

Siemens Customer Survey | Result Report

Digitalization – Trends and Solutions for a More Competitive Brazil 2015

Contents

Foreword Page 3

Paulo Stark
CEO and President Siemens Brazil

Final considerations Page 23

Introduction Page 4

Part 1: Siemens Customer Survey on Digitalization in Brazil 2015 Page 5

Part 2: The Competitive Environment for Digitalization in Brazil Page 17

Foreword



Paulo Stark

CEO and President
Siemens Brazil

The importance of digitalization for the competitiveness of Brazil's industry and infrastructure.

Digitalization is having a growing impact on daily operations, and it can serve as a catalyst for achieving significant progress toward higher levels of competitiveness. Siemens believes that digitalization will lead to new business models and fundamental changes in markets and business strategies. Consequently, we've developed solutions that are essential for mastering the resulting transformations, and we've paved the way for this new era.

Over the past 20 years, Brazilian industry has taken important steps toward incorporating sustainable environmental development and social responsibility into its business. But it has also faced obstacles – such as the international economic situation and the unfavorable domestic environment. Over the years, those issues have reduced the manufacturing sector's share of the national GDP.

Therefore, it's vital for Brazilian industry to enhance its global competitiveness significantly so that it can become a more relevant and active player on international markets.

Comprehensive, reliable and intelligent infrastructure is another important means of ensuring the availability of the resources required for continuous and sustainable development of industry and business. If Brazil's plan for boosting its competitiveness is to succeed, the country will need a robust national system that's able to handle demand peaks, manage contingencies and increase energy efficiency.

In terms of infrastructure, meeting these objectives will also require roads and railroads that feature all the capabilities that

digital technology offers in terms of control and efficiency. Ports and airports then complete the picture by facilitating the internal flow of resources and providing access to indispensable export channels.

Government and the business community, together with industrial and labor organizations, are currently discussing the conditions required for increasing the country's competitiveness in order to provide a basis for sustainable growth over the next few years.

To enable that growth, increasing the efficient use of resources, skills and expertise should be the primary aim of all participants in the value chain. Ensuring that these efforts remain in constant harmony with sustainability requirements will enable us to master the challenges of today and tomorrow.

Digitalization of infrastructure and industry presents a window of opportunity for boosting competitiveness by increasing productivity and enabling Brazilian companies to achieve greater integration into the global value chain.

Those are the reasons why we'd like to present the results of our survey-based study entitled **“Digitalization – Trends and Solutions for a More Competitive Brazil.”** We conducted this study in partnership with Fundação Dom Cabral, in order to gain a better understanding of digitalization perspectives in Brazil.

I wish you pleasant reading!

A handwritten signature in blue ink that reads "Paulo Stark". The signature is fluid and cursive, with a large initial "P" and "S".

Paulo Stark

Introduction

The trend toward digitalization is rapidly growing in significance as a means for achieving high levels of competitiveness. Siemens believes that digitalization will optimize processes, enable new business models and cause great changes in markets and business strategies.

Digitalization is a broad concept with many technological ramifications. Consequently, identifying the digital applications that will enable companies and industries to reach the next level of productivity, and thus of competitiveness, presents a tremendous challenge.

With that in mind, Siemens Brazil collaborated with the renowned Brazilian business school Fundação Dom Cabral (FDC) on a survey-based study entitled “**Digitalization – Trends and Solutions for a More Competitive Brazil 2015.**” This research was designed to analyze how digitalization is understood in Brazil and uncover the resulting trends and opportunities for Brazil’s industrial and infrastructure segments. To do this, it integrates a range of perspectives that, when combined, enable a much more accurate understanding of digitalization and of the opportunities that this trend is creating in Brazil.

Part 1 of this survey discusses the results of the Siemens Customer Survey on Digitalization in Brazil – a perception survey involving about 250 CEOs, CIOs and specialists from Brazilian companies. It was conducted to determine how Brazilians view digitalization and how they’re handling digital initiatives and strategies.

Part 2 examines the overall competitive environment in Brazil as it relates to digitalization. Two separate analyses deliver insights into Brazil’s competitive situation. The first examines data from the World Economic Forum to compare digitalization-relevant conditions in Brazil with those in other countries. The second uses the Competing Data Framework and a broad-based survey (in this case, not just Siemens customers) to map how Brazilian companies approach innovation. The goal of integrating these analyses is to enable a better understanding of how Brazilian companies are likely to address the trend toward digitalization.

Finally, Part 3 provides a very brief overview of the status of digitalization in Brazil. Overall, there’s a strong perception that Brazil is in a transitional period and that digitalization could present an opportunity to prepare the country for a new cycle of technology-driven development. Its benefits might be even greater than expected.

Part 1

Siemens Customer Survey on Digitalization in Brazil 2015

Executive summary of the Customer Survey Results

For many economies, digitalization provides a tremendous opportunity to increase their competitiveness. This customer survey analyzes the current situation in Brazil and seeks to determine how relevant digitalization is considered to be, how the concept is generally understood and which of the potential benefits are receiving special attention. To do this, Siemens surveyed about 250 decision-makers in Brazil from different industries, which can be grouped into two sectors: 63% work at industrial companies and 37% in the area of infrastructure.

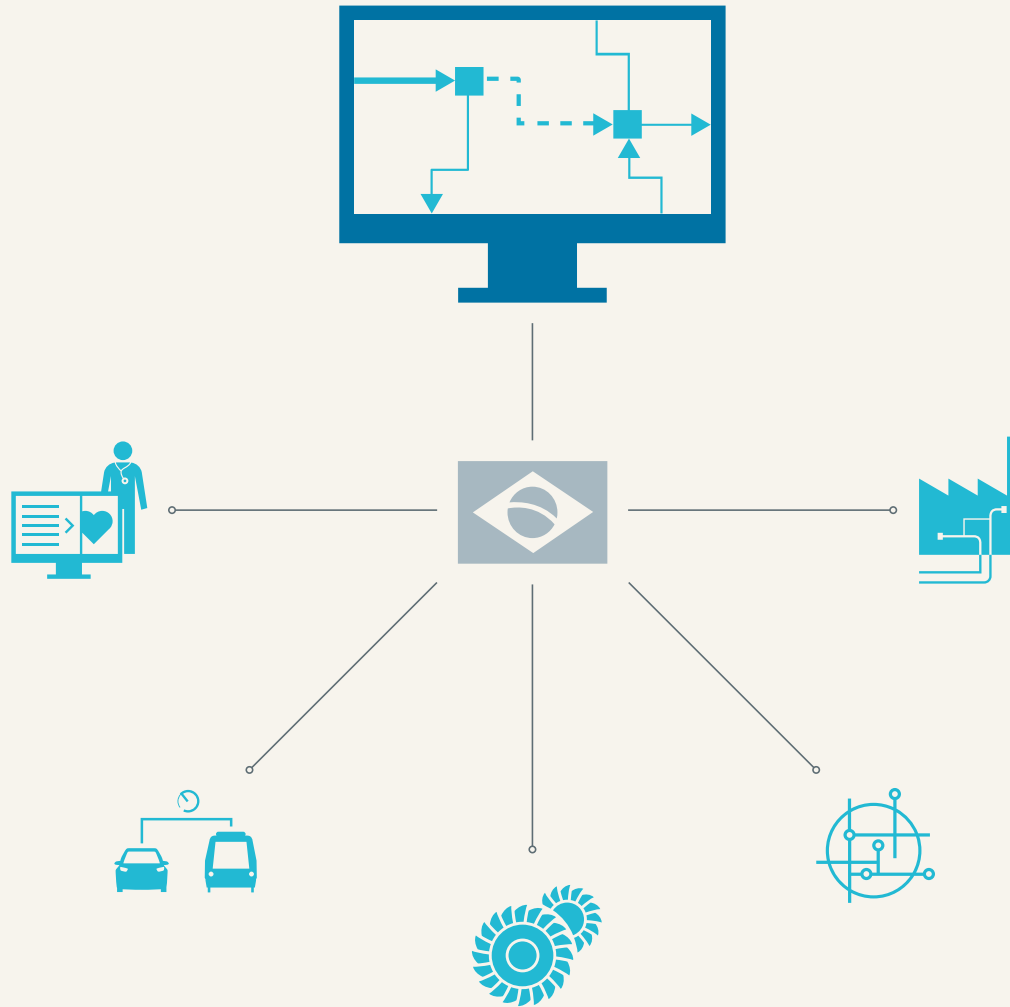
Brazilians tend to hold a traditional view of digitalization. Nearly half the respondents view it as the process of converting information, processes and systems that were originally analog into a digital format.

Overall, the respondents have high expectations for digitalization: 85% hope that it will make it possible to boost the Brazilian manufacturing sector's efficiency and competitiveness. In the area of energy management, 82% expect this to happen.

For the most part, Brazilian companies are approaching this challenge in a well-structured manner: nearly three-quarters of the surveyed Siemens customers have developed an overarching digital strategy. In the majority of the cases, the unit that bears central responsibility for this topic is part of the IT organization.

The respondents mentioned their company's structure or culture as the greatest internal barrier, followed by high licensing costs and a lack of clear business benefits. Regarding the framework conditions outside the company, they pointed to the fear of data theft and a lack of tax benefits for the corresponding investments.

Discussion of the survey results

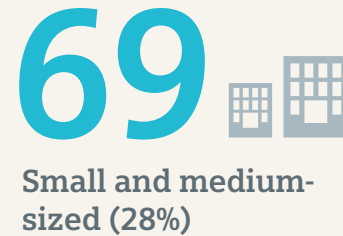
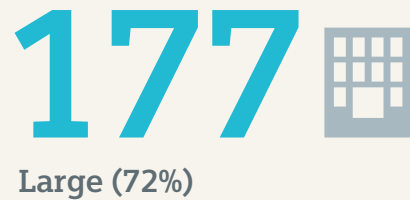


Siemens has performed this perception survey to determine how important digitalization is to Brazilian companies from a variety of industries.

However, the survey does more than analyze the basic understanding of this concept, the expectations associated with it, its fields of application and the barriers to implementation. It goes beyond these topics to find out what structures Brazilian companies are using to manage their digitalization efforts and where responsibility for this topic is located within their organization's hierarchy.

Survey scope: about 250 decision-makers from 21 industries

Company size (N=246 respondents)



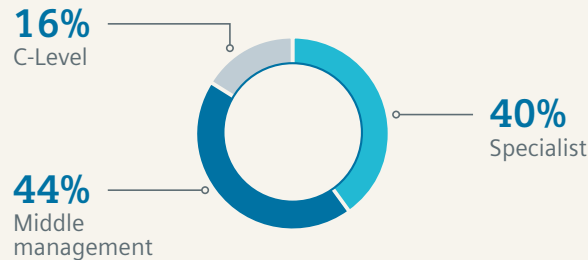
As part of this customer survey, which was conducted in February and March 2015, Siemens spoke with nearly 250 decision-makers active in 21 industries. Among the respondents, 72% work for large companies, and about 28% for small and medium-sized businesses.

The majority of the respondents were decision-makers in positions of leadership: 44% are in middle management, 16% hold a C-level position. The remaining 40% work as specialists in areas such as IT, innovation, development or process management.

Sector (N=246 respondents)



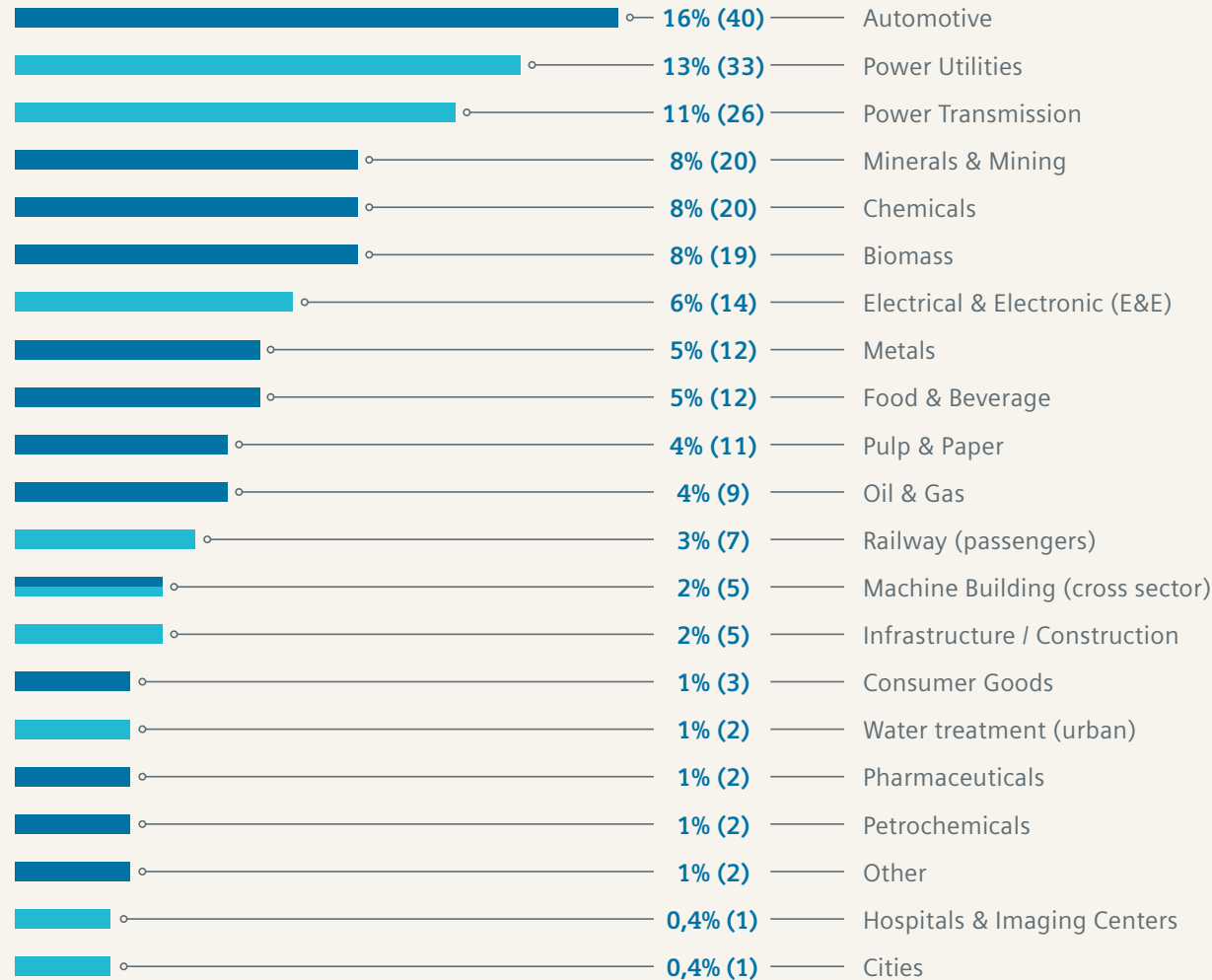
Position (N=246 respondents)



Survey scope: about 250 decision-makers from 21 industries

Industry that the customer is in

(N=246 respondents, ■ Industrial sector, ■ Infrastructure sector)

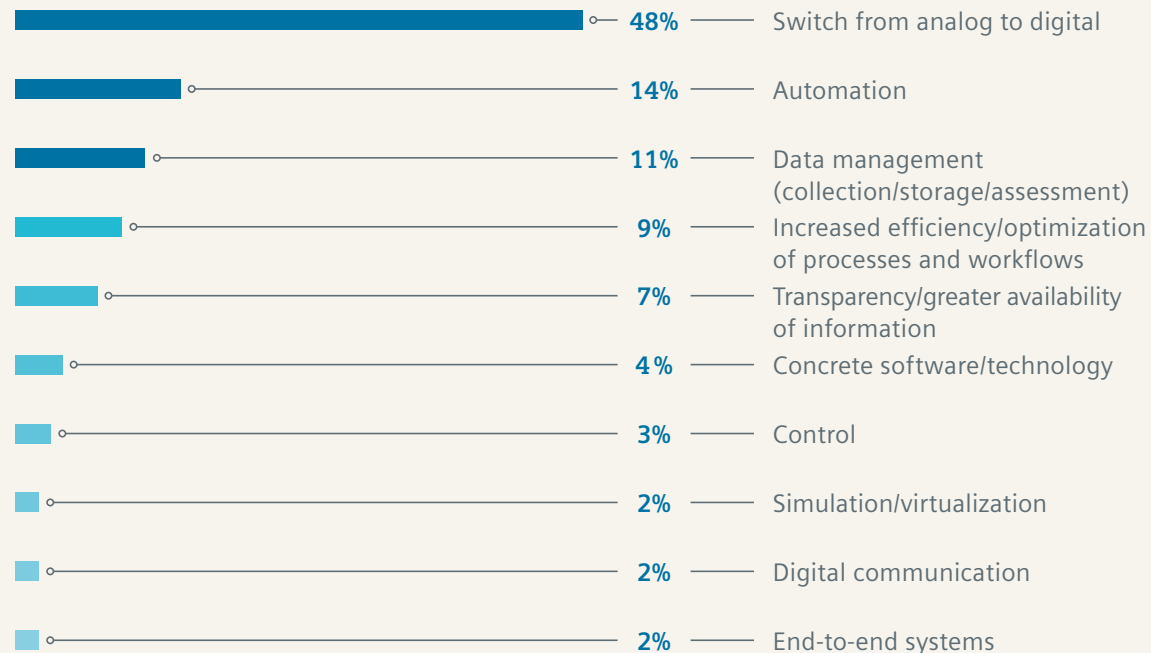


The total of 21 industries were clustered into two categories: 152 respondents from fields of business such as the automotive, minerals and mining, chemicals, food and beverage, and oil and gas industries were categorized as belonging to the industrial sector. Another 94 participants from the power utilities, power transmission and railways industries were grouped together in the infrastructure sector.

Main aspects of digitalization

What does the term “digitalization” mean to you?

(N=246 respondents, multiple answers possible, responses clustered)



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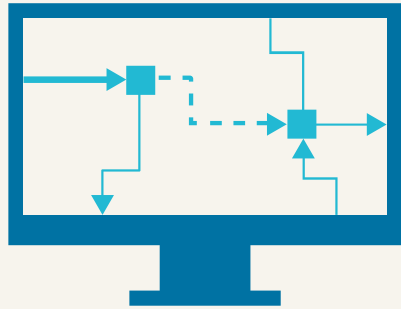
The Brazilian survey respondents have a relatively traditional understanding of what digitalization is. They primarily view this concept as the process of switching from analog information and processes to digital ones. This aspect was named by 48% of the Siemens customers.


Other potential aspects of digitalization, on the other hand, play a subordinate role. For example, only 14% of the respondents cited automation as an important aspect. One in nine (11%) mentioned the acquisition, storage and analysis of data (data management). The comparison between the industrial and infrastructure sectors reveals that data management is more important for the former (13%) while the latter has a stronger focus on optimizing processes (16%).


Impact on competitiveness


To what extent does digitalization help solve the following structural problems and thus boost Brazil's ability to compete?

(N=246 respondents)



209  **85%**
When it comes to boosting the efficiency and competitiveness of Brazil's industrial sector and fields of business

202  **82%**
In the area of energy management

150  **61%**
In the area of water resource management

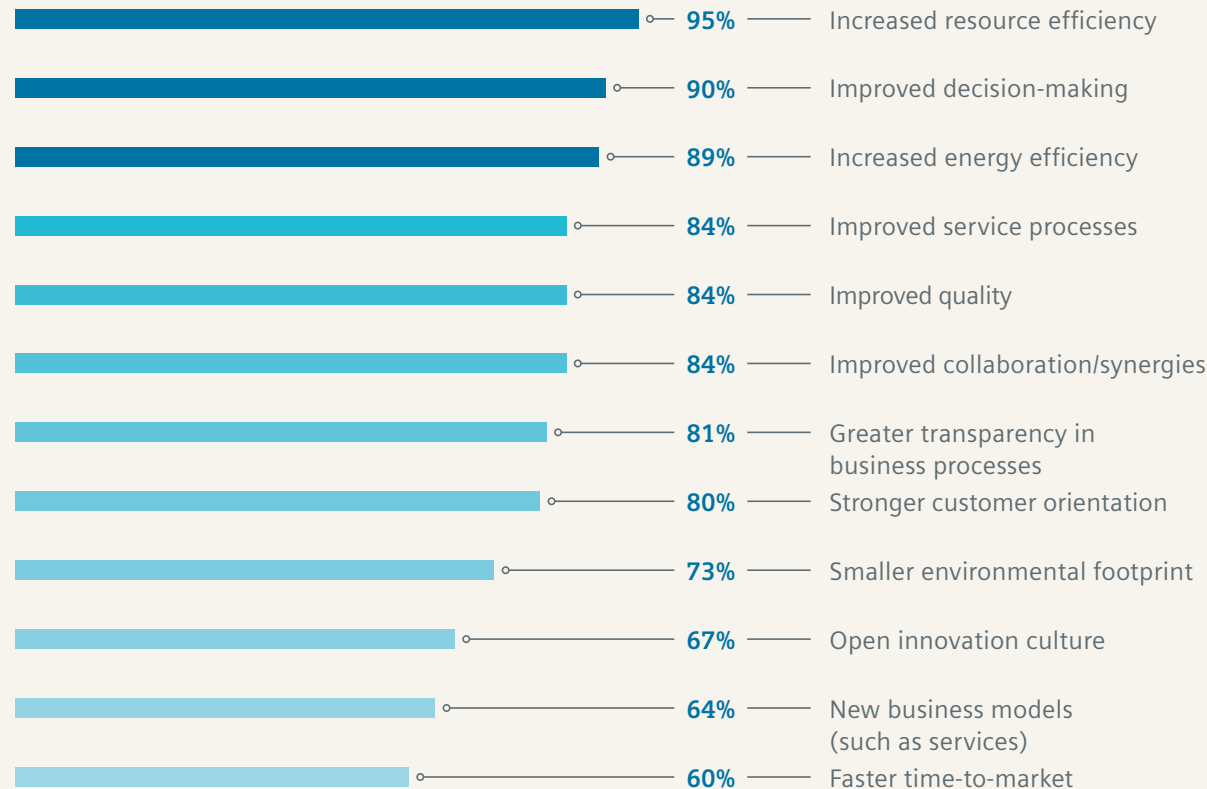
Respondents from across both sectors hope that digitalization will increase the Brazilian economy's efficiency and competitiveness, with 85% expecting positive effects here. Moreover, 82% of the participants anticipate benefits in the areas of energy management. Another 61% think digitalization will also have a positive impact on the management of water resources.

Assessed as belonging to one of the two top categories: "helps much" or "helps"

Impact on competitiveness

What benefits do you expect to gain from digitalization? What specific impact will this have on your business/company?

(N=246 respondents, multiple answers possible)

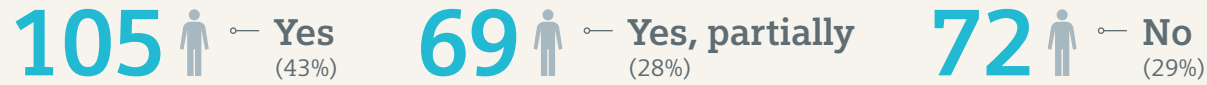


When asked about the impact on their own companies, the respondents cited many areas in which they see potential for improvements in their daily business. For example, 95% are looking to increase resource efficiency. Nearly an equal number (90%) expect optimization of decision-making processes or increases in energy efficiency (89%). While process-oriented aspects are generally considered to be of greater importance, factors such as time-to-market (60%), the establishment of new business models (64%) and the shaping of a corporate culture that's open to innovation (67%) were considered less significant.

Digitalization and business strategies

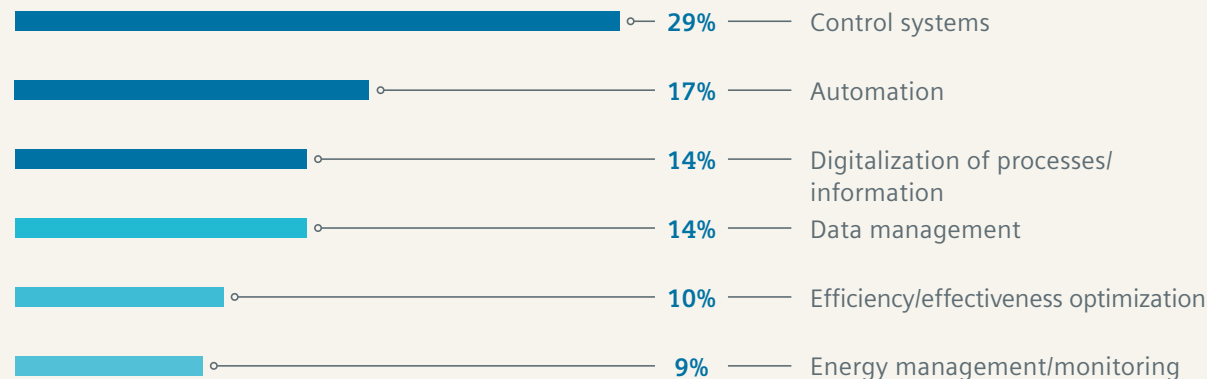
Would you say that you've already developed an overarching "digital strategy"?

(N=246 respondents)



Could you briefly describe this strategy?

(N=174 respondents, multiple answers possible, responses clustered)



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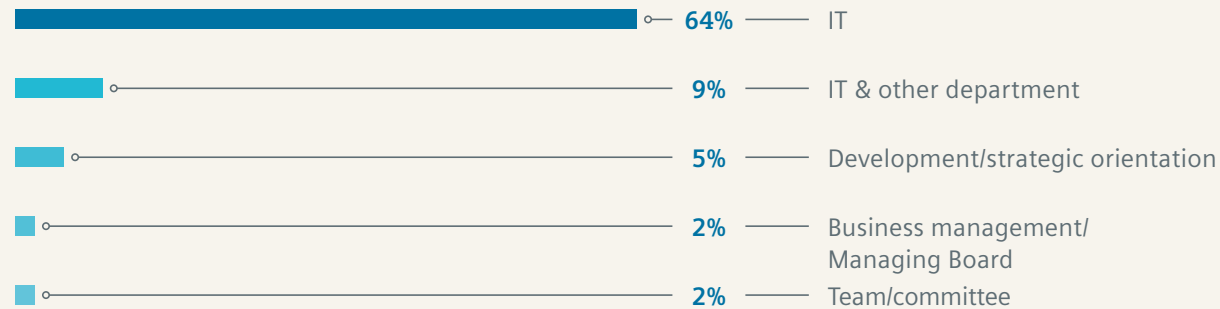
Among the surveyed Siemens customers in Brazil, 43% have developed an overarching digital strategy within their company. At 28% of the companies, such a strategy is at least partially in place.

When asked about the focal points of their strategy, 29% cited the implementation of management and control systems. Another 17% primarily aim to automate work processes, and 14% want to digitalize analog information and processes or use digitalization to acquire and store data and then employ that information for evaluations and analyses.

Institutionalization within the companies

Does your company have a position/body that bears central responsibility for these topics and makes decisions regarding a digital strategy?

Yes, ... (N=152 respondents, responses clustered)



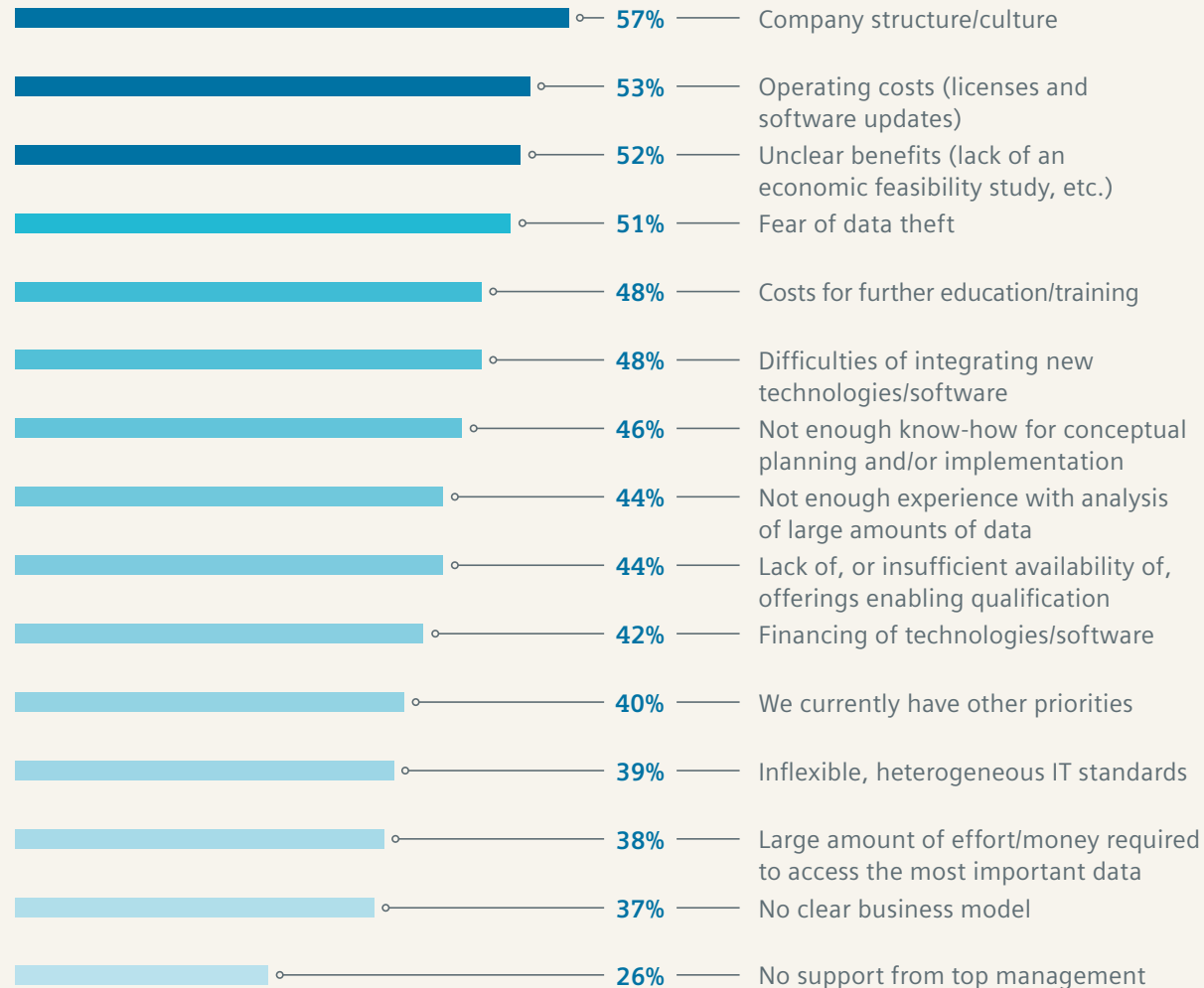
Not shown: "Other areas" (16%); "No comment" (3%) and categories with values below 1%

For 62% of the respondents, a central unit tasked with responsibility for digitalization has been set up within the company. In 73% of the companies with such a setup, this unit is part of the IT organization. Only 2% of the respondents indicated that their company's top management made the decisions in this area.

Barriers and challenges

What holds you back from making even greater use of digital technologies and processes at your company?

Barriers within the company (N=246 respondents, multiple answers possible)

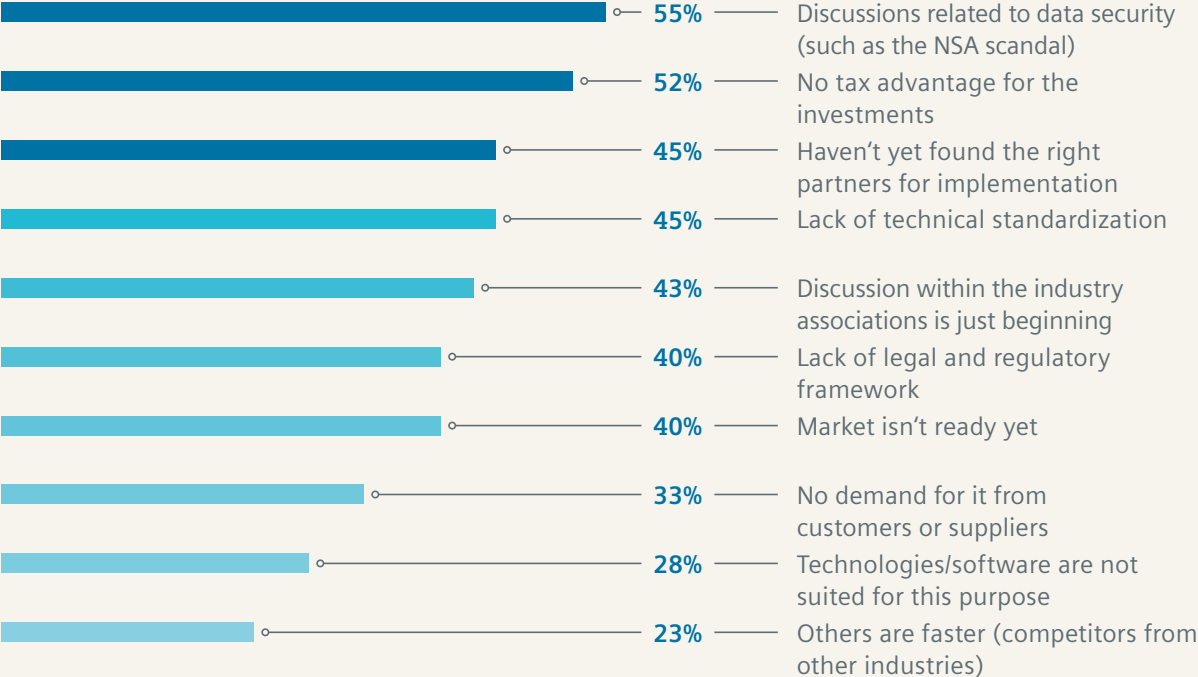


Many companies are struggling with internal barriers that inhibit greater use of digital technologies. In this area, the Siemens customers primarily cited their company's structure or culture (57%). For companies within the infrastructure sector, this figure was even 62%. In addition, the operating costs for software licenses and updates dampen the willingness to invest. Other respondents, on the other hand, don't see digitalization as providing clear advantages for their business. Beyond that, more than half the respondents fear that it won't be possible to safeguard the related data against theft.

Barriers and challenges

What holds you back from making even greater use of digital technologies and processes at your company?

External barriers (N=246 respondents, multiple answers possible)



Fear of data theft was not only among the prominent responses for internal barriers: When asked about external challenges, the lack of data security was even the most frequently cited negative factor (55%). Nearly an equal number point to a lack of support from political leaders, because no tax benefits were being made available for investments in this area. In addition, 45% of the respondents indicated that they hadn't yet found the right partner for their digitalization initiatives. An equal number sees challenges in the lack of technical standards.

Key findings of the survey

- 01** The digital revolution and terms such as the Internet of Things, cyber-physical systems, data management and product/process design development are already part of our customers' business landscapes, in particular, for those who do business in technology-intensive areas – such as automotive, chemical and power utility companies
- 02** According to the survey participants, the biggest challenge in boosting a digital strategy implementation is the respective company culture and the difficulty of quantifying the benefits of such investments. The greatest external barriers are the fear of information theft, or industrial espionage – a factor influenced by recent episodes involving the NSA (55%).
- 03** Another challenge mentioned by 52% of respondents is the lack of targeted policies, regulatory frameworks and fiscal incentives to support technology investments (import duties, tax incentives, etc.).
- 04** Despite the difficulties, 71% of respondents have a digitalization strategy in place which aims to increase their efficiency, particularly in the areas of systems control (29%) and automation (14%).
- 05** In this scenario, IT professionals, who were previously responsible for maintaining a company's infrastructure, have a more proactive role: they develop projects and support production/processes in alignment with the company's strategy department and overall strategy. According to the survey, 73% of digital strategy decisions relate to IT.

- 06** While 84% of respondents indicated that an economic feasibility study had been conducted for their digital initiatives, the majority also pointed to internal challenges such as a lack of clarity for defining outcomes (51%) and difficulties in prioritizing which digital features were best suited to their businesses.
- 07** It is clear from the survey that the 246 respondents – including CEOs, CIOs, engineers and technicians – consider digitalization a crucial business success factor which has the potential to enhance their competitiveness, quality and production processes.

Summary:

Brazil needs to drive its digitalization revolution, above all, in the industrial and infrastructure segments. Progress also depends on external factors such as targeted regulatory frameworks and fiscal incentives as well as on a clearer internal representation of the outcomes versus the investment required. The business community shows the necessary maturity to consider digitalization a key lever for business competitiveness. Since digitalization is a broad concept with many technological ramifications, the major challenge seems to be defining the digital applications that will push the country's companies and industries to the next level in terms of business performance.

Part 2

The Competitive Environment for Digitalization in Brazil

To augment its customer survey, Siemens Brazil collaborated with the Fundação Dom Cabral business school to analyze the overall business environment likely to influence digitalization in Brazil. This content was originally developed for the Digitalization Forum: Trends and Solutions for a More Competitive Brazil.

This part comprises two analyses focusing on different aspects of competitiveness.

The first of these analyses seeks to determine Brazil's position on the international market by examining data from the World Economic Forum's Global Competitiveness Report (GCR). Besides showing where Brazil stands within the world competitiveness rankings, this investigation identifies opportunities, advantages and deficiencies related to Infrastructure, Technological Readiness, Innovation and Business Sophistication (the four GCR pillars chosen for analysis). It does this by comparing Brazil to other relevant countries, such as Germany, the USA, Mexico, Russia and China.

The second analysis contained in part 2 applies the Competing Value Framework (CVF) to a survey of 470 companies from the infrastructure and industrial sectors. The aim is to evaluate the organizational culture and orientation on innovation that these companies display with respect to their focus on the future, the market, control aspects and social factors. This version of the CVF was designed to describe Brazil's innovation culture and analyze how the environment contributes to implementation of digitalization technologies.

Brazil's international standing: Analysis of data from the World Economic Forum

The World Economic Forum (WEF) is an international institution for public-private cooperation. It's committed to improving the state of the world by engaging business, academic and societal leaders to shape global, regional and industry agendas.

To support its mission, the WEF's Global Competitiveness Report (GCR) assesses the ability of countries to provide prosperity to their citizens. It ranks the set of institutions, policies and factors that set the sustainable current and medium-term levels of economic prosperity for 144 economies.

Twelve pillars support the GCR. Taken together, these pillars form the Global Competitiveness Index (GCI), which measures a country's economic prosperity. Four of these pillars were chosen for this analysis, because they cast light on the basis for digitalization:

01 **Technological Readiness**

measures the agility with which the economies adopt existing technologies, with specific emphasis on digitalization, information and communication (DICT)

02 **Business Sophistication**

measures the quality of overall business networks and of individual firms' operations and strategies

03 **Innovation**

measures the capacity of innovation through investments, R&D institutes and opportunities for innovation in processes and in creating products

04 **Infrastructure**

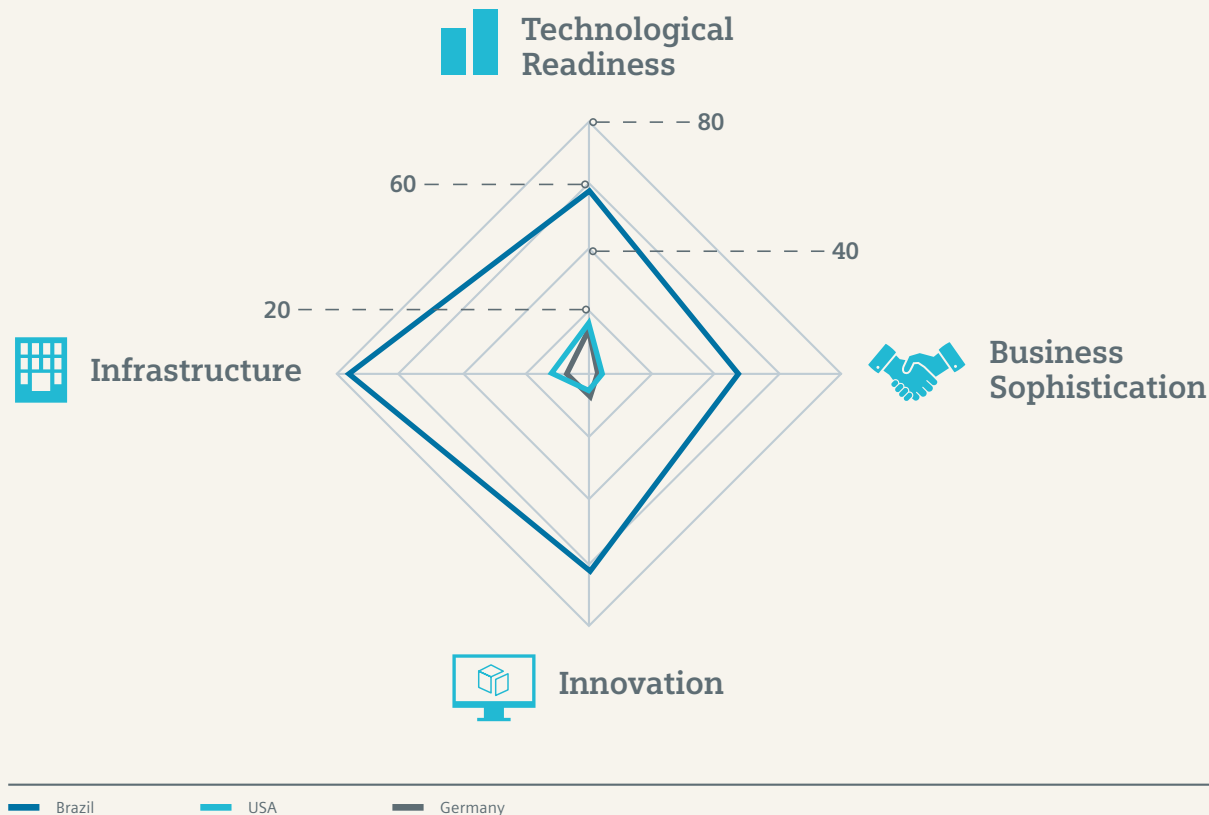
measures the quality and efficiency of transport, the communications network and the energy supply infrastructure

Brazil's international standing: Analysis of data from the World Economic Forum

Analysis of the selected competitiveness pillars

For the four selected GCR pillars, charts A and B each show a ranking scale for a different group of countries from among the WEF's 144 economies. **Please note:** The closer the score is to the center of the chart, the better it is.

Chart A: Comparison with two digitalization leaders



Alongside the United States, which is frequently a relevant reference point for Brazil, Germany was selected for comparison due to its leading role in digitalization.

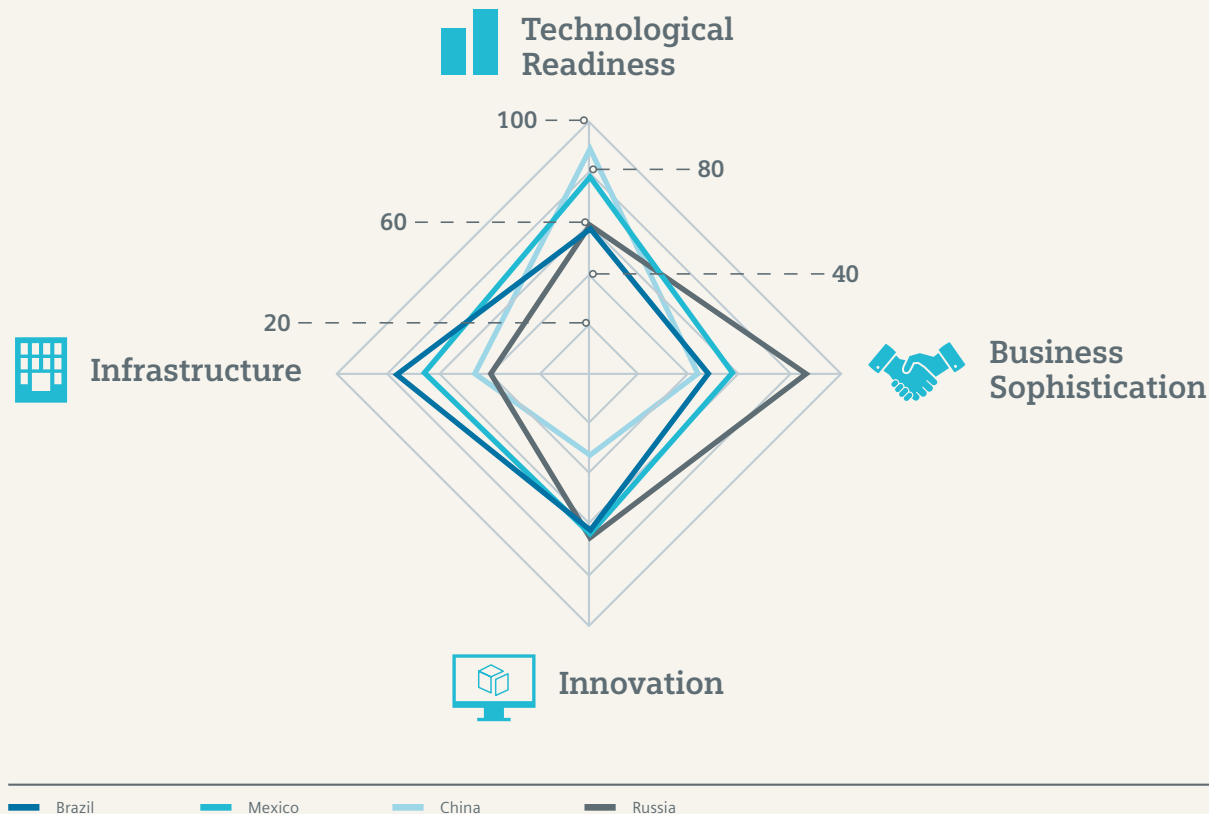
Comparing Brazil's score with these two countries reveals a clear disparity. Brazil is still very far from reaching its potential and from reaping the benefits of flexibility that Germany and the United States have gained from developing and implementing digital technologies.

Brazil's international standing: Analysis of data from the World Economic Forum

Analysis of the selected competitiveness pillars

For the four selected GCR pillars, charts A and B each show a ranking scale for a different group of countries from among the WEF's 144 economies. **Please note:** The closer the score is to the center of the chart, the better it is.

Chart B: Comparison with three similar economies



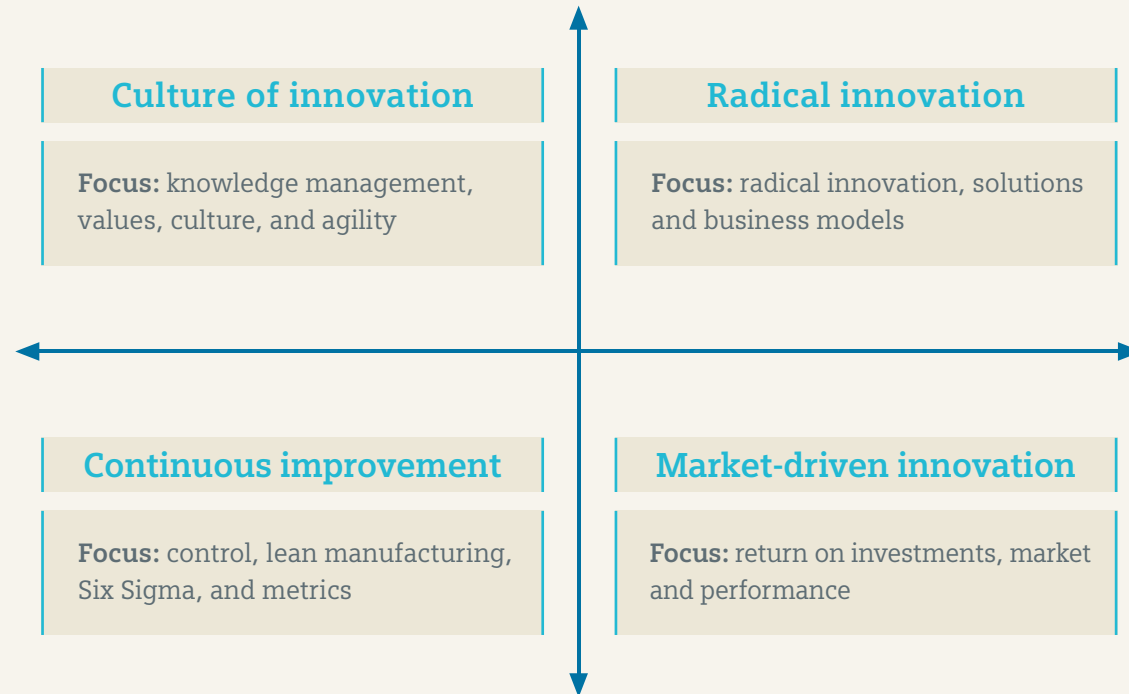
For the purposes of international benchmarking, China, Mexico and Russia provide a basis for relevant comparisons. Among the four analyzed pillars, Business Sophistication, which is directly linked to productivity, is the pillar for which Brazil achieved its best ranking (47th place).

Mexico, Russia and Brazil (61st, 65th and 62nd) have very similar rankings for investments in innovation (Innovation pillar), while China is far ahead (32nd) of those countries.

Brazil achieves a better ranking for Technological Readiness (58th place) than China, Mexico and Russia. This pillar supports implementation of digitalization technologies, because it's directly linked to the flexibility required to absorb new technologies. With regard to the four pillars selected for analysis, Brazil's lowest ranking is for Infrastructure (76th place).

Brazil's innovation culture: Analysis based on the Competing Values Framework

Competing Value Framework (CVF) Output



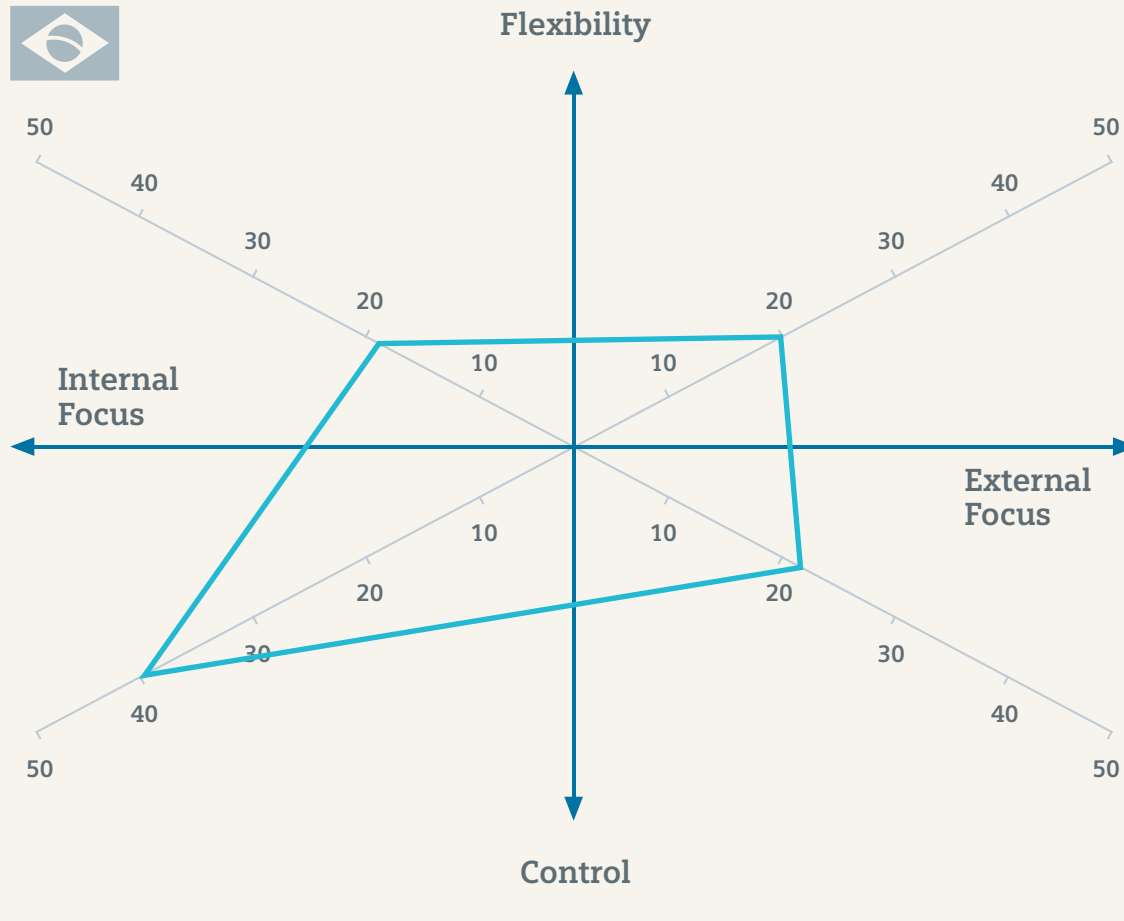
The Competing Values Framework (CVF) was initially based on research that the University of Michigan conducted on major indicators for effective organizational performance.

This framework provides insights into a wide range of organizational and individual phenomena, such as organizational efficiency, culture and quality. The applied methodology is directly related to the implementation of new technologies and to the interpretation of new trends, such as digitalization.

The CVF has been identified as one of the business world's 40 most important frameworks, and Fundação Dom Cabral has used it to analyze a large number of companies in Brazil. The CVF output is presented in four frames that categorize the focus and profile of an organization or a group of organizations. Digitalization can be found in all four frames, and each one supports processes and strategies aligned to the specific focus.

Brazil's innovation culture: Analysis based on the Competing Values Framework

Competing Value Framework (CVF) Output (N=470 respondents)



The CVF output provides a profile for an average Brazilian company. This analysis is based on input from 470 companies from different industries (such as oil and gas, energy, and industrial manufacturing).

The graphic indicates that Brazilian corporate strategies tend to have an internal focus with a particularly strong emphasis on control (aiming for productivity gains). This confirms the digital strategies profile identified in Key Finding 4 from the Siemens Customer Survey. In addition, the market-driven focus is represented as the second priority (with return on investment as the primary goal), which aligns well with Key Finding 6.

Digitalization can be found in each of the four CVF frames, but it's interesting to note the digital approach that is tied to control. For the Brazilian profile, this factor can provide a basis for implementing advanced digital technologies and disruptive innovations.

Final considerations

The approaches adopted for this survey yield interesting insights. In particular, they reveal alignments that provide a useful basis for discussing digitalization trends in Brazil. Here are some of the key takeaways:

- 01** CEOs, CIOs and technical experts from top Brazilian companies believe that applying digitalization in the fields of industrial manufacturing, energy and infrastructure can increase Brazil's competitiveness and boost its economical development.
- 02** Digital strategy is already impacting some parts of the Brazilian economy, such as the automotive, power utilities and chemicals industries. Digitalization can present itself in connection with different approaches, depending on an organization's focus – for example to support control, process optimization, productivity increases or new business models.
- 03** IT professionals, who were previously associated with just keeping the company's infrastructure running, are now taking on a more proactive role by developing projects and supporting production areas and processes in alignment with overall corporate strategy.
- 04** Brazil's position on global competitiveness indices reveals potential for developing more advanced digital technologies.
- 05** There's a perception that Brazil is in a transitional period, and this could be used as an opportunity to prepare the country for a new cycle of development based on technology.

Information resources

Further information on the content is available from:

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