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Realising a cloud-enabled economy in Canada:

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 Canada

Across key sectors[i] this opportunity is expected to represent:

$9.7 billion combined annual productivity benefits unlocked through cloud-enabled MSMEs in healthcare, education, and agriculture

This represents a 52% increase on current levels

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

29 million telehealth consultations using cloud supported by MSMEs' services

2 million 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 Canada, MSMEs collectively account for over 98% of all firms, over two-thirds of jobs, and over one-third of Gross Domestic Product (GDP).[1] MSMEs are also a major source of innovation and disruption in the economy, leveraging both old and new 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), 49% of all businesses across Canada now utilize at least some basic form of cloud technology such as office tools and storage, although usage of more intermediate and advanced tools, such as artificial intelligence and big data analytics, is expected to be far lower based on trends observed in other developed economies. Cloud has most profoundly impacted MSMEs by allowing them to start, operate, and scale their organisation 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," which would be characterized by high levels of overall cloud adoption across Canadian businesses.[2,3] It is anticipated that under this scenario, 90% of all businesses would adopt at least a basic level of cloud technology. 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 Canadian economy is expected to deliver societal impact by supporting MSMEs to produce innovative products and solutions or augment their existing operations. In health, education, and agriculture, this annual productivity benefit is expected to reach $9.7 billion. By 2030, cloud-enabled MSMEs are expected to support 29 million remote health consultations, two million school students to access online education, and one in three farms access more efficient and sustainable farming practices in Canada. Cloud-enabled MSMEs are also heavily involved with developing solutions to transition the economy towards a more sustainable future and designing digital finance solutions (through 'fintechs') that are helping to support better financial inclusion and wellbeing.

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[1] Innovation, Science and Economic Development Canada (2021), Key Small Business Statistics- 2021.
[2] Gartner (2022), The future of cloud computing in 2027: From technology to business innovation.
[3] Gartner (2021), Gartner says cloud will be the centerpiece of new digital experience.

Although these benefits are substantial, the opportunities of the cloud-enabled economy will not eventuate without action. To unlock this potential, Canadian 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.

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

- prioritizing cloud technology education and talent development across all levels and roles, both technical and non-technical
- investing in digital infrastructure to ensure innovation can continue unimpeded; and
- and leading by example through promoting cloud adoption across all levels and divisions of government, along with ensuring the right legislation is in place to promote innovation and the adoption of new technologies.

1 The cloud-enabled economy

Cloud technology has changed the way many businesses operate, particularly for MSMEs (businesses with between 1 and 250 employees)[4], 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.[5] 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.[6]

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

Average % of cloud-enabled MSMEs across several industries in Canada that find cloud somewhat or extremely significant in providing a particular benefit
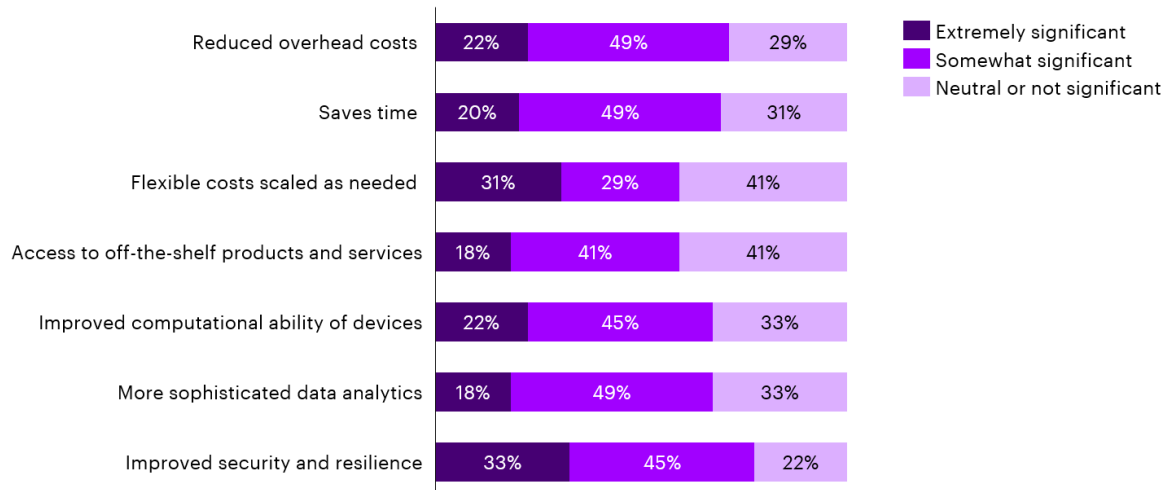
Source: Accenture societal impact survey (2023), n = 52. 'Neutral or not significant' includes responses of neutral, somewhat insignificant, and not significant at all.

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
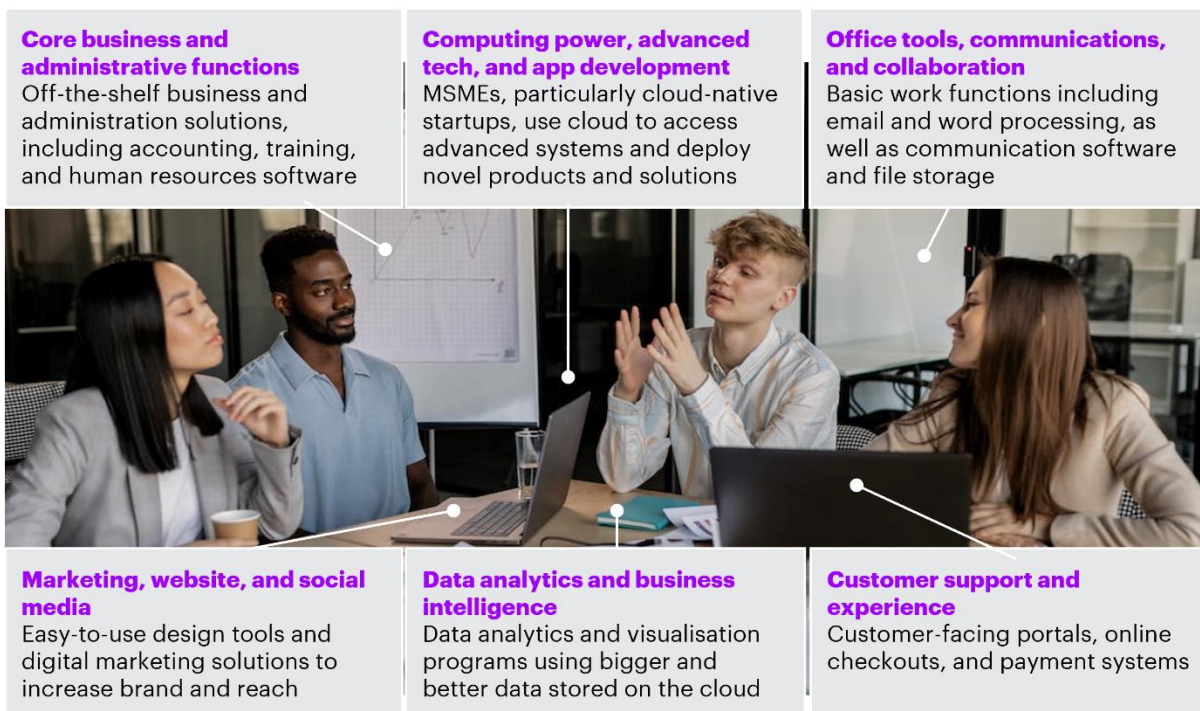
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[4] The definition of MSME used in this report is taken from the OECD (2023) and covers enterprises with businesses between 1-250 employees.
[5] AWS (2023), What is cloud computing?
[6] Accenture societal impact survey (2023), n = 562.

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

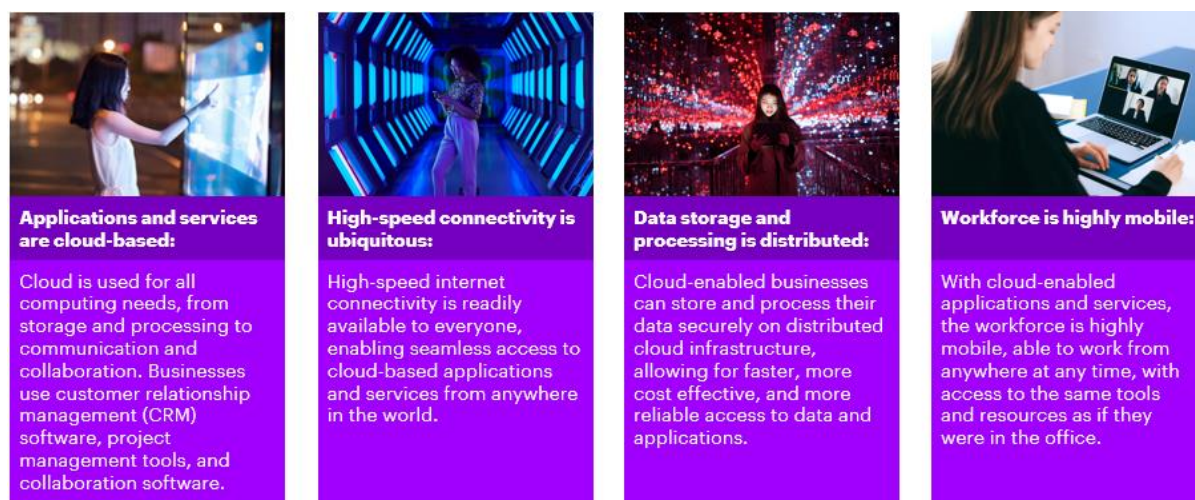**Figure 2: End-to-end cloud technology applications for MSMEs**

Core business and administrative functions	Computing power, advanced tech, and app development	Office tools, communications, and collaboration
Off-the-shelf business and administration solutions, including accounting, training, and human resources software	MSMEs, particularly cloud-native startups, use cloud to access advanced systems and deploy novel products and solutions	Basic work functions including email and word processing, as well as communication software and file storage

Marketing, website, and social media	Data analytics and business intelligence	Customer support and experience
Easy-to-use design tools and digital marketing solutions to increase brand and reach	Data analytics and visualisation programs using bigger and better data stored on the cloud	Customer-facing portals, online checkouts, and payment systems

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, it is expected that 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

Applications and services are cloud-based:	High-speed connectivity is ubiquitous:	Data storage and processing is distributed:	Workforce is highly mobile:
Cloud is used for all computing needs, from storage and processing to communication and collaboration. Businesses use customer relationship management (CRM) software, project management tools, and collaboration software.	High-speed internet connectivity is readily available to everyone, enabling seamless access to cloud-based applications and services from anywhere in the world.	Cloud-enabled businesses can store and process their data securely on distributed cloud infrastructure, allowing for faster, more cost effective, and more reliable access to data and applications.	With cloud-enabled applications and services, the workforce is highly mobile, able to work from anywhere at any time, with access to the same tools and resources as if they were in the office.

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 services[7] as a proportion of all businesses, across all levels of maturity.[8] 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 technology 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

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[7] 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

[8] OECD (2023), OECD Going Digital Toolkit

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

Figure 4: Spectrum of cloud technology maturity and example applications
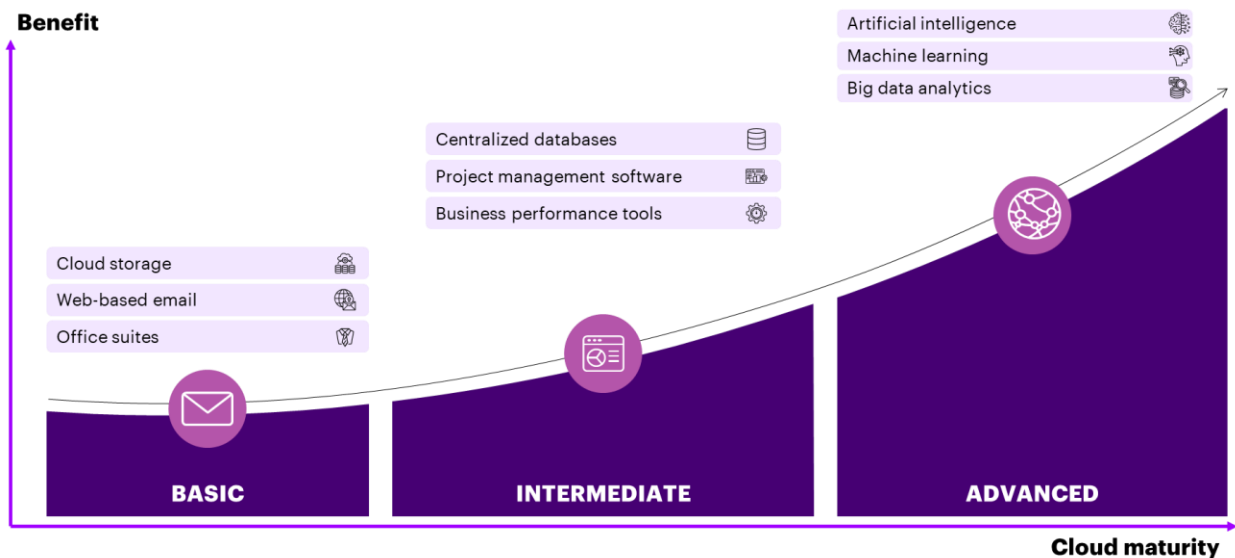
Note: Applications above are examples of types of uses for each of the levels of maturity. The lists are not exhaustive. Source: Accenture.

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

Embracing advanced cloud adoption also 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. Cloud has increased the viability and proliferation of a wide range of tools, business models, and technologies that, together with cloud, generate societal and economic impact. Advanced applications of cloud technology 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 though cloud (see Appendix D of the global report for a full description of each technology supported by cloud).[9] 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%.[10] 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.[11] As shown in Figure 5, 77% of Canadian MSMEs across several industries identified AI (including generative AI and natural language processing (NLP)) and ML as the

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[9] Damian Mazurek, (2023), Leveraging Cloud-based AI/ML Services to elevate your business.
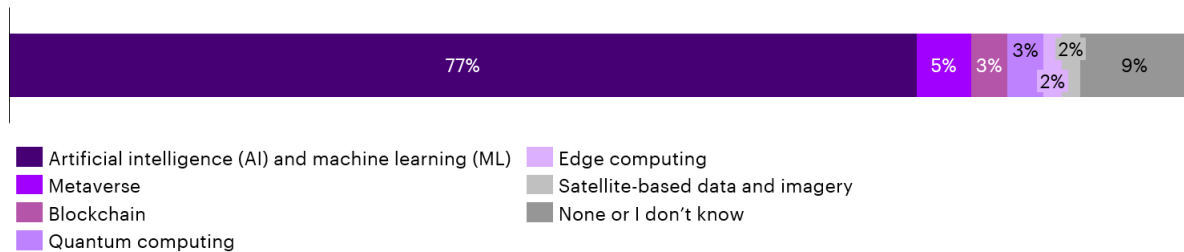[10] Precedence Research (2023), Generative AI Market size to hit USD 118 Bn by 2032
[11] AWS (2023), Generative AI on AWS.

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technologies likely to be most significant in creating societal impacts in 2030.[12,13] 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, supporting pharmaceutical drug development, 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 several industries in Canada that believe a technology supported by cloud will be the most significant in creating societal impacts in 2030

77%	5%	3%	3%	2%	2%	9%

- ■ Artificial intelligence (AI) and machine learning (ML)
- ■ Metaverse
- ■ Blockchain
- ■ Quantum computing
- ■ Edge computing
- ■ Satellite-based data and imagery
- ■ None or I don't know

Source: Accenture societal impact survey (2023), n = 52. '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.[14]

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).[15] Figure 6 demonstrates through a

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[12] Accenture societal impact survey (2023), n = 52. 77% of Canadian 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.

[13] Survey responses were from MSMEs working in healthcare, education, agriculture, finance, and sustainability.

[14] 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).

[15] 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

This is Emily.
Emily balances part-time work with full-time university. Emily benefits from cloud solutions delivered by MSMEs to make her day easier and more productive.

Telehealth services	8:00 am

Emily has a doctor's appointment before work. Through telehealth, Emily can now talk to her doctor virtually. Her doctor can also access and upload her medical information to Emily's secure online health record.

No longer needs to ...
× Spend two hours driving to the doctor and waiting in the office
× Be near people who are sick
× Worry about her doctor not having access to her records

Examples
verato
telescope health

Access to education	3:00 pm

After getting home from work, Emily logs in for her online tutoring class. Whilst the tutor is based in the United States, Emily and her 10 classmates from around the world have access to additional learning material that enables collaboration with people from different backgrounds.

No longer needs to ...
× Leave work early to travel to university
× Be restricted to the limited lecture and tutor times offered by the university

Examples
Vocareum
Knowt

Spending insights	6:30 pm

Before bed, Emily reviews her weekly spending data on a new finance app. The app uses cloud to securely classify and store her spending patterns, to identify new ways Emily can cut costs. This week, Emily has saved $45 from cancelling unused subscriptions!

No longer needs to ...
× Spend lots of time balancing her budget
× Worry about exceeding her weekly budget on purchases
× Carry cash for basic payments

Examples
mobileware
FROOL

Notes: Examples include MSMEs and startups using cloud solutions from AWS case studies
Source: AWS[16]

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[16] AWS ([2023](#)), Customer Success Stories.

2 Unlocking $9.7 billion in productivity benefits within key societal sectors

MSMEs are a major driver of economic performance and collectively account for over 98% of all firms, over two-thirds of jobs, and over one-third of Gross Domestic Product (GDP).[17] 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 labour inputs). A full explanation of the modelling approach, data, and outputs can be found in Appendix A of the global report.

Canada has had strong growth in cloud adoption, and is well positioned to transition to a cloud-enabled economy with already high levels of cloud adoption.[18] The share of Canadian businesses using at least some basic level of cloud technology in their business operations is 49%, although the rate of adoption for intermediate or advanced technology is expected to be far lower, based on a data from other developed economies.[19] For example, the overall adoption rate for the developed economies within the OECD is 44%, while intermediate and advanced is much lower at 19% and 13% respectively.

The productivity benefits of the cloud-enabled economy to Canadian societal sectors would be significant. Through successful transition to a cloud-enabled economy, MSMEs in the healthcare, education, and agriculture industries within Canada are expected to unlock $9.7 billion in combined annual productivity benefits by 2030, a 52% increase from $6.4 billion in 2023.[20] Under this scenario, it is estimated that 1.6 million people would work at cloud-enabled MSMEs in these industries, which would be 8% of the total jobs in Canada, an increase from 4% currently. This reflects the increasing ubiquitousness of cloud technology in almost all forms of digital technology and occupations across the economy.

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[17] Innovation, Science and Economic Development Canada (2021), Key Small Business Statistics- 2021.
[18] 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.
[19] Accenture analysis of OECD data. See global report for full methodology.
[20] All monetary values are quoted in Canadian (2023) dollars unless otherwise specified.

Annual productivity benefits unlocked by cloud-enabled MSMEs in key societal sectors are expected to reach $9.7 billion by 2030
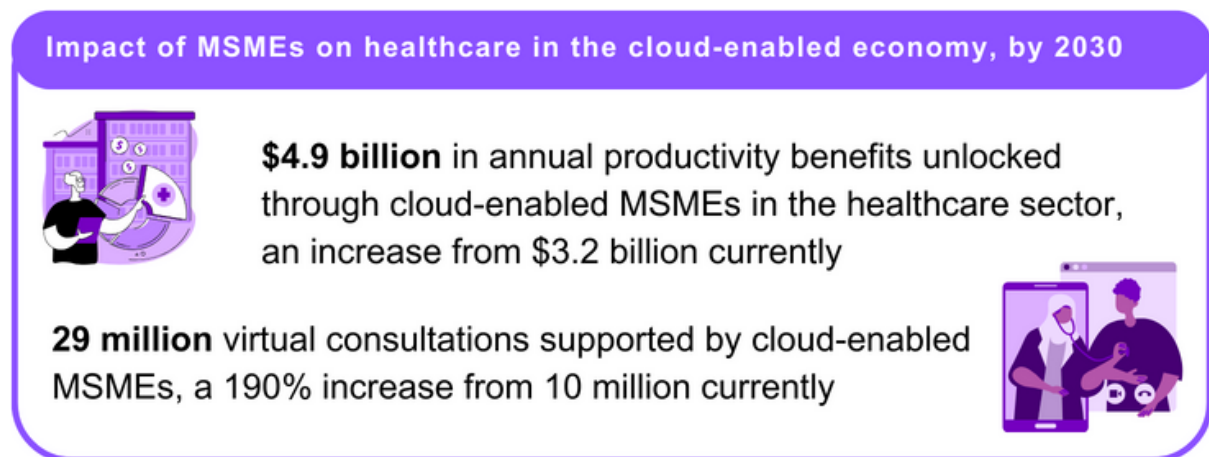
1.6 million people in Canada are expected to be employed by cloud-enabled MSMEs in key societal sectors by 2030

3 The societal impact of the cloud-enabled economy

MSMEs that harness cloud technology have the potential to create significant societal impact in Canada. 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 sustainability technology. These solutions will lead to improved social wellbeing and development.

3.1 Driving innovation and improving access to healthcare and life sciences

Cloud is enabling MSMEs to make healthcare easier to access for individuals whilst also driving efficiency in healthcare delivery and supporting decisions around patient healthcare. There are barriers for some communities to access healthcare, particularly for the approximately 18% of Canadians living in rural and remote areas.[21] Through remote consultations and monitoring of health indicators, cloud technology can help make healthcare more accessible to underserved communities throughout Canada. In particular, telehealth is helping to support older people, as Canadians over age 65 have higher rates of telehealth usage compared to other age groups.[22] If Canada were to achieve a cloud-enabled economy, MSMEs in healthcare are expected to unlock $4.9 billion in annual productivity benefits by 2030. Cloud-enabled MSMEs are expected to support 29 million virtual health consultations per year by 2030.[23]

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

$4.9 billion in annual productivity benefits unlocked through cloud-enabled MSMEs in the healthcare sector, an increase from $3.2 billion currently

29 million virtual consultations supported by cloud-enabled MSMEs, a 190% increase from 10 million currently

Note: Estimates for the number of telehealth consultations produced through market size estimates (see Appendix C of the global report) and are calculated separately from 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

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[21] Statistics Canada (2022), Population growth in Canada's rural areas, 2016 to 2021.
[22] OECD (2023), The future of telemedicine after COVID-19
[23] Remote health consultations can also be supported by telephone or through large cloud-enabled firms.

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. Healthcare and life science research can also benefit from advanced data analytics tools supported by data. Sequence Bio, a Canadian MSME based out of Newfoundland, is using cloud to better analyze genetic data, helping to find patterns to improve how diseases are diagnosed and treated.[24] Technologies supported by cloud, particularly generative AI, also have significant potential to change the healthcare industry, from the delivery of healthcare to 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.[25]

3.2 Improving access to engaging and personalized education

Cloud technology can make education more equitable 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. These students and adult learners will be able to learn in a more collaborative environment, as cloud supports them to interact and share content more readily. Cloud technology can also help reduce the administration workload for teachers, enabling them to spend more time educating students. Under a cloud-enabled economy, MSMEs in education are expected to unlock $3.6 billion in annual productivity benefits by 2030. Through supporting the education industry, cloud-enabled MSMEs are expected to facilitate two million school students and eight million adult learners in Canada to receive online learning by 2030.

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

$3.6 billion in annual productivity benefits unlocked through cloud-enabled MSMEs in the education sector, an increase from $2.3 billion currently

2 million primary to high school students using online education via cloud-enabled MSMEs, a 25% increase from 1.6 million currently

8 million adults accessing education via cloud-enabled MSMEs

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[24] Sequence Bio (2023).
[25] WE Forum (2023), How will generative AI impact healthcare?

Cloud-enabled MSMEs are also introducing advanced analytics into the classroom, helping to personalize learning. Personalised 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.[26,27]

3.3 Developing smarter and more sustainable farming practices

Agricultural is an important sector for Canada, particularly in the Prairies, with agricultural food products making up 14% of Canada's exports.[28] Canada's agricultural sector is highly productive compared to a global average, which drove around 3% growth in Canada's agricultural output between 2010 and 2019.[29] MSME cloud services are being used by the agricultural industry in Canada 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).[30] 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 $1.3 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 Canada by 2030.

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

$1.3 billion in annual productivity benefits unlocked through cloud-enabled MSMEs in the agriculture sector, an increase from $0.9 billion currently

1 in 3 farms using precision agriculture supported by cloud-enabled MSMEs, a 100% increase from 1 in 6 farms currently

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[26] World Economic Forum (2023), Can AI improve education? Here are 4 potential use cases.
[27] Stanford University, Human-Centered Artificial Intelligence, (2023) AI Will Transform Teaching and Learning. Let's Get it Right.
[28] OECD (2022), Agricultural Policy Monitoring and evaluation 2022: Reforming Agricultural Policies for Climate Change Mitigation.
[29] OECD (2022), Agricultural Policy Monitoring and evaluation 2022: Reforming Agricultural Policies for Climate Change Mitigation.
[30] FAO (2022), Leveraging automation and digitalization for precision agriculture: Evidence from the case studies.

3.4 Improving financial access and wellbeing

Digitization of the finance sector has led to a wave of disruption, increased competition, and new types of products and services that better service customers. 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.[31] In Canada, cloud technology is already widely used, at least in basic applications, across the financial services sector. A sample of cloud-enabled 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 financial management tools through cloud-based platforms.[32,33] These MSMEs support increased affordability of services, improved financial literacy and education, and fraud detection.[34,35]

There is an opportunity for more broader adoption and even more advanced applications, such as AI and ML, to improve outcomes for consumers across a range of applications.[36] These applications have the potential to unlock even greater individual financial wellbeing in a cloud-enabled economy by allowing customers to automate more elements of personal finances, such as Trust Science (see case study below) that uses AI and ML to better assess credit worthiness.[37] 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.[38]

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. [KOHO](#) is one such fintech company based in Canada seeking to financially empower a generation of Canadians by offering accessible and affordable spending and savings products. 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.[39] Globally, 15% of

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[31] OECD ([2020](#)), "Digital disruption in banking and its impact on competition".
[32] Accenture societal impact survey (2023), n = 188.
[33] Based on the services that cloud-enabled MSMEs are currently delivering.
[34] Accenture societal impact survey (2023), n = 188.
[35] Based on the number of cloud-enabled MSMEs currently supporting this outcome.
[36] IMF ([2021](#)), Powering the Digital Economy: Opportunities and Risks of Artificial Intelligence in Finance.
[37] Crunchbase ([2023](#)) How the future of personal finance is self-driving money
[38] Vantage market research (2023)
[39] Accenture societal impact survey (2023), n = 188.

cloud-enabled MSMEs working with the finance sector are expected to be helping budget-constrained customers or small businesses to better manage their finances.[40,41]

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.[42] A sample of MSMEs operating in the global financial services space indicated that the most common areas to be active were in providing digital banking and budgeting or financial management tools.[43,44] The improvements in societal outcomes most often attributed to these MSMEs were increased affordability of services, improved financial literacy and education, and fraud detection.[45,46]

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[40] Accenture societal impact survey (2023), n = 188.
[41] Based on the number of cloud-enabled MSMEs currently supporting this outcome.
[42] IMF (2021), Powering the Digital Economy: Opportunities and Risks of Artificial Intelligence in Finance.
[43] Accenture societal impact survey (2023), n = 188.
[44] Based on the services that cloud-enabled MSMEs are currently delivering.
[45] Accenture societal impact survey (2023), n = 188.
[46] Based on the number of cloud-enabled MSMEs currently supporting this outcome.

Trust Science helps keep vulnerable customers away from predatory loans by using explainable AI to help lenders make better credit decisions

TRUST SCIENCE.

Industry: Finance

Size: Small (<50 employees)

Locations: Canada and the United States

Trust Science is a Canada-based, growth-stage business that supports more people get access to suitable and affordable credit. Over a lifetime, individuals will turn to credit for a range of reasons, including buying a new car, renting a house, taking a holiday, or funding emergencies. However, the traditional credit checks used by many financial institutions have not adapted to a changing society. Nowadays, many people move out of home later, purchase a vehicle later, avoid credit cards, or relocate internationally, meaning that they may not obtain a credit score until later in life.

"Absence of a credit rating does not necessarily signify inability to pay. New migrants or people new to credit – including younger people and those in the gig economy – will tend to struggle to get credit when they need it. Using our tool, we sift through numerous sources of public and consumer-consented, financial and alternative information to conduct a fairer, objective assessment".
Evan Chrapko, Founder and CEO

Inaccurate or missing credit assessments affect more than **90 million (one in five) Canadians and Americans**. Without access to an appropriate credit score, many of these borrowers often find themselves unnecessarily forced to engage with predatory lending practices.

Trust Science is not a lender, but instead provides software to financial institutions helping them identify and screen potential borrowers. Trust Science employs a cloud-based, explainable AI and ML platform, known as "Credit Bureau**+™**", to better

analyze consumer-consented banking data. By linking different financial data points, Credit Bureau+ is able to develop a more comprehensive understanding of an individual's spending habits, assets and income and determine a more objective assessment of credit worthiness. Using Credit Bureau+ not only increases the pool of potential applicants (which is good for borrowers and lenders) but also provides more accurate assessments, differentiating between good and bad credit with over **36% greater accuracy than traditional means**. For one client, Trust Science **approved 10.4% more customers while reducing instances of bad debt by 20%**.

Trust Science has operated on cloud since inception, as Credit Bureau+ requires extensive computational power that would otherwise be expensive and inflexible to run on premises. Running on cloud allows Trust Science to scale more effectively, taking on new banking clients and immediately incorporating additional, consented banking data of new potential borrowers.

Source: Accenture interviews and research. TrustScience (2023).

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 innovation, such as enabling 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.[47] 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.[48,49] "Smart cities" are using a wide range of technologies supported by cloud-enabled MSMEs, including AI, to create societal impact and improve sustainability, such as through environmental monitoring and data-driven urban planning.[50,51,52,53] Globally, 15% of cloud-enabled MSMEs providing services to achieve sustainability goals are expected to be supporting "smart cities".[54,55]

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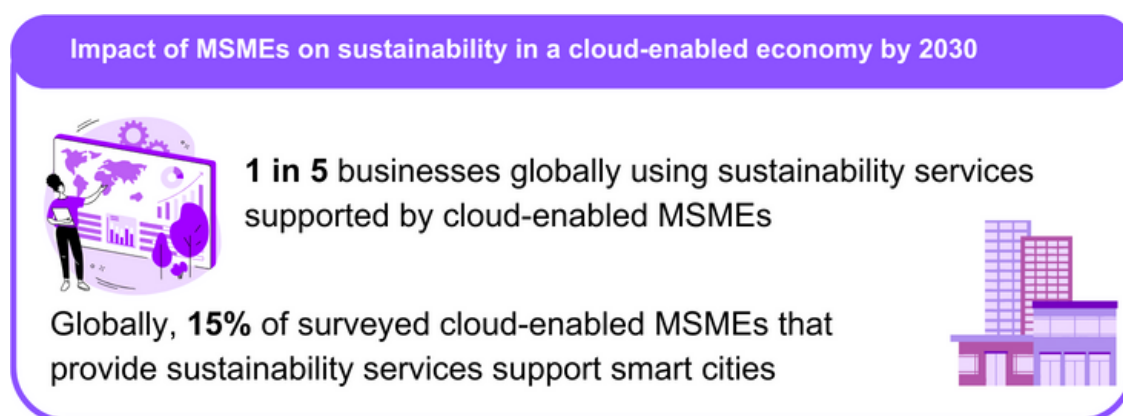
Source: Accenture societal impact survey (2023), n = 66. Based on global results across 12 countries.

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.[56] 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.[57] Brainbox AI is a Canadian MSME that is helping to support smart cities by using AI to reduce energy consumption (see case study below).

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[47] Accenture societal impact survey (2023), n = 66.
[48] IDC (2023), Smart Cities.
[49] IDC (2021), The Next Frontier: AI and Digital Twins in Smart Cities.
[50] "Smart cities" use technology to meet people's needs and improve social, financial, and environmental outcomes, which can involve better transport networks, more efficient resource use, improved city administration, along with a variety of other use cases.
[51] IDC (2021), Building Digital Resiliency in Smart Cities and Communities.
[52] World Economic Forum (2021), What is a 'smart city'?
[53] IDC (2021), The Next Frontier: AI and Digital Twins in Smart Cities.
[54] Accenture societal impact survey (2023), n = 66.
[55] Based on the number of cloud-enabled MSMEs currently supporting this outcome.
[56] Accenture societal impact survey (2023), n = 66.
[57] Accenture societal impact survey (2023), n = 66.

BrainBox AI's cloud-based platform utilizes integrated AI algorithms to greatly reduce energy consumption and emissions in commercial buildings

BRAINBOX AI

Industry: Sustainability

Size: Medium (<250 employees)

Locations: Canada, United States, Europe, Middle East and Australia

BrainBox AI is a Canadian-based MSME launched in 2019 with the mission to make commercial buildings smarter, greener, and more efficient. In developed economies, commercial buildings are responsible for up to 30% of the energy consumed, stemming primarily from the day-to-day operations to heat and cool them. The typical behaviour of a commercial building is heavily influenced by reactive Heating, Ventilation, and Air Conditioning (HVAC) systems that result in operational inefficiencies and excess energy usage. By deploying an autonomous AI-driven solution that operates 24/7, commercial buildings are ushered into the pre-emptive maintenance of their HVAC systems, that reduces the energy required to run them by up to 25%.

BrainBox AI is currently operating in over 700 commercial and retail buildings, across 21 countries. By utilizing deep learning, cloud-based computing, as well as proprietary algorithms, BrainBox AI seamlessly integrates into a building's existing HVAC system, to predict the energy needs of a building without compromising tenant comfort.

BrainBox AI is able to do this by analyzing information from a multitude of internal and external data points, including historical building data, weather patterns, utility tariff structures, pollution levels and even sun position. With this data, BrainBox AI optimizes the energy consumed to both heat and cool the building thereby ensuring a stable modulated temperature with all of the aforementioned factors taken into account.

"Our AI tool predicts internal and external conditions to optimally manage a building's consumption of electricity. A cloud-based system is the only solution that provides the scale and flexibility our algorithm needs to process and learn from such large volumes of internal and external data as well as seamlessly integrate with building systems around the world."

Jean-Simon Venne, Co-founder and CTO.

Cloud technology supplies the critical infrastructure that BrainBox AI needs as it collects large quantities of data and analyses it using artificial intelligence and deep learning methodologies. Cloud provides BrainBox AI with the ability to connect with buildings worldwide and to process the large volumes of data that they have collected and stored. With its support, BrainBox AI envisions an optimization of the energy grid that utilizes its AI technology to alleviate the current demand and strain that it is currently under, in favor of a more flexible grid that can produce electricity in line with the increased demand.

Source: Accenture interviews and research. BrainboxAI (2023), BrainBoxAI (2023) Unlocking energy efficiency in commercial buildings.

4 Achieving the cloud-enabled economy

With businesses across Canada at starkly different points along the adoption spectrum, Canada's path to a cloud-enabled economy involves a combination of increasing sophistication and further encouraging greater levels of overall adoption. However, barriers to adoption remain despite the potential upside. A survey of global business leaders, conducted by Accenture, shows that persistent barriers to adoption in developed countries, like Canada, continue to concern cybersecurity, reluctant organizational cultures, insufficient infrastructure (e.g., software and hardware) or difficulty transitioning, and digital cloud skills (see Figure 7).

Figure 7: Primary barriers to cloud technology uptake

% of respondents listing barrier in top three responses

41	31	41	32	39	38	34	36
Security and compliance risks	Regulatory uncertainty	Complexity in operational changes	IT and business misalignment	Modification of legacy applications	Uncertainty over cloud strategy	Modifying legacy infrastructure	Lacks cloud skills
Cybersecurity		**Organizational culture**		**Infrastructure**			**Skills**

Source: Accenture (2023). Survey responses from 2022, n = 800.

To address each of these complex challenges MSMEs should evaluate barriers at the firm level, to identify specific security, IT resources, organizational culture, and skills required to be successful. This will help MSMEs to develop holistic cloud solutions, optimized and scaled to improve performance, and reduce costs.

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

MSMEs can adopt a range of internal policies and actions to further integrate more complex cloud solutions across all business functions, thereby maximizing their productivity dividend overtime (see Figure 8). Whilst there is 49% of cloud adoption across businesses in Canada, 81% of large businesses have adopted cloud, suggesting many of the firm-specific barriers to cloud adoption are particularly significant amongst MSMEs.[58]

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[58] OECD (2022), Share of businesses purchasing cloud services.

Figure 8: Steps for MSMEs to accelerate cloud maturity

Legend: Cybersecurity ▪ Infrastructure ▪ Skills ▪ Organizational culture

Steps	Description	Cybersecurity	Infrastructure	Skills	Organizational culture
1. Identify how cloud can streamline strategic goals	• 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	• Examine the Canadian 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 Canadian government, or sponsorship programs for startups run by cloud providers	✓	✓	✓	✓
3. Educate all employees	• 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	• 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	• 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

Canadian governments have already begun to implement strategies that address these barriers to adoption. This includes highlighting the benefits of cloud adoption to MSMEs and the broader commercial sector through a variety of government adoption policies, from 'Cloud-right' to 'Cloud-first' and now 'Cloud-smart'.[59] Canadian governments have also supported digital skills programs such as the Canada Training Benefit, and improved broadband infrastructure which can help facilitate adoption.[60] To continue improving policy and accelerate more MSMEs towards cloud maturity, international counterparts can offer best practice solutions for further addressing these barriers to cloud adoption (see Figure 9).

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[59] Government of Canada (2023), Cloud Adoption Strategy: 2023 Update.
[60] Government of Canada (2019), The Canada Training Benefit: Empowering Canada's workforce to adapt and prepare for the jobs of tomorrow.

Figure 9: Global examples of best-practices for cloud adoption policies

Legend: ■ Cybersecurity ■ Infrastructure ■ Skills ■ Organizational culture

Policy	Key existing support	Future policy	International policy examples	Cybersecurity	Infrastructure	Skills	Organizational culture
Invest in digital infrastructure	In Canada, 94% of individuals have access to broadband connections, attributable to the ~$3.8B spent on infrastructure.	Continued investment into regional and rural areas and connecting more premises to full optic fibre connections would improve speeds to facilitate cloud.	**Thailand optic fibre** accounts for 94% of broadband connections **Norway** have connected 99% of the population to the internet		✓		
Invest in cloud skills and training	The government has worked with industry and academia on multiple initiatives to improve digital skills, such as Digital Skills for Youth, the Canada Job Grant and the Canada Training Benefit.	Continued collaboration with industry to deliver additional cloud training programs, especially for MSMEs.	**Australia's National Cloud Computing Strategy** includes cooperation with industry and educators to enhance cloud training **Brazil's Digital Transformation Strategy (E-Digital)** includes partnerships with industry and educators to provide cloud training and certifications	✓		✓	✓
Harmonize data privacy policy across regions	The Personal Information Protection and Electronic Documents Act, 2000 (PIPEDA) applies in most provinces. Provinces such as Quebec. Alberta and British Columbia have their own regulation similar to PIPEDA. Bill C-27 has been proposed as an amendment to PIPEDA.	Work with provinces and world leaders to harmonize policy in line with best practices, while promoting cross border data flows.	**European Union's General Data Protection Regulation (GDPR, 2016)** improved clarity and consistency across the EU, promoting data flow within the EU	✓			
Create clear guidelines for industry	While PIPEDA has guidelines for cloud computing, there are no clear guidelines for certain industries on how the legislation applies to them.	Work with experts and provinces to develop clear industry guidelines to integrate cloud compliantly.	**Japan's Data Protection Laws** include clear guidelines for the finance, healthcare and telecommunications sectors	✓			✓
Incentivize cloud adoption and maturity	The Canadian government has some incentives for businesses to adopt cloud, including the Scientific Research and Experimental Development (SR&ED) program to incentivize innovation.	Continued 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		✓	✓	✓
Improve cloud first policies	The Canadian government is still in the early stages of adoption, having had a Cloud-First strategy since 2018, and an updated principle of Cloud-Smart since 2023. The 2018 policy prioritized public Cloud-First, and the 2023 strategy update recognizes cloud is a preferred choice whilst requiring departments to balance multiple priorities when selecting a hosting model.	Evolve public cloud-first policies and tools to improve clarity and relevance for departments, supported by cloud skill development. Provide clear leadership around the benefits of cloud to provide confidence for the commercial sector, including MSMEs, to also adopt cloud.	**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	✓	✓	✓	✓

Source: OECD,[61] Government of Canada,[62] Statista,[63] Lim, S.,[64] Statista,[65] Government of Canada,[66] Forum for International Trade Training,[67] Australian Government,[68] Federal Government of Brazil,[69] Office of the Privacy Commissioner of Canada,[70] GDPR EU,[71] Delphix,[72] Government of Canada,[73] Mcguire Sponsel,[74] Government of Canada,[75] UK Government[76]

61 OECD (2023), OECD broadband statistics update

62 Government of Canada (2023), High-speed Internet for all Canadians

63 Statista (2022), Number of data centers worldwide in 2022, by country

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

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

66 Government of Canada (2023), Digital Skills for Youth program

67 Forum for International Trade Training (n.d.), Canada Job Grant

68 Australian Government (2013), The National Cloud Computing Strategy

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

70 Office of the Privacy Commissioner of Canada (2018), Summary of privacy laws in Canada

71 GDPR EU (n.d.), What is GDPR, the EU's new data protection law

72 Delphix (2020), The Japan Act on the Protection of Personal Information Explained

73 Government of Canada (2022), How your business can benefit from the SR&ED tax incentives

74 Mcguire Sponsel (2020), Calculating cloud computing expenses

75 Government of Canada (2018), Government of Canada Cloud Adoption Strategy: 2018 update

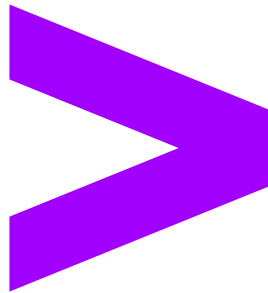76 UK Government (2022), Government Cloud First policy

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