimension was the best rated, which suggests that Brazilian companies are increasingly recognizing the importance of aligning digital transformation with their business strategies. In this context, digital transformation is no longer just a trend and has become a fundamental component in guaranteeing companies' competitiveness and success in the short and long term. A clear digital strategy makes it possible to optimize operations, improve the customer experience and reach new markets, an important competitive differentiator to position companies as leaders in their respective sectors. Advanced AI could significantly boost global economic growth, but only when implemented through deliberate, well-aligned strategies [Davidson (2021)]. For Brazilian firms, this implies that the perceived strategic value of digital transformation must translate into clear and measurable roadmaps to unlock these broader benefits.

In this context, 76% of respondents indicated that strategic and future business vision is the term that best defines the understanding digital transformation in their organizations, followed by analytical model and process improvement (61%) and technological development with a customer focus (53%). This data shows that, in addition to strategic alignment, companies are also looking to optimize internal processes and improve the customer experience. However, although companies understand this importance, many still don't have clear and structured plans for the effective implementation of digital transformation. When it comes to developing digital strategies, the majority of respondents (34%) focus on drawing up a digital strategic plan, while others focus on improving processes and operational efficiency (19%).

On the other hand, the data-driven decisions dimension received the worst rating, indicating that companies face difficulties in transforming large volumes of data into valuable insights on which to base strategic decisions. Although data collection has advanced, the ability to generate value from this data is still a challenge, as Brazilian firms are still in early stages of developing the analytical and algorithmic capabilities. Advanced machine learning models, such as gradient boosting machines have proven effective in extracting predictive patterns from complex datasets and are widely adopted in digitally mature ecosystems [Friedman (2001)]. However, their application in Brazil remains limited. Therefore, adopting a data-driven culture requires significant changes in the organizational culture, involving everything from leadership to employees at various levels. This requires continuous training, ensuring that all members of the organization feel empowered to work with data efficiently.

In addition, companies reported difficulties in attracting and developing talent with the new digital skills required. Even so, they showed concern about complying with the General Data Protection Act (LGPD) and mitigating risks related to the digital transformation, with a view to guaranteeing the privacy and security of information, with 92% of respondents having the ethical and moral use of digital data and technologies as part of their strategy. In addition, 95% say that information security is aligned with governance and compliance, helping to avoid risks and security breaches.

## 3.1 Emerging trends

The adoption of emerging technologies in Brazil reveals a paradoxical reality: while companies seek to modernize processes and gain efficiency, structural obstacles still hinder the consolidation of a systemic digital transformation. Factors such as inflation and restrictive economic policies reduce companies' capacity to take steps toward deep digital transformation, causing digital projects to remain mostly in the background. Additionally, the country's complex tax system results in bureaucratic dysfunction, with a heavy administrative burden that compromises companies' operational time and resources.

These contradictions become particularly evident when comparing the national scenario with the global landscape. The study in question indicates a decline in technological infrastructure, with a drop from 3.7 to 3.6, signaling limitations in connectivity, legacy systems, and computational capacity. Although computational capacity continues to improve globally, the cost-benefit is still inaccessible for many organizations, especially in emerging economies with outdated infrastructure [Besiroglu and Hobbhahn (2022)].

According to the IMD, technologies such as artificial intelligence (AI), robotics, and the internet of things (IoT) have gained prominence in global business strategies. AI, for instance, was identified by 20% of respondents as the primary technology adopted, reflecting a growing trend of automation and productivity gains. Its applications range from internal process automation to customer service through chatbots and virtual assistants. Emerging forms of AI, such as large language models (LLMs) like GPT-3 and GPT-4, are already reshaping the nature of work by transforming tasks that involve information processing, writing, and programming. AI adoption is not only about access to tools, but also about the ability to redesign organizational processes and upskill the workforce to fully leverage these technologies. Even in advanced economies, the adoption faces organizational and infrastructural constraints [Eloundou et al. (2023)]. In Brazil, the implementation of AI faces recurring challenges, including a shortage of qualified professionals, low analytical culture, and inadequate technological infrastructure in many organizations. Although the index shows a significant improvement in the AI dimension (from 2.4 to 3.7 on a scale of 1 to 6), this progress falls short of indicating consolidation.

Robotics, mentioned by 11% of companies, has been instrumental in automating tasks and processes, reducing costs, and increasing efficiency. Additionally, robots can be integrated with human labor, making automation more flexible and adaptable to market needs. The growing demand for automation in Brazil reflects companies' pursuit of greater competitiveness, particularly in the industrial and logistics sectors, especially amid a shortage of specialized labor.

The internet of things (IoT), cited by 9%, enables the connection of devices and sensors for real-time data collection and transmission, facilitating the creation of intelligent and interconnected environments. However, the high implementation cost remains a barrier to widespread adoption, particularly for small- and medium-sized

enterprises. In this context, the expansion of 5G technology in the country is seen as a promising opportunity to broaden IoT usage in the coming years.

The application of 5G technology in Brazil represents not only a technical advancement but also a strategic political movement toward modernizing the country's digital infrastructure. Coordinated by Anatel (National Telecommunications Agency) and driven by public policies involving various government levels, the national plan envisions the phased installation of antennas by 2029. Since July 2022, when the first commercial antenna was activated, 5G coverage has reached all Brazilian municipalities, operating in the 3.5 GHz band and offering speeds up to five times faster than 4G. The schedule, defined within a regulatory environment supported by Congress and federal agencies, stipulates that by July 2025, municipalities with over 500,000 inhabitants will be served, extending to all cities with more than 30,000 inhabitants by 2029. The network expansion, in addition to facilitating the installation of fifth-generation stations by operators, also symbolizes a political agenda focused on innovation, economic digitalization, and global competitiveness. In this context, the EAF (Entity for Band Management) plays a crucial role in assisting the population's transition from traditional satellite dishes to digital ones.

Thus, 5G emerges as a political and economic transformation tool, essential for productivity, sustainability, and reducing connectivity access inequalities. Still, technological transitions at the national level require a blend of market forces and long-term policy to be successful [Korinek and Suh (2024)]. The 5G deployment in Brazil is a prime example of this coordination, but its long-term impact will depend on how well the ecosystem of public, private, and civil society actors work together to enable scalable adoption. This collaborative approach is essential not only for the integration of 5G but also for preparing the country for the future of more advanced technologies.

Beyond these technologies, 25% of companies mentioned the use of more specific solutions, such as financial tools, computer vision, and biotechnology, indicating a trend toward technological customization according to each productive sector's demands. Even when automation technologies become economically viable, their adoption depends on task-specific cost-effectiveness and the feasibility of labor substitution, due to high deployment costs, limited accuracy improvements and other factors that are highly sensitive to local economic and organization contexts [Svanberg et al. (2024)]. This behavior suggests that Brazil has the capacity to explore advanced technologies but still lacks structural conditions, such as training, governance, and well-defined strategies, to support this expansion in a continuous and widespread manner.

This is precisely where the contrast with the international scenario becomes more evident. In the IMD World Digital Competitiveness Ranking 2024, Brazil ranks 57th among 67 countries, behind Latin American neighbors like Chile (47th) and Colombia (55th), and far from leaders such as Singapore, Switzerland, and Denmark. While these economies heavily invest in foundational digital education, data infrastructure, applied research, and intelligent regulation, Brazil still struggles to align its technological strategy with its economic reality. This disconnect manifests in various areas: high capital costs (driven by the elevated interest rate), low regulatory predictability, fragmented innovation tax incentives, and educational inequality, which hinders the development of a critical mass of professionals capable of leading or sustaining large-scale digital transformations. Currently, Brazil still faces high levels of social

and educational inequality, with limited education outside major urban centers. The lack of qualified technology professionals is identified by executives as one of the main obstacles to digital transformation, making it challenging for companies to train digital leaders and disseminate knowledge internally, thereby compromising cultural change.

Nevertheless, there are positive signs. The digital governance dimension showed a significant improvement in the index, rising from 2.9 to 3.9, reflecting the creation of internal forums, innovation committees, and more structured digital strategies within companies. The "strategy" dimension, in turn, was the highest-rated (4.1), indicating that the discourse on digital transformation is already embedded in executive agendas.

From this perspective, the financial services sector stands out, exhibiting the highest level of digital maturity among the sectors analyzed. This performance can be explained by the need to offer fast and secure services while handling large volumes of data. Digitalization has enabled banking services to be carried out in an accessible manner, anytime and anywhere, with high efficiency. The regulatory environment has been a key factor in fostering digital transformation within the sector, with the Central Bank of Brazil implementing initiatives such as open banking, which allows for the secure sharing of data among financial institutions, and PIX, an instant payment system that promotes greater competitiveness and innovation in the financial market. Additionally, Brazil has a large fintech ecosystem that has been leading innovation in the financial sector. The growth of these startups has pressured traditional banks to adopt new technologies or even form partnerships with fintechs in order to remain competitive. This movement has further accelerated digital transformation in Brazil's financial sector. As a result, the financial services sector has become a benchmark for digital transformation, serving as a model for other sectors.

The challenge now is to turn discourse into practice. For that, it is not enough to adopt isolated technologies or follow market trends: it is necessary to train people, redesign processes, invest in governance, and connect the digital agenda to the country's broader economic and social development goals.

## 3.2 Barriers to digital transformation

The implementation of digital strategies faces structural and cultural challenges within companies, which compromise the progress of digitalization effectively. The integration of technologies into businesses strategies depends not only on adoption, but on the firm's ability to overcome organizational inertia, invest in intangible assets, and develop new work process [Bresnahan (2019)]. These aspects are particularly challenging in economies with lower digital maturity, such as Brazil, where the workforce lacks training and access to adequate infrastructure.

The biggest barrier identified is the organizational structure and culture that is resistant to change, pointed out by 49% of the businesses. This figure shows that almost half of the companies surveyed have a high degree of resistance to digital implementation. This resistance is associated with the difficulty of adapting traditional processes to new technological approaches, as well as a lack of incentives for innovation. Despite the growing availability of advanced analytical tools, most companies in Brazil are still far from fully leveraging unstructured data for strategic purposes. The extraction of value from data, such as text, logs, or customer feedback, requires not only robust modeling frameworks and computational power but also data literacy and the ability to apply the right models to extract meaningful insights. The lack of data literacy

and algorithmic understanding further reinforces the cultural resistance to digital transformation, making it difficult for companies to move beyond superficial digital initiatives [Blei et al. (2003)].

In addition, 22% of companies report a lack of strategic vision for digital business models as a significant obstacle, indicating that many organizations have not yet developed a structured plan for digitalization. Risk aversion (20%) and lack of experience in digital projects (17%) indicate that initially adopting digital processes can generate uncertainty about the transformation of historically traditional company practices. Risk-averse companies tend not to invest in digitalization and innovation projects, restricting their growth in this area and depriving employees and management of valuable learning from these experiences.

> **“The real challenge lies not in technology, but in governance mechanisms.**

However, the obstacles are not limited to companies' internal dynamics. They are strongly influenced by external structural factors, particularly those related to the economy, politics, and technological accessibility in the country. The diffusion of digital technologies is often uneven, with large firms and leading sectors benefiting the most, while smaller businesses struggle to access and implement these technologies. This dynamic increases economic inequality, as those unable to invest in digital transformation are left behind, further widening the gap between more and less competitive firms [Bresnahan (2019)]. The high cost of capital in Brazil, driven by a restrictive monetary policy aimed at controlling inflation, makes it difficult for companies to access funding for innovation projects, especially small- and medium-sized enterprises. In this context, more complex digital initiatives become risky and less viable, reinforcing a preference for safer and less transformative operational models.

On the political-institutional front, the absence of an integrated and long-term public policy focused on digitalization limits the systemic advancement of digital transformation. Although important federal initiatives exist, such as the National IoT Plan, the Brazilian Strategy for Digital Transformation (E-Digital), and the expansion of 5G, they still lack continuity, integration with state and municipal governments, and coordination with the productive sector. Moreover, regulatory uncertainty surrounding topics such as artificial intelligence, data governance, and cybersecurity contributes to companies' hesitation in investing in cutting-edge solutions.

Another critical issue is the disparity in access to basic digital infrastructure, which still persists across several regions of the country. The connectivity gap, especially outside major urban centers, hinders the full digitalization of production chains and reinforces digital exclusion for both businesses and workers. This barrier to technological accessibility directly impacts the level of digital maturity observed across sectors and regions, keeping the country at an intermediate position in international rankings. These structural limitations are not only technical but also socio-economic. Technological progress, when not accompanied by inclusive labor policies and investments in education, tends to reduce the labor share of income, disproportionately benefiting capital and exacerbating inequality [Elsby et al. (2013)]. In Brazil, this dynamic is already visible in the unequal access to digital training and in the concentration of digital capabilities within a few sectors and regions.

Internally, the lack of a structured and clear process for the stages of digitalization within organizations remains a significant barrier. More than half of the companies (56%) emphasize that it is necessary to carry out the digital transformation as a robust internal plan, so that it is possible to measure the performance of the proposed stages. Another relevant aspect is the difficulty in economically evaluating digital projects, identified by 32% of companies. Innovation and digitalization need to be able to boost companies' ability to convert capital. Standardized methodologies for measuring the effectiveness of technological initiatives are therefore essential. This reinforces the need for clearer guidelines for integrating new technologies into the core business, as well as within existing projects (31%).

The main gap for Brazilian companies today lies in the strategic planning and management of digitalization initiatives (27%). The role of leadership is essential for centralizing the digital transformation within the corporate culture, as well as defining the initial scope of the plan. Through this responsibility, it is possible to achieve other opportunities for improvement, such as operational efficiency by improving processes and using assertive technological tools.

## 3.3 Impacts

The impacts of digitalization are significant and cover various organizational dimensions. In the operational context, there has been a significant increase compared to previous analyses, and the impact of digitalization in this segment is expected to grow. 75% of companies say that digital transformation significantly improves the efficiency of internal processes. Digitalization makes it possible to automate repetitive tasks, optimize workflows and improve resource allocation, resulting in reduced operating costs and greater productivity. AI and related technologies can enhance the productivity of mid-skill works by embedding expert knowledge into the tools and systems they use. This allows a broader range of workers to perform complex tasks that were previously limited to highly skilled professionals. However, for organizations to fully realize this potential, it is essential that they actively support the transition [Autor (2024)].

Another impact to be analyzed is in terms of the company's internal culture, with 47% of organizations indicating that digitalization contributes to a significant cultural change, promoting a mindset with tendencies towards innovation and new practices, which consequently contributes to greater acceptance of digital habits.

In terms of consumers, 43% of companies identify greater customer orientation as a positive impact of digitalization, allowing for a more personalized response to consumer needs, as well as an in-depth understanding of their behavior in terms of how they relate to companies. This is fundamental to boosting the organization's ability to influence the market, offering solutions and products that are assertive in relation to customer demands. In addition, 38% of organizations point to an improvement in decision making, driven by the adoption of analytical technologies and business intelligence tools that help managers understand internal and external factors and guide the company's decision making. Overall, 85% see benefits generated by digital transformation practices.

Although the indicators are positive for procedural increases and gains in internal operational efficiency, the dimension of generating new types

of service and business offer is less prominent than the others. In other words, a closer look is needed to validate the real potential for creating digital transformation, based on an analysis of the challenges faced in the digitalization process.

In the area of sustainability, more than half of the companies assess the impact of digital transformation on their ESG strategy (55%). Although this is considered a significant figure, it indicates that there is still considerable room for improvement within organizations in this respect. This reflects the need for greater integration between technology and social and environmental responsibility. The lack of digital integration between companies and ESG may be due to factors such as internal culture, and there needs to be internal practices and initiatives that encourage contact with digital tools. Furthermore, there needs to be awareness of ESG issues within companies, so that structured and effective plans can be designed to achieve this. It is important to highlight the high percentage of companies that have not adopted technologies to mitigate ESG-related risks (48%) for stakeholders, with room for an increase in the percentage of companies with related processes in the development stages.

As far as compliance is concerned, with the implementation of emerging technologies of great value to organizations, ethical, moral and data security challenges must be taken into account. In this context, 92% of organizations consider the ethical use of data to be a strategic priority, while 95% say that information security is aligned with corporate governance, showing a growing commitment to regulatory compliance. These aspects are capable of strengthening investor security, although they require complex internal plans and structures at considerable cost, as well as an active role for management to implement them assertively.

# 4. Recommendations

Given the evidence gathered by the research and the contrast between Brazil's performance and that of more advanced economies in terms of digital transformation, it becomes essential to reflect on the possible paths the country can take to accelerate its digital maturity.

The comparative analysis with the IMD World Digital Competitiveness Ranking 2024, in which Brazil ranks 56th out of 67 countries, highlights a set of global best practices that can inspire structured and long-term actions. Countries such as Singapore, Switzerland, Denmark, and Sweden, which lead the digital competitiveness rankings, share characteristics that go far beyond technology: they treat digitalization as a state policy, rather than a government agenda.

## 4.1 Digital education starting at the basic school level

Building human capital with technological skills goes beyond training professionals for the IT market, it involves embedding digital thinking as a transversal competence. In Brazil, however, the responsibility for digital education still falls primarily on companies, often without systematic support from the public sector. It is essential that digital skills be integrated into basic and technical education curricula, and that partnerships between universities, the private sector, and government be encouraged to foster talent development. The absence of national programs for digital reskilling and inclusion deepens regional inequalities and limits the reach of digital transformation.

## 4.2 Strengthening digital governance

The first essential step is to strengthen digital governance by structuring digital transformation committees and creating clear metrics for monitoring the implementation

of new technologies. These committees should act in a multidisciplinary way, involving stakeholders from different hierarchical levels, ensuring that the digital strategy is aligned with long-term organizational objectives. In addition, the definition of information security and digital compliance policies is crucial to ensure compliance with legislation such as the LGPD and international data protection guidelines.

### 4.3 Developing a digital organizational culture

Resistance to change is one of the main obstacles to adopting new technologies. It is therefore essential to promote an organizational culture that values experimentation, continuous learning and collaboration between teams. Companies should invest in training their employees, providing training on new technologies, agile methodologies and analytical tools. Encouraging intrapreneurship can also be a differentiator, allowing employees themselves to develop innovative solutions in line with the corporate digital strategy.

### 4.4 Digital infrastructure

In leading countries, digital infrastructure is widely accessible, even in less developed regions. Brazil has made progress in this area with the expansion of 5G, but still faces challenges related to connectivity, data storage, and computing capacity. The country needs to increase investments in data infrastructure not only in major urban centers but also in rural areas and urban outskirts, ensuring that digital innovation is not a privilege for a few. Tax incentives for companies implementing technological solutions in low-coverage regions, as well as technical support programs for small- and medium-sized enterprises, can be effective ways to democratize access to digitalization.

### 4.5 Stable regulatory environment

In the top-ranking countries in the IMD, a stable, transparent, and up-to-date regulatory environment has been key to attracting investment and boosting innovation. Clear regulations on data protection, artificial intelligence, and cybersecurity provide legal certainty for companies to innovate responsibly. In Brazil, although important frameworks such as the LGPD exist, there are still significant gaps regarding topics like the ethical use of algorithms, open innovation, and generative artificial intelligence. Developing modern and responsive regulation is essential to build trust among economic actors and promote the adoption of emerging technologies in a safe and strategic way.

### 4.6 Strategies for evaluating and measuring digital impacts

The difficulty in economically evaluating digital projects can be mitigated by adopting digital return on investment (ROI) measurement frameworks, such as objectives and key results (OKRs) and key performance indicators (KPIs). These tools allow organizations to measure, quantitatively and qualitatively, the impacts of digitalization in different sectors of the company. Benchmarking and the use of predictive data can also provide relevant insights for decision making.

### 4.7 Integrating digital transformation into ESG practices

The implementation of digital solutions must be aligned with environmental, social and governance (ESG) guidelines, ensuring that innovations contribute to reducing the carbon footprint, optimizing resources and strengthening corporate transparency. Companies that adopt digital technologies to improve their environmental and

social practices tend to obtain greater perceived value from the market and consumers, as well as positioning themselves as leaders in social and environmental responsibility.

### 4.8 Adoption of emerging technologies and artificial intelligence

Investment in emerging technologies such as AI, the IoT and blockchain can significantly accelerate companies' digital maturity. However, its implementation requires strategic planning and a robust governance structure. Organizations must establish partnerships with universities, startups and research centers to foster innovation and ensure that they position themselves as leading players amid the scenario of technological transformations.

In summary, it is evident that the most digitally advanced countries in the world integrate digital transformation across their economic, industrial, and social development plans. It is not treated as a parallel agenda, but as a pillar of sustainable growth. In Brazil, there is still a fragmentation of initiatives across different levels of government and a lack of clear targets for digitalization within major national programs, such as the Growth Acceleration Program (PAC) or the Multi-Year Plan (PPA). To overcome this scenario, it is essential to include concrete digital maturity goals in Brazil's official planning strategies, promote sector-specific evaluation indicators, and strengthen the role of digital transformation as a strategic axis for national competitiveness.

## 5. Conclusion

The trajectory of digital transformation in Brazil is marked by significant progress, but also by structural challenges that continue to hinder its consolidation. The survey results show that although Brazilian companies recognize the importance of digital transformation, there is still a long way to go before digitalization is fully integrated into their strategies and operations. Most organizations operate reactively, with isolated initiatives that are not embedded in a long-term strategy, which limits their potential for innovation and sustainable growth.

Although digital discourse is increasingly present in corporate agendas, its effective consolidation still faces significant internal and external barriers. Structurally, these include deficient technological infrastructure, the absence of integrated public policies, and a shortage of qualified labor. Internally, factors such as cultural resistance, lack of a clear strategic vision, and difficulties in measuring the economic impacts of digital projects hinder progress in digital maturity within organizations.

On the other hand, there have been meaningful advances, particularly in the adoption of AI, the IoT, and data analytics solutions to enhance decision making and build a more innovative, resilient, and connected economy. Sectors like financial services already show that there are viable paths forward, which can be replicated, through proper regulation and innovation incentives, to accelerate digitalization and bring gains in efficiency, security, and competitiveness.

However, for digital transformation to be effective and produce lasting impacts, a coordinated effort between businesses, the state, and academia is essential. Above all, digitalization must no longer be treated as a sector-specific agenda but rather as a strategic pillar of national development. In this sense, companies must strengthen their digital governance, invest in workforce training, and align their technology strategies with market demands. At the same time, the public sector must promote long-term policies, invest in the development of digital skills, encourage research and innovation, and expand technological infrastructure equitably across the country.

The future of business competitiveness in Brazil will depend on organizations' ability to adapt and innovate. Digital transformation should not be seen merely as a trend, but as a critical strategic differentiator and a decisive factor in driving the country's productivity and competitiveness.

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