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Realizing a cloud-enabled economy in Brazil:

How cloud drives economic and societal impact through micro, small, and medium-sized businesses

2023

By 2030, MSMEs can deliver greater societal value in a cloud-enabled Brazil

Across key sectorsⁱ this opportunity is expected to represent:

R\$24.3 billion combined annual productivity benefits unlocked through cloud-enabled MSMEs in healthcare, education, and agriculture



This represents a 27% increase on current levels



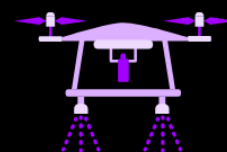
8.4 million people in Brazil (8% of the workforce) employed by cloud-enabled MSMEs within healthcare, education, and agriculture

24 million telehealth consultations using cloud supported by MSMEs' services



12 million primary to secondary school students engaging in online learning via cloud-enabled MSMEs

1 in 3 farms using cloud-enabled precision agriculture technologies supported by MSMEs



MSMEs is the abbreviation of micro, small, and medium enterprises.
Current values are annual 2022-2023 values based on the latest available data.
i. Key societal sectors are healthcare, education, and agriculture.

Overview

Micro, small, and medium enterprises (MSMEs, businesses and startups with between 1 and 250 employees) are a major driver of economic performance. In Brazil, MSMEs collectively account for over 99% of all firms, 70% of jobs, and 30% of Gross Domestic Product (GDP).^{1,2} MSMEs are also a major source for innovation and disruption in the economy, leveraging both old and new, transformative technologies to fill gaps in the current market and bringing new products and services to bear.

By allowing users to procure on-demand, scalable IT products and services over the internet or a private network, cloud technology has driven economic and societal benefits by creating new business models, reducing costs, and supporting new opportunities for entrepreneurs and startups. According to the Organisation of Economic Cooperation and Development (OECD), 62% all businesses across Brazil now utilize at least some basic form of cloud technology (such office software and email), although usage of more intermediate and advanced tools, such as artificial intelligence (AI) and big data analytics, is expected to be far lower based on adoption data observed in other developed economies.³ Cloud technologies have most profoundly impacted MSMEs by allowing them to start, operate, and scale their operations more effectively.

The use of cloud technology by MSMEs is expected to become increasingly ubiquitous, advanced, and mature. With continuous advancements in technology and the decreasing costs of cloud services, MSMEs will have access to an even wider range of scalable and cost-effective technology solutions across functions, occupations, and industries. We refer to this potential future state as the “cloud-enabled economy,” a future characterized by high levels of overall cloud adoption across Brazilian businesses. It is anticipated that under this scenario, 90% of all businesses would adopt at least a basic level of cloud technology.^{4,5} For many businesses, however, this represents only the beginning of their cloud journey. The escalating sophistication in cloud technology beyond basic applications will be a pivotal driver for economic growth in the future. As MSMEs tap into advanced cloud functionalities, such as AI, data analytics, and serverless computing, they can foster innovation, streamline operations, and customize consumer experiences at scale. These advanced uses can unlock new revenue streams, encourage innovation and the creation of new business models, and enhance competitiveness, collectively underpinning the future of the digital economy.

By 2030, a cloud-enabled Brazilian economy is expected to deliver even greater societal impact by supporting MSMEs to produce novel, new products and solutions or augment their existing operations. In certain societal sectors, namely health, education, and agriculture, this annual contribution is expected to reach R\$24.3 billion. Not only that, but by 2030, cloud-enabled MSMEs are expected to support 24 million remote health consultations, 12 million primary to secondary school students to access online education, and one in three farms to access more efficient and sustainable farming practices in Brazil. Cloud-enabled MSMEs are also heavily involved with developing solutions to transition the economy towards more a more sustainable future and designing digital finance solutions (through ‘fintechs’) that are helping to support better financial inclusion and wellbeing.

¹ OECD (2022), Financing SMEs and Entrepreneurs 2022: An OECD Scoreboard.

² Agência Sebrae (2022), Pequenos negócios aceleram emprego e PIB do Brasil.

³ OECD (2023), Share of businesses purchasing cloud services

⁴ Gartner (2022), The future of cloud computing in 2027: From technology to business innovation.

⁵ Gartner (2021), Gartner says cloud will be the centerpiece of new digital experience.

While these benefits are substantial, the opportunities of the cloud-enabled economy will not eventuate without action. To unlock this potential, Brazilian businesses and governments will need to collaborate to foster the continued adoption and maturity of cloud usage. Businesses can achieve this by:

- identifying how cloud technology can help them scale and deliver global impact
- investing in embedding cloud technology into their strategy; and
- developing a migration plan and training employees to leverage the benefits of cloud technology.

Brazilian governments can support businesses in achieving a cloud-enabled economy by:

- prioritizing digital education, especially cloud technology education across all levels
- investing in digital infrastructure to ensure digital access and inclusion
- fostering innovation with adequate regulations; and
- and leading by example through promoting a cloud-first model of adoption across all levels and divisions of government.

1 The cloud-enabled economy

Cloud technology has changed the way many businesses operate, particularly for MSMEs (businesses with between 1 and 250 employees)⁶, by enabling them to scale quickly, reduce costs, reach global markets, and access a range of technology resources that were previously unattainable.

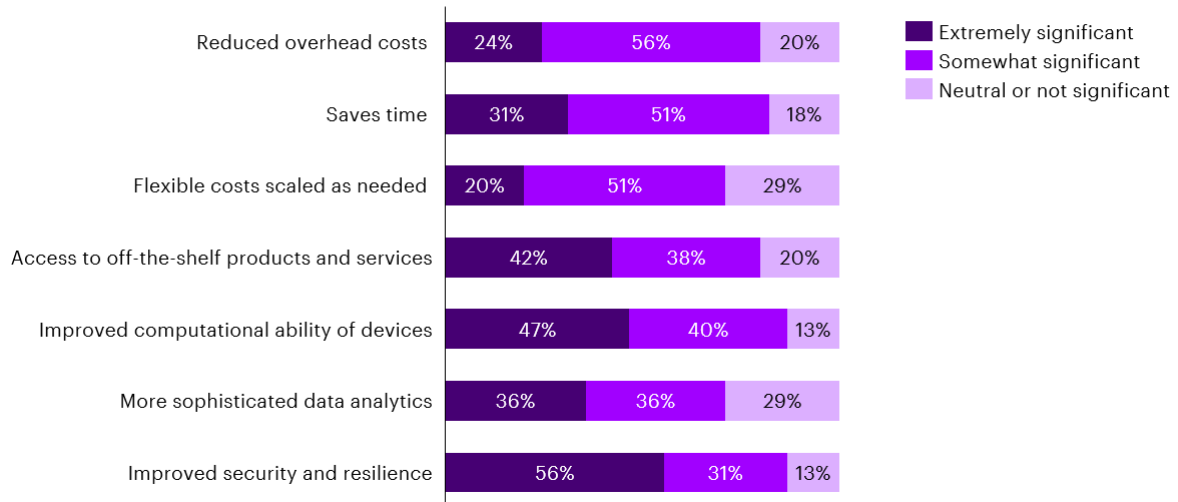
1.1 Cloud technology enables the digital economy

Cloud technology refers to the provision of on-demand IT products and services delivered over the internet or a private network.⁷ This involves housing digital resources from centralized servers owned and operated by cloud service providers, reducing the need for individual businesses to procure and maintain physical hardware. Outsourced technology provides greater flexibility to support MSMEs through the early stages of the business lifecycle by:

- reducing overheads and time to market
- providing greater ability to scale up or down depending on business demands
- offering specialized technology solutions
- increasing computational power of ordinary devices; and
- enhancing security and resilience.⁸

Figure 1: The most significant benefits of cloud technology for MSMEs

Average % of cloud-enabled MSMEs across several industries in Brazil that find cloud somewhat or extremely significant in providing a particular benefit



Source: Accenture societal impact survey (2023), n = 49. 'Neutral or not significant' includes responses of neutral, somewhat insignificant, and not significant at all.

By promoting shared resources, cloud has fundamentally changed the way that individuals and businesses interact with technology, with the number of potential applications of cloud technology far eclipsing simple, remote data storage. Most applications, platforms, and smart products have some functionality facilitated by cloud technology as shown in Figure 2. Having

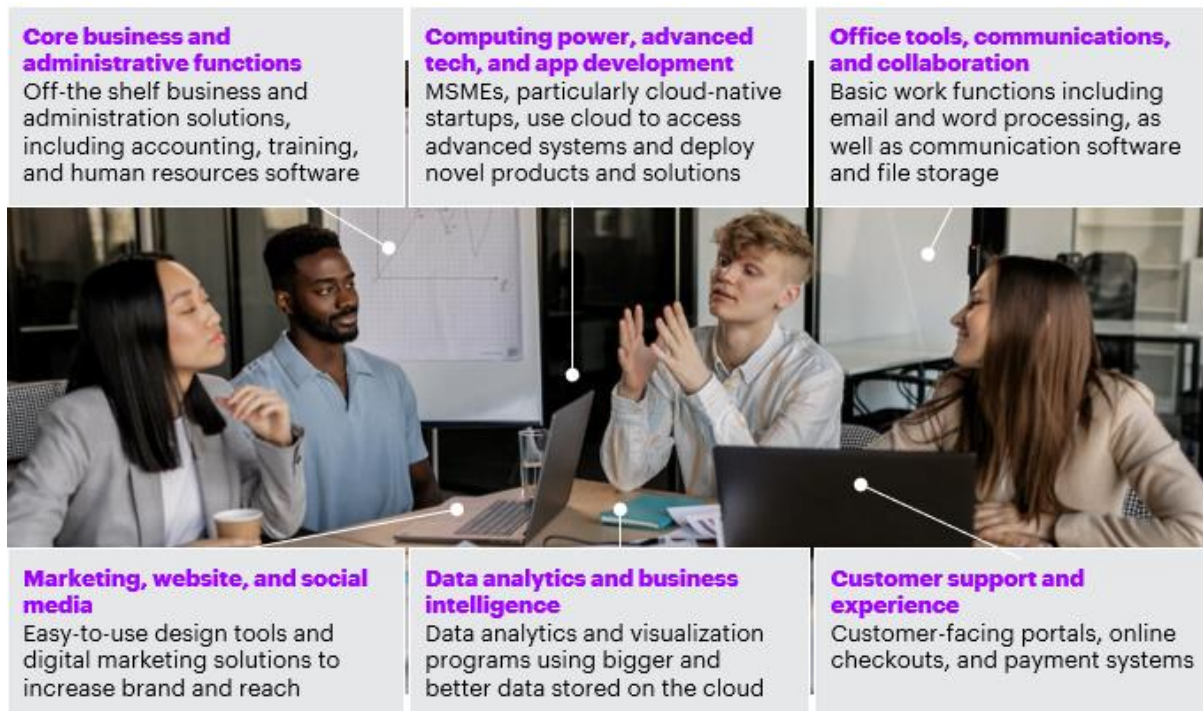
⁶ The definition of MSME used in this report is taken from the OECD (2023) and covers enterprises with businesses between 1-250 employees.

⁷ AWS (2023), What is cloud computing?

⁸ Accenture societal impact survey (2023), n = 562.

access to on-demand functionalities supports MSMEs to start, operate, and scale their business more efficiently and effectively.

Figure 2: End-to-end cloud technology applications for MSMEs

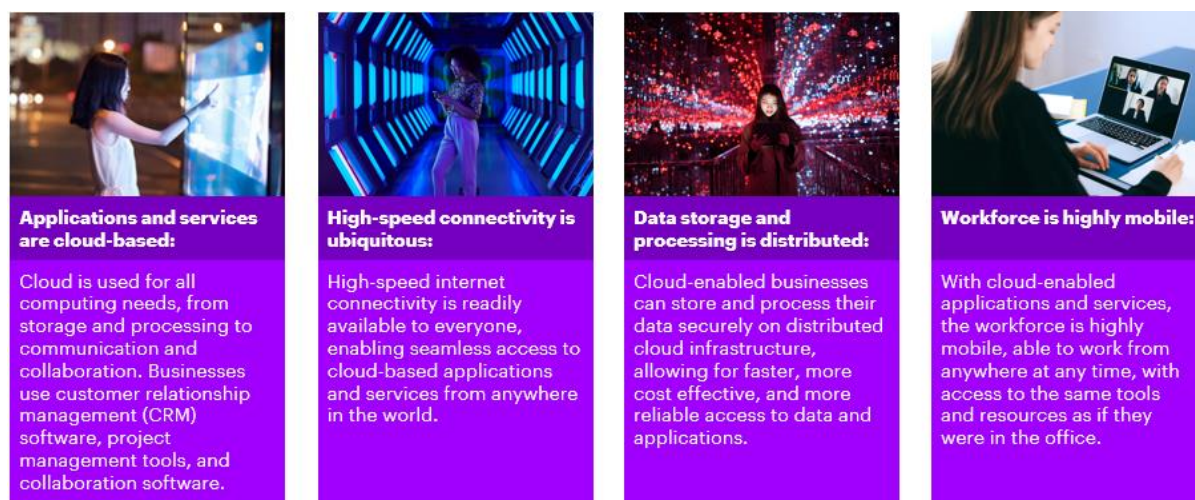


Source: Accenture

1.2 Achieving a cloud-enabled economy can unlock significant societal and economic potential

With continuous advancements in technology and the decreasing costs of cloud services, economies will continue to experience a wave of digital disruption and productivity as businesses find more ways to produce novel, new products and solutions or augment their existing operations. We refer to this potential future state as the “cloud-enabled economy,” a future characterized by high levels of cloud adoption; based on an assessment of cloud industry forecasts, this report expects 90% of all businesses will adopt at least a basic level of cloud technology in a cloud-enabled economy. As cloud technology applications mature, a cloud-enabled economy would increasingly involve digital applications and services being cloud-based, high internet speed and connectivity, cloud-enabled data storage and processing, as well as a mobile workforce (see Figure 3).

Figure 3: Characteristics of a cloud-enabled economy



Source: Accenture

1.2.1 The spectrum of cloud adoption

The definition of cloud technology adoption used in this report is consistent with the OECD, and refers to the share of businesses that purchased cloud services⁹ as a proportion of all businesses, across all levels of maturity.¹⁰ However, cloud technologies have a range of applications across a suite of business functions that mean that the use of cloud technology can be considered on a spectrum of maturity or sophistication as shown by the figure below, which includes:

- **Basic adoption:** user-friendly solutions designed for everyday tasks. These solutions typically do not require specialized technical knowledge to operate and primarily serve to simplify and enhance common digital activities. These include simple cloud-based storage solutions, web-based email services, and collaborative office suites.
- **Intermediate adoption:** applications and platforms that cater to more specialized needs but still largely consist of off-the-shelf products with intuitive interfaces. Such tools include customer relationship management, enterprise resource planning, project management tools, developer platforms, and cloud-based databases.
- **Advanced adoption:** highly specialized cloud applications and cutting-edge technologies tailored for expert tasks. This category encapsulates machine learning and AI platforms, big data analytics tools, internet of things (IoT) platforms, serverless computing, container management systems, and advanced security and compliance tools.

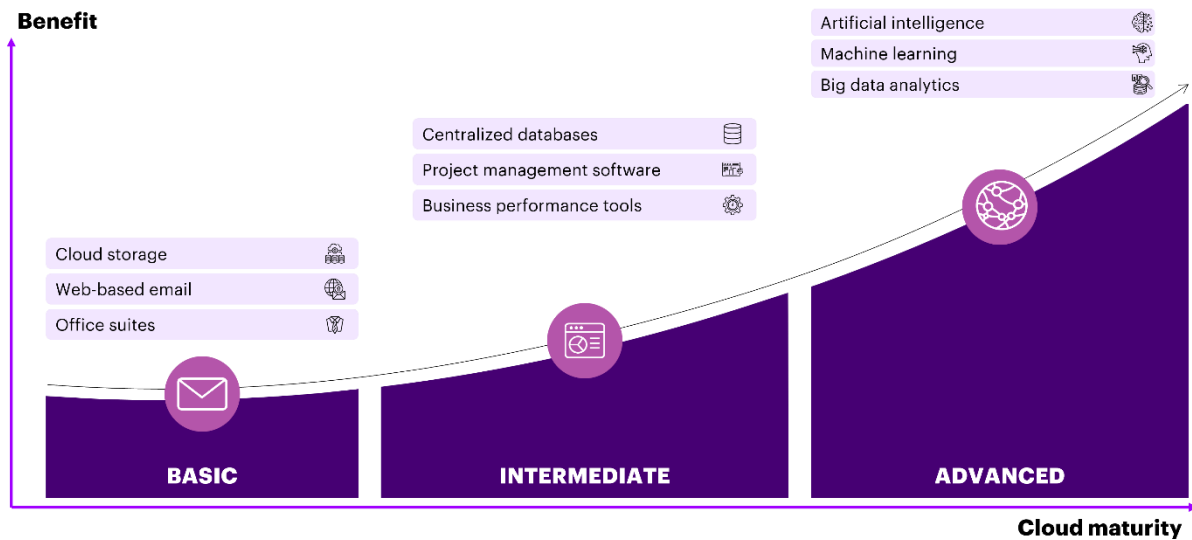
As the global economy increasingly digitizes, the need for MSMEs to increase their cloud maturity is becoming increasingly pertinent. MSMEs that fail to leverage the scalability of cloud solutions may not only forfeit the ability to compete more effectively with fewer fixed IT costs, but may also pass up more sophisticated data analysis tools, more secure safeguards for digital assets, streamlined compliance with international regulations, and advanced technology applications (such as artificial intelligence, see Section 1.2.2). For many MSMEs to maintain their competitive edge in a dynamic, cloud-enabled economy, the sophistication of

⁹ Cloud computing as part of this definition includes information and communications technology (ICT) services that are provided over the internet or a private network to access servers, storage, network components and software applications

¹⁰ OECD (2023), OECD Going Digital Toolkit

their adoption will need to evolve and adapt with the technology according to their specific needs.

Figure 4: Spectrum of cloud maturity and example applications



Note: Applications above are examples of types of uses for each of the levels of maturity. The lists are not exhaustive. Source: Accenture

1.2.2 Advanced cloud usage unlocks the potential for emerging and innovative technologies

Embracing advanced cloud adoption allows businesses to select from a variety of innovative and cutting-edge technologies to meet their unique business needs and secure a competitive edge in the market. The cloud has increased the viability and proliferation of a wide range of tools supported by cloud, business models, and technologies that, together with cloud, generate societal and economic impact. Advanced applications of cloud include:

- artificial intelligence (AI), encompassing generative AI
- machine learning (ML)
- internet of things (IoT)
- quantum computing; and
- edge computing.

These examples form a growing list of advanced technologies that have become accessible to a wider base of users through the cloud (see Appendix D of the global report for a full description of each technology supported by cloud).¹¹ Of these technologies, generative AI is experiencing the most rapid and dramatic growth; over the next 10 years generative AI is expected to grow at an annual average rate of 27%.¹² Although the technology has only recently been adopted by the wider public, generative AI is already disrupting and enhancing businesses' processes, accelerating innovation, and facilitating greater speed and creativity across a variety of industries. Businesses and employees are already experimenting with generative AI to create content that supports a range of tasks from writing text and code to generating images.¹³ As shown in Figure 5, 78% of Brazilian MSMEs across several industries

¹¹ Damian Mazurek, (2023), Leveraging Cloud-based AI/ML Services to elevate your business.

¹² Precedence Research (2023), Generative AI Market size to hit USD 118 Bn by 2032

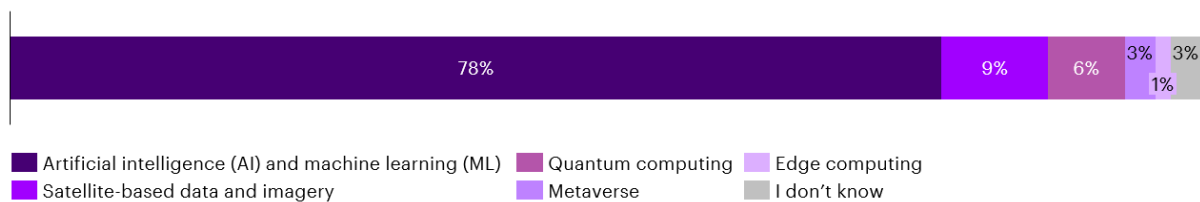
¹³ AWS (2023), Generative AI on AWS.

identified AI (including generative AI and natural language processing (NLP)) and ML as the technologies likely to be most significant in creating societal impacts in 2030.^{14,15}

Generative AI could be used by cloud-enabled MSMEs for a wide variety of applications, such as helping medical professionals analyze patient data and testing results to inform decision making, or generating practice exam questions and content with instant feedback available to support individualized learning pathways.

Figure 5: Technologies supported by cloud creating the most significant societal impacts in 2030

Average % of cloud-enabled MSMEs across industries in Brazil that believe a technology supported by cloud will be the most significant in creating societal impacts in 2030



Source: Accenture societal impact survey (2023), n = 49. ‘Artificial intelligence (AI) and machine learning (ML)’ includes subsets generative AI and natural language processing (NLP).

1.2.3 A more productive, cloud-enabled economy offers societal as well as economic benefits

While the opportunity to scale and grow businesses has a clear impact on economic activity (see Chapter 2), in many cases businesses can also create a positive societal impact. Cloud has opened up a range of emerging technologies that are underpinning a new wave of digitally-led innovation to address some of society’s most pressing, global issues. Cloud technology offers MSMEs new ways to produce and commercialize technological solutions that generate positive societal benefits, in addition to economic benefits, across a range of industries. Although this list of industries is not exhaustive, the estimation of the societal impact of cloud technology is focused on the following industries:

- healthcare
- education
- agriculture
- finance; and
- sustainability and disaster response.¹⁶

While these industries are not the only ones that are impacted by cloud technology, these industries face increasingly complex challenges that could lead to less equitable societal outcomes if they do not adapt and harness the benefits offered by cloud technology. These industries are also directly linked to the UN Sustainable Development Goals (SDGs), particularly the overarching objectives of improved healthcare (Goal 3), education (Goal 4), and economic prosperity and equality (Goal 9 and 10).¹⁷ Figure 6 demonstrates through a

¹⁴ Accenture societal impact survey (2023), n = 49. 78% of Brazilian MSMEs is consistent with the 78% of MSMEs globally out of a sample of 562 who identified AI and ML as the technologies likely to be most significant in creating societal impacts by 2030.

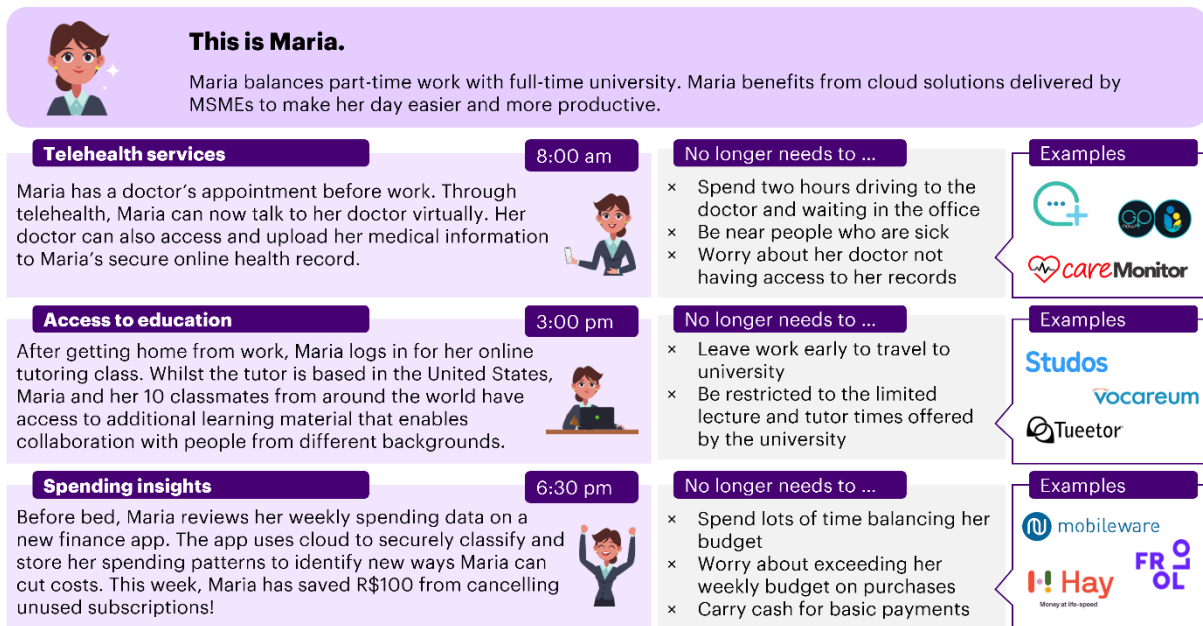
¹⁵ Survey responses were from MSMEs working in healthcare, education, agriculture, finance, and sustainability.

¹⁶ The report chose to focus on these industries since most societal impact case studies reviewed fell into one or more of these industries. These labels also benefit from matching the economic modelling data as they are taken directly from the International Standard Industrial Classification (ISIC).

¹⁷ United Nations (2023), Sustainable development goals.

stylized cameo how cloud technology supports access to these industries for individuals through digitization.

Figure 6: The impact of cloud-enabled MSMEs on individuals



Notes: Examples include MSMEs and startups using cloud solutions from AWS case studies

Source: AWS¹⁸

¹⁸ AWS (2023), Customer Success Stories.

2 Unlocking R\$24.3 billion in productivity benefits within key societal sectors

MSMEs are a major driver of economic performance in Brazil, accounting for about 99% of all firms, 50% of jobs, and 30% of Gross Domestic Product (GDP).^{19,20} Cloud technology is helping to create and scale MSMEs (see Chapter 1), the impact of which can be identified in overall, aggregate economic performance. The impact of further cloud adoption and maturity on aggregate economic output is estimated with a novel economic model, based on analyzing current data that captures the relationship between adoption and economic activity. In Chapter 3, this analysis is taken to the next level of granularity, assessing how much of this impact can be attributed to key societal sectors of healthcare, agriculture, and education.

Box 1: Modelling the economic potential of a cloud-enabled economy

This research estimates the impact of cloud on economic productivity at the country level using data from the OECD to capture the relationship between cloud adoption rates and GDP (controlling for capital and labor inputs). A full explanation of the modelling approach, data, and outputs can be found in Appendix A of the global report.

Brazil is well positioned to transition to a cloud-enabled economy with growing levels of cloud adoption.²¹ The share of all businesses using some form of cloud technology in their business operations is 62%, growing from 35% as recently as 2014.²² However, cloud technology spending as a proportion of GDP in mature cloud markets like United States is four times higher than Brazil.²³

The range of new technologies underpinned by cloud is accelerating, with advances in technologies such as generative AI, that also offer significant economic and societal potential. Continued investment from Brazilian industries and governments is required to continue realizing the benefits of the cloud-enabled economy. Cloud technology expenditure in Brazil is expected to grow at an average compounding rate of 19% over the next five years to R\$47 billion in revenue as cloud usage maintains pace with technological change.^{24,25}

¹⁹ OECD (2022), Financing SMEs and Entrepreneurs 2022: An OECD Scoreboard.

²⁰ US Embassy and consulates, Brazil (2023), US-Brazil cooperation on entrepreneurship

²¹ For consistency across modelling, we use adoption rates as reported by the OECD which refers to the share of all businesses purchasing cloud services. Adoption rates reported by the OECD may differ from those reported by local statistical agencies.

²² Accenture analysis of OECD data. See global report for full methodology.

²³ Statista (2023).

²⁴ All monetary values are quoted in Brazilian (2023) reais unless otherwise specified.

²⁵ Statista (2023). Dollar values converted to R\$ from USD.



Annual productivity benefits unlocked by cloud-enabled MSMEs in key societal sectors are expected to reach R\$24.3 billion by 2030



8.4 million people in Brazil are expected to be employed by cloud-enabled MSMEs in key societal sectors by 2030

The productivity benefits of the cloud-enabled economy to Brazilian societal sectors would be significant. Through successful transition to a cloud-enabled economy, MSMEs in the healthcare, education, and agriculture industries within Brazil are expected to unlock R\$24.3 billion in combined annual productivity benefits by 2030, a 27% increase from R\$19.1 billion. Under this scenario, it is estimated that 8.4 million people would work at cloud-enabled MSMEs in these industries, which would be 8% of the total jobs in Brazil, an increase from 6% currently. This reflects the increasing use of cloud technology in almost all forms of digital technology and occupations across the economy.


3 The societal impact of the cloud-enabled economy

MSMEs that harness cloud technology have the potential to create significant societal impact in Brazil. We define “societal impact” in reference to the positive changes and improvements in outcomes facilitated by cloud technology in areas such as healthcare, education, and agriculture. By leveraging cloud technology, MSMEs can enhance the efficiency, affordability, and accessibility of services in these industries, enabling advancements such as telemedicine, online education, precision agriculture, financial access and autonomy, and sustainable technology. These solutions will lead to improved social wellbeing and development.

3.1 Driving innovation and improving access to healthcare and life sciences


Approximately 12% of Brazilians live in rural and remote areas, which imposes additional barriers to accessing healthcare.²⁶ Cloud technology is helping to overcome these barriers by enabling MSMEs to make healthcare easier to access whilst also driving efficiency in healthcare delivery and supporting decisions around patient healthcare. Through remote consultations and monitoring of health indicators, cloud technology can help make healthcare more accessible to underserved communities throughout Brazil. If Brazil were to achieve a cloud-enabled economy, MSMEs in healthcare are expected to unlock R\$8.6 billion in annual productivity benefits by 2030. Cloud-enabled MSMEs are expected to support 24 million virtual health consultations per year by 2030.²⁷

Impact of MSMEs on healthcare in the cloud-enabled economy, by 2030



R\$8.6 billion in annual productivity benefits unlocked through cloud-enabled MSMEs in the healthcare sector, an increase from R\$6.8 billion currently

24 million virtual consultations supported by cloud-enabled MSMEs



Note: Estimates for the number of telehealth consultations produced through market size estimates (see Appendix C of the global report) and are calculated separately to the GDP contribution. Current values are annual 2022-2023 values based on the latest available data.

Cloud technology is also important for streamlining administrative tasks, creating efficiency for healthcare providers. Healthcare providers can use cloud technology to support informed patient healthcare decisions, helping providers to collaborate and easily share patient information, and assisting them to take insights from large amounts of data to make treatment personalized and tailored. Technologies supported by cloud, particularly generative AI, also have significant potential to change the healthcare industry, from the delivery of healthcare to

²⁶ World Bank (2022), Rural population.

²⁷ Remote health consultations can also be supported by telephone or through large cloud-enabled firms.

administrative functions. While generative AI is still a nascent technology, MSMEs can use it to support clinical decision making, helping medical professionals analyze data more accurately, along with supporting efficiency in research and development.²⁸

3.2 Improving access to engaging and personalized education

Brazil has significantly increased the number of children and young people involved in education in the last few decades, with almost all in primary education, 80% in lower secondary education, and over half in upper secondary education.²⁹ However, there is still a need to increase participation in learning, particularly as one quarter of young adults in Brazil are not in education, employment or training.³⁰ MSME education services which utilize the cloud technology are improving access to quality education. Cloud technology can make education more equitable, safe, and accessible by providing new learning opportunities for a wider audience, including remote communities or adults with limited time who are looking to boost or diversify their skills. Under a cloud-enabled economy, MSMEs in education are expected to unlock R\$8.6 billion in annual productivity benefits by 2030. Through supporting the education industry, cloud-enabled MSMEs are expected to facilitate 12 million primary to secondary school students and 32 million adults in Brazil to receive online learning by 2030.

Impact of MSMEs on education in the cloud-enabled economy, by 2030



R\$8.6 billion in annual productivity benefits unlocked through cloud-enabled MSMEs in the education sector, an increase from R\$6.8 billion currently

12 million primary to secondary school students using online education via cloud-enabled MSMEs, a 70% increase from 7 million currently



32 million adults accessing education via cloud-enabled MSMEs

Note: Estimates for the number of students are for the primary and secondary school students in the basic education system. The number of students and adults accessing cloud-based education are produced through market size estimates (see Appendix C of the global report) and are calculated separately to the GDP contribution. Current values are annual 2022-2023 values based on the latest available data.

Students and adults will be able to learn in a more collaborative environment, as cloud technology supports them to interact and share content more readily. Wakke is a Brazilian-

²⁸ WE Forum (2023), How will generative AI impact healthcare?

²⁹ OECD (2021), Education in Brazil: An International Perspective.

³⁰ OECD (2021), Education in Brazil: An International Perspective.

based MSME using cloud technology to provide online learning with Wakke Class, along with enabling schools to improve their administration (see Case Study below).³¹

³¹ Wakke ([2023](#)).

Wakke Class is a cloud-based platform that emerged to support continuation and resiliency of school, youth and adult education during COVID-19



**Industry:
Education**



**Size: Medium
(<250 employees)**



Location: Brazil

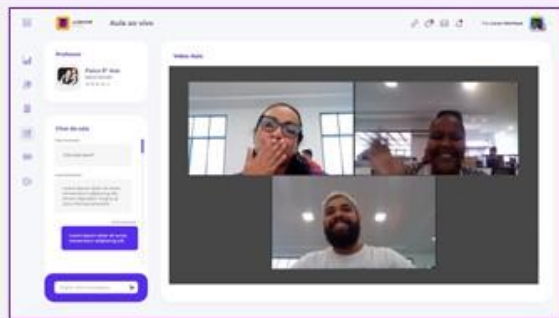
Wakke Class is an online LMS (Learning Management System) platform developed by Wakke, a company founded in 2004 whose main product is Escolaweb, an ERP (Enterprise Resource Planning) aimed at managing and administering schools online. Escolaweb provides a streamlined platform for teachers and school administrators to manage a range of backend tasks, from enrollment and attendance to fees and expenses in one central location. On all its platforms, Wakke operates in 1,300 schools across Brazil.

Wakke Class is an education platform introduced in 2020 in response to the outbreak of COVID-19 and widespread lockdowns across Brazilian schools. Brazil experienced some of the worst exposure to COVID-19 and underreporting, creating one of the highest per capita infection rates and deaths in the world. Leveraging an existing network of schools through Escolaweb, and the scalability of cloud, **Wakke grew from zero to 20,000 students in under two months after launch.**

“The Brazilian school system was completely unprepared for the outbreak of COVID-19 and we saw a need for a completely new product to keep schools running. Nothing like this existed in Brazil and we simply could not have achieved what we did so quickly without cloud.”

Gabriel Nogueira, Operations Director

Wakke offers an entirely cloud-based platform that gives students and teachers access to not only online learning content, but also virtual classrooms (Wakke Meet),



educational games and interactive activities. Wakke’s learning dashboards track and monitor a student’s progress and provide data and curated feedback to teachers. The benefits of this technology have transcended the pandemic with teachers continuing to integrate the platform into their physical classrooms. Wakke has also since expanded usage across the broader education market, with approximately 20-25% of students engaged through colleges, adult education, microlearning activities, and language schools. Wakke currently has more than **580,000 daily active users across Brazil.**

Wakke has been a cloud-based organisation since 2018, but Wakke Class is entirely cloud-native, having started after migration in 2020. Wakke indicated that the ability to develop and deploy the product so rapidly during COVID-19 would have been inconceivable with on-premises infrastructure as the content library, platform requirements and usage increased exponentially in a matter of weeks. Wakke plans to continue expansion into more schools and other forms of education.


Source: Accenture Consultation; Wakke Class (2023)

Cloud-enabled MSMEs are also introducing advanced analytics into the classroom, helping to personalize learning. Personalized content and feedback can help students with different learning styles work at their own pace, not to mention reduce the administration burden on teaching staff. Educators are also utilizing cloud-based learning analytics to monitor the quality, safety, and security of online learning environments. AI, and in particular, generative AI has the potential to be particularly useful in helping educators provide differentiated learning pathways based on the needs of individual students.^{32,33}


3.3 Developing smarter and more sustainable farming practices

Brazil is amongst the largest global agricultural producers for a variety of commodities, especially for cereals, soya beans, and sugar cane.³⁴ Productivity in the Brazilian agricultural sector is relatively high compared to other countries, with significant agricultural research from institutions such as the Brazilian Agricultural Research Corporation (EMBRAPA).³⁵ Further investment into technological advancements can help maintain and advance agricultural productivity. MSME cloud services are being used by the agricultural industry in Brazil to support smarter, more sustainable farming practices. These technologies can assist agricultural decision making, by employing sophisticated monitoring devices that provide better, real-time data about crops, livestock health, and resource consumption (referred to as precision agriculture).³⁶ In addition to supporting the use of data or supply chain tools, cloud technology is also enabling automated vehicles and equipment which helps to improve the efficiency of agriculture. Under a cloud-enabled economy, MSMEs in agriculture are expected to unlock R\$7 billion in annual productivity benefits by 2030. Precision agriculture technology supported by cloud-enabled MSMEs is expected to be in operation in one in three farms across Brazil by 2030.

Impact of MSMEs on agriculture in the cloud-enabled economy, by 2030



R\$7.0 billion in annual productivity benefits unlocked through cloud-enabled MSMEs in the agriculture sector, an increase from R\$5.5 billion currently



1 in 3 farms using precision agriculture supported by cloud-enabled MSMEs, a 170% increase from 1 in 10 farms currently

Note: Estimates for the number of farms using precision agriculture produced through market size estimates (see Appendix C of the global report) and are calculated separately to the GDP contribution. Current values are annual 2022-2023 values based on the latest available data.

³² World Economic Forum (2023), Can AI improve education? Here are 4 potential use cases.

³³ Stanford University, Human-Centered Artificial Intelligence, (2023) AI Will Transform Teaching and Learning. Let's Get it Right.

³⁴ FAO (2021), FAOSTAT Analytic Brief 60, Agricultural production statistics.

³⁵ OECD (2021), Agricultural Policy Monitoring and Evaluation 2021: Addressing the Challenges Facing Food Systems.


³⁶ FAO (2022), Leveraging automation and digitalization for precision agriculture: Evidence from the case studies.

3.4 Improving financial access and wellbeing


Availability, access, and convenience of financial services is an important feature of economic and social development. Given that around 15% of Brazilians over the age of 15 do not have a financial account, improving accessibility is an important step in improving financial equity.³⁷ The distance to financial institutions is a key barrier to account access for 33% of Brazilian adults who do not have an account.³⁸ MSMEs in Brazil are utilizing cloud technology to support improved financial equity and outcomes, helping improve access to finance. Cloud technology can enable digitally accessible financial services such as finance and banking to reach more people, especially for those who face barriers to financial services, such as distance, affordability, or financial literacy.

Digitization of the finance sector has led to wave of disruption, increased competition, and new types of products and services that better service customers.³⁹ Alongside the rapid adoption of smart devices, a critical part of the proliferation of digital finance options has been cloud technology that supports fast and secure methods of transferring financial information and better access to information.⁴⁰ As such, cloud-native MSMEs in the finance industry (referred to as fintechs) represent one of the fastest growing markets in the world, expected to rise from US\$134 billion in 2022 to US\$557 billion globally by 2030 – more than a 400% increase.⁴¹

Impact of MSMEs on finance in a cloud-enabled economy by 2030



1 in 4 people globally using financial services supported by cloud-enabled MSMEs



Globally, 15% of surveyed cloud-enabled MSMEs working with the finance sector help budget-constrained customers or small businesses better manage their finances

Source: Accenture societal impact survey (2023), n = 188. Based on global results across 12 countries.

The rise of fintech apps has not only been seen an increase in the number of financial services companies, but also a boost in convenience and access, individual autonomy over financial decisions, better access to information, and tighter security frameworks. The MSME Belvo operates in Brazil and uses cloud technology to help over 3 million users on Belvo-supported apps through over 60 institutions to connect their financial data, helping to provide a comprehensive view of financial activity and improve borrowing experiences.^{42,43}

According to the Accenture societal impact survey, by 2030, one in four people globally are expected to be using financial services supported specifically by cloud-enabled MSMEs.⁴⁴ Globally, 15% of cloud-enabled MSMEs working with the finance sector are expected to be helping budget-constrained customers or small businesses to better manage their

³⁷ World Bank (2021), The Global 2021 Findex Database.

³⁸ World Bank (2021), The Global 2021 Findex Database.

³⁹ OECD (2020), "Digital disruption in banking and its impact on competition".

⁴⁰ Ibid.

⁴¹ Vantage market research (2023)

⁴² AWS (2022), Belvo Earns ISO 27001 Certification, Grows Rapidly Using AWS Security Services.

⁴³ Belvo (2023).

⁴⁴ Accenture societal impact survey (2023), n = 188.

finances.^{45,46} AI has the potential to unlock even greater individual financial wellbeing in a cloud-enabled economy by allowing customers to automate more elements of personal finances.⁴⁷ While this technology is still nascent, the possibility of integrating AI to perpetually monitor and screen for better fees or financial products holds enormous potential to improve financial health.⁴⁸

For many countries, a cloud-enabled financial services sector is not far away, with many MSMEs already incorporating or exploring the use of cloud-supported technologies, such as AI and ML, to improve outcomes for consumers across a range of applications.⁴⁹ A sample of MSMEs operating in the financial services space globally indicated that the most common areas for these MSMEs to be active were in providing digital banking and budgeting or financial management tools.^{50,51} The improvements in societal outcomes most often attributed to these MSMEs were increased affordability of services, improved financial literacy and education, and fraud detection.^{52,53}

3.5 Designing a sustainable future

Developing the tools and technologies that will support a sustainable future is one of the most pressing global challenges, but also one filled with enormous economic potential. Cloud-enabled MSMEs can employ technology and digitization to directly reduce environmental impact through innovations such as more efficient resource usage and smarter waste management. According to the Accenture societal impact survey, by 2030, one in five businesses globally are expected to be using services provided by cloud-enabled MSMEs to directly address their climate and sustainability objectives, such as through energy or emissions monitoring and reduction.⁵⁴ And it's not only businesses using these services; across the world, cities and towns are increasingly turning to cloud-based technology solutions provided by MSMEs to achieve a range of sustainable outcomes.^{55,56} Globally, 15% of cloud-enabled MSMEs providing services to achieve sustainability goals are expected to be supporting "smart cities", such as through optimising traffic flows or making waste removal more efficient, and enabling the tracking or reduction of electricity usage.^{57,58,59,60}

⁴⁵ Accenture societal impact survey (2023), n = 188.

⁴⁶ Based on the number of cloud-enabled MSMEs currently supporting this outcome.

⁴⁷ Crunchbase (2023) How the future of personal finance is self-driving money

⁴⁸ Crunchbase (2023) How the future of personal finance is self-driving money

⁴⁹ IMF (2021), Powering the Digital Economy: Opportunities and Risks of Artificial Intelligence in Finance.

⁵⁰ Accenture societal impact survey (2023), n = 188.

⁵¹ Based on the services that cloud-enabled MSMEs are currently delivering.

⁵² Accenture societal impact survey (2023), n = 188.

⁵³ Based on the number of cloud-enabled MSMEs currently supporting this outcome.

⁵⁴ Accenture societal impact survey (2023), n = 66.

⁵⁵ IDC (2023), Smart Cities.

⁵⁶ IDC (2021), The Next Frontier: AI and Digital Twins in Smart Cities.

⁵⁷ Accenture societal impact survey (2023), n = 66.

⁵⁸ Based on the number of cloud-enabled MSMEs currently supporting this outcome.

⁵⁹ AWS (2023), Building Smart Cities with AWS Cloud.

⁶⁰ OECD (2021), Measuring smart city performance in COVID-19 times: Lessons from Korea and OECD countries.

Impact of MSMEs on sustainability in a cloud-enabled economy by 2030



1 in 5 businesses globally using sustainability services supported by cloud-enabled MSMEs

Globally, **15%** of surveyed cloud-enabled MSMEs that provide sustainability services support smart cities



Source: Accenture societal impact survey (2023), n = 66. Based on global results across 12 countries.

According to the Accenture societal impact survey of global MSMEs, cloud technologies have already enabled these businesses to provide smarter resource management and usage, access to sustainable and renewable technologies, carbon footprint monitoring, and sustainability information.⁶¹ Through these sustainable solutions, global MSMEs are helping to support wider sustainability goals including more efficient use of energy and water, improving waste management, supporting better air quality, and increasing the availability of renewable energy.⁶²

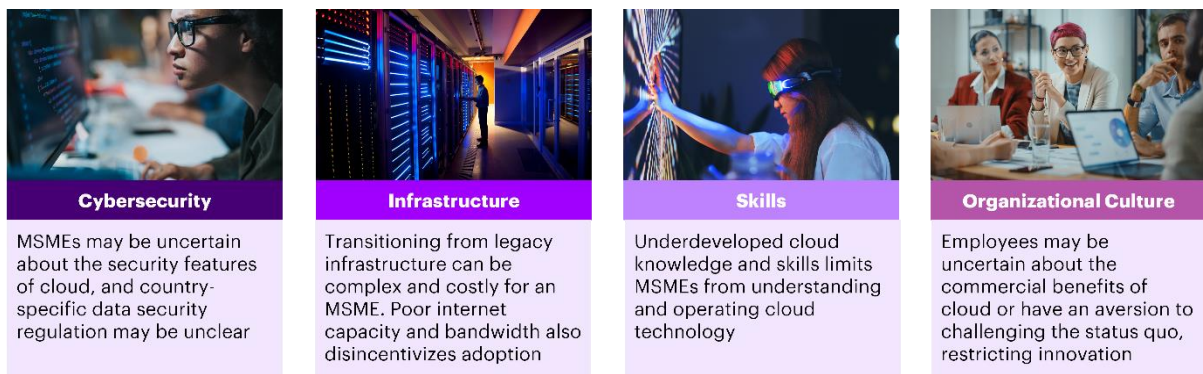
⁶¹ Accenture societal impact survey (2023), n = 66.

⁶² Accenture societal impact survey (2023), n = 66.

4 Achieving the cloud-enabled economy

The cloud-enabled economy offers significant potential in terms of both economic and societal impact. With 62% of businesses adopting cloud technology as of 2021, Brazil’s path towards a cloud-enabled economy has more to do with using cloud in new ways within firms who have already adopted, rather than pursuing the businesses that continue to operate outside of the cloud. To unlock this potential, the focus shifts to maturing cloud usage across more complex business functions and implementing more advanced technologies supported by cloud including AI and ML. Unlocking these opportunities by 2030 requires continued coordinated action from industry and government to address the barriers to uptake. The main persistent barriers are included in Figure 7.

Figure 7: Firm-level barriers to cloud adoption



Source: Accenture⁶³

4.1 Holistic strategies to overcome firm-specific barriers to cloud adoption

MSMEs can adopt a range of internal policies and actions to overcome these barriers and further integrate cloud solutions across all business functions, thereby maximizing their productivity dividend overtime (see Figure 8).

⁶³ Accenture (2023), The race to cloud: Reaching the inflection point to long sought

Figure 8: Steps for MSMEs to accelerate cloud maturity

■ Cybersecurity
 ■ Infrastructure
 ■ Skills
 ■ Organizational culture

Steps	Description	Barriers addressed			
1 Identify how cloud can streamline strategic goals	<ul style="list-style-type: none"> Identify how cloud solutions can meet your goals Identify a cloud partner that can help navigate the process Examine case studies of how MSMEs have used cloud to transform their business and create impact Interview employees to determine which barriers are preventing these systems and/or processes from being introduced or optimized at the firm level 				✓
2 Evaluate industry and government support	<ul style="list-style-type: none"> Examine the Brazilian government’s cloud policies and programs offered by industry to address firm-specific barriers and accelerate cloud maturity This could include R&D tax credits from the Brazilian government, or sponsorship programs for startups run by cloud providers such as AWS 	✓	✓	✓	✓
3 Educate all employees	<ul style="list-style-type: none"> Support employees to upskill in cloud, and utilize training from cloud providers where relevant Identify specific skill shortages to focus their training 	✓		✓	✓
4 Review data security arrangements	<ul style="list-style-type: none"> Review data security arrangements from the cloud provider and determine whether additional internal policies are required Review security features of cloud and best practice data policies Simplify and harmonize policy across the business, with clear guidelines for different functional applications of cloud 	✓			
5 Create a whole-of-business cloud migration strategy	<ul style="list-style-type: none"> Evaluate the costs and benefits of alternative strategies to determine a whole-of-business solution that meets business goals MSMEs should prioritize solutions which deliver the greatest net benefit in the medium to long term Determine the scale and complexity of the cloud infrastructure required MSMEs with less cloud experience could consider enlisting cloud partners such as consultants to achieve this 	✓	✓	✓	✓

Source: Accenture

4.2 Strong policy support to address structural barriers and incentivize MSME cloud adoption

Brazil’s status as a cloud technology leader in South America is partially attributable to the government’s commitment to delivering strong policy support. This includes a variety of policies addressing the barriers discussed in Section 3.5. Despite being one of the largest countries in the world, both by land and population, Brazil has connected over 86% of the population to the internet.⁶⁴ The government has also worked with industry to illustrate their commitment to cloud technology by delivering a Digital Transformation Strategy and a Digital Government Strategy.^{65,66} As an emerging economy with such a large population, politicians in Brazil have a much more difficult task in terms of developing the financial support required to incentivize MSMEs to adopt cloud technology. However, Brazil can build on their existing strong policy support by looking to global best practice examples (see Figure 9).








⁶⁴ World Bank (2021), Individuals using the Internet (% of population)

⁶⁵ Federal Government of Brazil (2018), Brazilian Digital Transformation Strategy

⁶⁶ Brazilian Government (2020), Digital Government Strategy.

Figure 9: Global best-practice examples of cloud adoption policies

■ Cybersecurity ■ Infrastructure ■ Skills ■ Organizational culture

Policy	Key existing support	Future policy	International policy examples	Barriers addressed
Invest in digital infrastructure	81% of Brazilians are connected to one of the fastest broadband networks in South America. The Programa Amazonia Integrada Sustentavel (PASI) and Nordeste Conectado plans will connect or improve internet to 24 million people. Brazil also has over 150 data centers to support cloud.	Continued investment into regional and rural areas and connecting more premises to full optic fibre connections would improve speeds to facilitate cloud.	 Singapore optic fiber accounts for 93% of broadband connections  Thailand optic fiber accounts for 94% of broadband connections	<div style="display: flex; justify-content: space-around;"> <div style="width: 20px; height: 20px; background-color: #cccccc;"></div> <div style="width: 20px; height: 20px; background-color: #800080;"></div> <div style="width: 20px; height: 20px; background-color: #cccccc;"></div> <div style="width: 20px; height: 20px; background-color: #cccccc;"></div> </div>
Invest in cloud skills and training	Brazil's Digital Transformation Strategy (E-Digital) includes partnerships with industry and educators to provide cloud training and certifications. Brazil has partnered with cloud providers to train millions of workers in digital skills, including cloud, since 2020.	Continued collaboration with industry to deliver digital skills training programs, with a focus on cloud technology. This should be especially targeted to MSMEs.	 Australia's National Cloud Computing Strategy includes cooperation with industry and educators to enhance cloud training	<div style="display: flex; justify-content: space-around;"> <div style="width: 20px; height: 20px; background-color: #800080;"></div> <div style="width: 20px; height: 20px; background-color: #cccccc;"></div> <div style="width: 20px; height: 20px; background-color: #cccccc;"></div> <div style="width: 20px; height: 20px; background-color: #800080;"></div> </div>
Harmonize data privacy policy across regions	Brazil's Lei Geral de Proteção de Dados (LGPD) or the General Data Protection Law came into effect in 2020 to unify 40 previous laws regulating data flows.	Continue working with world leaders to harmonize policy in line with best practice, while promoting cross border data flows.	 The international community could work together in forums such as the G20 to harmonise data policies.	<div style="display: flex; justify-content: space-around;"> <div style="width: 20px; height: 20px; background-color: #800080;"></div> <div style="width: 20px; height: 20px; background-color: #cccccc;"></div> <div style="width: 20px; height: 20px; background-color: #cccccc;"></div> <div style="width: 20px; height: 20px; background-color: #cccccc;"></div> </div>
Create clear guidelines for industry	Brazil's Resolution No. 4,658 issued by the Central Bank provides guidelines and requirements for regulated financial institutions.	Work with experts to develop industry guidelines on the specific applications of cloud.	 Japan's Data Protection Laws include clear guidelines for the finance, healthcare and telecommunications sectors	<div style="display: flex; justify-content: space-around;"> <div style="width: 20px; height: 20px; background-color: #800080;"></div> <div style="width: 20px; height: 20px; background-color: #cccccc;"></div> <div style="width: 20px; height: 20px; background-color: #cccccc;"></div> <div style="width: 20px; height: 20px; background-color: #800080;"></div> </div>
Incentivize cloud adoption and maturity	Besides R&D tax incentives to promote innovation, Brazil does not have specific financial incentives for cloud costs.	Greater ongoing support for MSMEs to reduce the cost of transitioning to cloud and encourage innovation.	 United States' incentives include cloud being fully tax deductible and tax credits for cloud-related investments	<div style="display: flex; justify-content: space-around;"> <div style="width: 20px; height: 20px; background-color: #cccccc;"></div> <div style="width: 20px; height: 20px; background-color: #800080;"></div> <div style="width: 20px; height: 20px; background-color: #cccccc;"></div> <div style="width: 20px; height: 20px; background-color: #800080;"></div> </div>
Improve cloud-first policies	The Brazilian Government has undergone tenders for public cloud services, with the Government allocating a two-year contract to Extreme Digital Solutions (EDS) worth 65.9 million reais to integrate cloud for government bodies.	Develop an explicit cloud-first policy with clear guidelines for implementation, and consider the benefits of public cloud-first strategies with appropriate public procurement to enhance confidence.	 United Kingdom's Cloud-First policy (2013) is a whole-of-government, public cloud-first approach that outlines clear guidelines and procurement policies for departments	<div style="display: flex; justify-content: space-around;"> <div style="width: 20px; height: 20px; background-color: #800080;"></div> <div style="width: 20px; height: 20px; background-color: #800080;"></div> <div style="width: 20px; height: 20px; background-color: #cccccc;"></div> <div style="width: 20px; height: 20px; background-color: #800080;"></div> </div>

Source: OECD,⁶⁷ World Bank,⁶⁸ O'Grady, V.,⁶⁹ Statista,⁷⁰ Lim, S.,⁷¹ Statista,⁷² Brazilian Government,^{73,74} Australian

⁶⁷ OECD (2023), OECD broadband statistics update

⁶⁸ World Bank (2021), Individuals using the Internet (% of population)

⁶⁹ O'Grady, V. (2022), Brazil aims to connect millions in the country's north to fibre

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⁷¹ Lim, S. (2019), The city of the future: What will a full-fiber broadband city look like

⁷² Statista (2021), Share of fiber optic internet connection in Thailand from the 3rd quarter of 2019 to the 2nd quarter of 2021

⁷³ Brazilian Government (2018), Brazilian Digital Transformation Strategy

⁷⁴ Brazilian Government (2022), Economy opens new Price Registration Intent to hire cloud computing services.

Government,⁷⁵ Usercentrics,⁷⁶ GDPR EU,⁷⁷ Bnamericas,⁷⁸ Lexology,⁷⁹ Coos, A.,⁸⁰ Deloitte,⁸¹ Mcguire Sponsel,⁸² Mari, A.,⁸³ UK Government⁸⁴

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⁷⁶ Usercentrics (2022), Brazil's General Data Protection Law / Lei Geral de Proteção de Dados (LGPD): An overview

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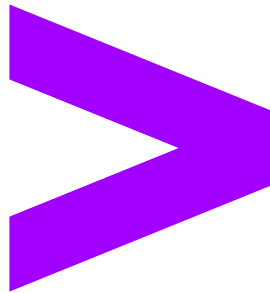
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