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The cloud imperative

Asia Pacific's unmissable opportunity

July 2021



Deloitte Access Economics



Foreword

Cloud makes the impossible, possible.

COVID-19 has turned the world on its head and has changed the way we live, work and conduct business. The priority continues to be to minimise the virus spread, keep people safe, and care for those who have been affected.

A further priority for government and organisations has been to rapidly respond to changes in demand for their products and services – pivoting to find new opportunities to compete, or reimagining operations, to become more resilient.

Conditions may be challenging and risks higher but operating in these times lets us reimagine how we work and in the last 12 months we have seen organisations large and small transform to become more digital and technology enabled. Their aim is to create streamlined, efficient, cost-effective and customer-oriented organisations that can quickly respond to external challenges and compete with confidence. While many organisations were forced to transform for survival, those prepared to challenge the status quo going forward will keep better pace and tap into new growth opportunities to maintain and improve their competitive edge.

This is where digital technology plays an essential role. It has been instrumental in supporting and fuelling business growth and will continue to transform the way we live and work. The trick is finding the best way to benefit from digital technology's potential. And this takes the appropriate infrastructure, the right business mindset, and a clear roadmap endorsed by senior leaders and supported by the entire organisation.

Cloud helps unlock organisations' digital potential, address multiple challenges and offers strong foundations to ensure operations and teams are prepared to tackle new shocks and future disruption. Cloud makes what seems impossible, possible. At Deloitte we have seen organisations, industries and markets at various stages of cloud readiness and maturity, and we know that cloud is the answer to numerous business challenges. It has endless potential to enhance operations and to allow organisations to thrive with confidence.

Cloud goes way beyond a cost-cutting exercise – it drives significant business value. It is the unmissable opportunity that organisations should act on, now.

The cloud imperative is a must-read report for leaders of any business. We share insights into cloud adoption across Asia Pacific (APAC), unpick the challenges and barriers, explore opportunities and look at inspirational case studies that examine how cloud is driving business success in our turbulent times.

Whatever your challenges and wherever you are on the cloud journey, get in touch to discover your cloud possible.

Dan Newman Partner, Cloud Tr

Partner, Cloud Transformation Leader, Deloitte Asia Pacific



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The pandemic has **accelerated** digital transformation and forced organisations to take radical steps to bring forward investments, adapt to ensure business continuity and, for some, launch new business models to survive and remain competitive.

Businesses have always faced some level of disruption, but todays' are increasingly forced to navigate a dynamic environment where the pace of change is accelerating. To continue creating value, companies must plan to meet future challenges and be ready to navigate disruptions. They need to be ready to respond to both predictable and unforeseen challenges, as COVID-19 has demonstrated.

Almost a third of organisations surveyed in this study indicated they do not have the capability to rapidly adapt to a shift in consumer or client preferences. When it comes to readiness to respond to future challenges, such as climate change, increased competition and exposure to cyber risks, less than half of organisations surveyed said they are prepared, particularly when it comes to global supply chains, skills shortages and high workforce turnover.

The business landscape: disrupted

While some challenges faced by businesses affect all companies and industries, the different dynamics unique to each one means they will be exposed and affected differently depending on the industry the business operates in.

It is critical for businesses to identify and acknowledge where the greatest areas of disruption are in the years to come for the industries they are operating in and exposed to. To quantify how the forces of disruption are affecting industries. Deloitte Access Economics contrasted two distinct types of disruptive forces industries are facing:

• External forces of disruption are those that are out of the control of individual businesses or an industry. These include factors relating to the environment, social, globalisation and regulation.

· Business forces of disruption refers to those related to a business's internal operations and more directly under the control of boards, managers, and shareholders. These include aspects related to an industry structure such as projected skills shortages, use of technology, competition, profit variance and volatility.

We examine a range of factors considered most relevant to assess the disruptive forces. These factors were categorised into distinct pillars, with six pillars for business forces and four pillars for external forces. These forces were assessed for 18 industries across the region to develop **Deloitte's disruption map.**

Businesses operating in mining, finance, manufacturing, information, media and technology, wholesale and arts and recreation services are expected to face the most significant level of disruption. These industries comprise around 50% of the Asia Pacific economy.

Industries where exposure to disruption from both business and external forces are expected to be low are public administration, education, construction, transport, property services and healthcare, representing around 29% of the Asia Pacific economy.

Chart I

Deloitte's disruption map





How cloud tackles disruption

Cloud plays a vital role in preparing businesses for the future. Around 80% of organisations surveyed stated that by implementing cloud they were better prepared to address future challenges and organisation needs. A similar proportion indicated that cloud enables them to innovate more quickly and frequently, and 7 out of 10 respondents indicated that cloud allows them to instantly scale up or down.

These results show that cloud can be vital in making businesses more flexible, agile and prepared to respond to disruption.

Cloud readiness

The level of cloud adoption varies across industries and markets. Most companies will already be using some cloud enabled functions, however, there would be increased business benefits and value gained if they were more prepared and ready to progress towards a greater level of cloud adoption.

How cloud ready companies are will be important for the next steps they take. Organisations that have a 'primed' (high) level of cloud readiness will proceed with cloud investments differently to those that are 'hesitant' about cloud (low level of cloud readiness) or 'unprepared' (not at all cloud ready). With 46% of companies in the region unprepared or hesitant around cloud technology, this could indicate there is business value to be realised in getting organisations better positioned to adopt cloud.

Chart II

Cloud readiness across focus markets and industries in Asia Pacific



Source: Deloitte Access Economics



Cloud presents significant business and economic value

Business leaders in the region identified several core organisational benefits associated with implementing cloud technology. Operational efficiency ranks top, with 72% of business leaders stating they were already experiencing benefits. This is closely followed by the ability to expand to new customer segments, and revenue and profit growth.

The better organisations are prepared and ready to embark on their cloud journey, the more likely they are to see an impact from their investments in cloud technology.

Cloud computing has proven to be an enabler in times of disruption and has underpinned value creation over the last decade. The way business is conducted is always evolving, and with the potential of cloud and the advanced technologies it can enable, there will be new business valuecreating opportunities the world has yet to realise.

Cloud will continue to unlock and fuel innovations, which will lead to the formation of new, as yet unimagined, businesses in the future.





Benefits to businesses and industries will lead to benefits in the broader economy, importantly growth in productivity, job creation and better living standards. The investment in cloud has soared in the last five years in Asia Pacific, with an average of 40% growth each year between 2015 and 2020 reaching \$US43 billion across the focus markets in this study. Demand for public cloud services will continue, tripling to more than \$US116 billion by 2024.

Between 2015 and 2024, public cloud services will contribute \$US258 billion to the Asia

Pacific economy (2019 real terms), equivalent to 0.8% of GDP. These productivity impacts are also increasing over time, with most of the benefits yet to be realised. We estimate that only 38% of this contribution (or \$US98 billion) occurred between 2015 and 2019, with the majority (\$160 billion) still to come.

Next steps

The next leap of cloud services is when organisations start to tap on cloud-based resources for a wide range of transformative use cases by enabling the next wave of innovative technologies. Around 6 out of 10 organisations surveyed expect their level of cloud adoption to grow in three years' time, with just under 30% expecting adoption to remain unchanged.

While most organisations recognise the benefits of cloud services, many have indicated challenges they have faced in the cloud transformation journey. The top three challenges indicated by organisations are security issues, skills shortages and transitioning from legacy systems.

There are fundamental aspects such as planning, strategy development and training that organisations need to do to be ready to advance the use of cloud across the business. These fundamentals need to be matched with a revamped mindset from the top to drive the adoption of cloud.

- to realise cloud's potential
- business innovation

- need to shift their approach.



These are the top **six actions** for organisations to prepare for and advance cloud across their business.

Set out a leader-led cloud strategy

• Don't be held back by legacy systems – look beyond them

• Be bold in experimenting – you can go further with

Work with partners, don't go it alone

Develop a cloud-fluent workforce

Rethink risk – it will look different and business leaders



Introduction

Organisations around the globe were snapped into a state of rapid multi-dimensional change in 2020. COVID-19 has reset organisations' business plans and broken down decision-making processes to address overlapping priorities of business operations and employee health.

The notion of **digital transformation** has been discussed for many years and has reached advanced levels in many developed nations and global businesses. The pandemic has accelerated the process and forced organisations to take radical steps to bring forward investments, adapt to ensure business continuity and, for some, launch new business models to survive and remain competitive.

The pace of change is unequalled, and organisations cannot afford to ignore the accelerated disruption and transformation, which will likely bring greater economic uncertainties, demographic shifts, social issues and workforce and business government challenges. Speed and agility in responding to ongoing challenges are critical and only adaptable businesses will continue to survive.

Investment in technology solutions is essential. Technology can enhance business efficiencies, help respond to market requirements and **enable and improve connectivity** internally and externally seamlessly and at speed.

Cloud is at the forefront of all technologies, serving more complex and dynamic requirements of businesses.

Cloud is an internet-based computing model where software and shared services – such as data storage, backup, and file access – are provided by another company over the internet instead of stored locally on a computer. It allows businesses to streamline and manage information and lets users access and share files on any device with a connection, anywhere.

Cloud is not a new concept, but a shift in business models and mindsets have led to the upsurge in adoption of cloud services and the pace of development in cloud technology has been phenomenal in the past decade, providing business solutions faster than business leaders could imagine.

Business opportunities with cloud technology are real and significant and with growing confidence in its capability and benefits to support all businesses and government organisations – whatever their size – cloud technologies are increasingly the mainstream choice.

This report focuses on the value of cloud transformation across organisations in Asia Pacific. The markets covered are Australia. New Zealand, Japan, South Korea, China, Hong Kong SAR, Singapore and India. We focus on six key industry groupings including technology, media and telecommunications (TMT), financial services, energy and resources, consumer, healthcare and life sciences, and government and public services.

The analysis is based on consultations with industry experts from across Deloitte, publicly available information, public cloud spend data from International Data Corporation (IDC), and a bespoke survey of close to 600 organisations across the focus markets and industries. The survey was fielded by Ipsos in May 2021.

Drawing on a combination of data from these sources, econometric modelling was undertaken to estimate the benefits of cloud technology to businesses and the extension of these benefits to the broader economy.

Purpose of this study



Key findings

- 1/3 of organisations surveyed cannot quickly adapt to shifts in consumer or client preferences
- Less than **1/2** of organisations surveyed are **ready to respond to future challenges** such as climate change, increased competition, and exposure to cyber risks
- Around 45% of organisations surveyed experienced a decline in sales due to COVID-19
- 6/10 organisations surveyed have scaled up their use of digital technologies in response to the pandemic.

Businesses have always faced some level of disruption, but todays' are increasingly forced to navigate a dynamic environment where the pace of change is accelerating. Much of this change comes from emerging digital technologies.

Business models are transforming through new technologies like artificial intelligence (AI), robotics, and the internet of things (IoT). As companies move operations online, cybersecurity risks will continue to grow. Consumer preferences are constantly shifting under the influence of new trends and social media, and businesses must adapt to remain relevant.



1.1 Preparing for future challenges

To continue creating value, companies must plan to meet future challenges and be ready to navigate disruptions. As COVID-19 has demonstrated, they need to be ready to respond to both predictable and unforeseen challenges. As the old world recedes, organisations cannot afford to be slow, siloed and bureaucratic. Agility is key. But are organisations across Asia Pacific agile enough to adapt to the future?

Almost a third of organisations surveyed indicated they do not have the capability to rapidly adapt to a shift in consumer or client preferences (chart 1.1), with those operating in the life sciences and healthcare, and TMT sectors were likely to be the least agile in responding to shifts in consumer or client preferences.

Chart 1.1

Responses to the statement 'My organisation has insufficient capability today to rapidly adapt to a shift in consumer/client preferences'



Source: Deloitte Access Economics' survey

Note: Agree refers to those respondents answering 8,9 or 10 (on a scale of 1-10). Disagree refers to those answering 1-3. Source: Deloitte Access Economics' survey





Are you ready for tomorrow?

COVID-19 has upended the global economy, accelerated structural shifts and drastically reshaped business as usual operations. The growing complexity in the regulatory environment, where governments are trying to address social needs, or are reacting to populist sentiment, has led to higher cost for businesses.

Climate change presents unparalleled challenges for businesses – whether due to a high emissions profile, consumer sentiment or the government policy environment. In addition, geopolitical uncertainties mean globalisation, trade and foreign investment rules and trends can no longer be taken for granted. Corporate reputations are also vulnerable to unforeseen events that can significantly affect profits.

We asked whether organisations are ready to respond to future challenges, such as climate change, increased competition and exposure to cyber risks. Less than half of organisations surveyed said they are prepared (chart 1.2), particularly when it comes to global supply chains, skills shortages and high workforce turnover.

Chart 1.2 Organisations readiness to respond to scenarios



Note: Chart shows percentage of respondents scoring their readiness level at 8 or above (on a scale of 1-10). Source: Deloitte Access Economics' survey



Lockdown's legacy

Demand for services that require face-to-face interactions has contracted significantly due to imposed lockdowns, and this has impacted the world's economies. Around 45% of organisations surveyed experienced a decline in sales (chart 1.3). This was most pronounced in businesses in consumer industries, with 20% citing a major decrease. However, 13% of respondents in this sector also experienced a major increase in sales during this period, providing evidence of the uneven impacts of COVID-19 across the economy.

Digital Dominance

Unsurprisingly, a notable action taken by organisations in response to the pandemic was the increased use of digital technologies. Almost 6 out of 10 business leaders surveyed stated their organisations have scaled up their use of digital technologies, with 28% indicating a major increase. This is driven by the TMT sector, with 40% of organisations noting they had experienced a major increase in their usage of digital technology.

Chart 1.3 Degree of impact of COVID-19





75%

Major increase



The ability of businesses and governments to navigate and emerge from potential future disruptions will be vital to the prosperity and living standards of communities in the coming decade.

While digital technologies are an element driving the acceleration of disruption, effectively utilising emerging technologies will help organisations overcome and manage uncertainty and change.

1.2 The business landscape: disrupted

While some challenges faced by businesses affect all companies and industries, the different dynamics unique to each one means they will be exposed and affected differently depending on the industry the business operates in. Climate change, for example, is on everyone's radar, but there will be different implications for businesses in the utilities, mining and agriculture industries than those in the services industry.

Determining future disruption

It is critical for businesses to identify and acknowledge where the greatest areas of disruption are in the years to come for the industries they are operating in and exposed to. To quantify how the forces of disruption are affecting industries, Deloitte Access Economics contrasted two distinct types of disruptive forces facing industries: • External forces of disruption are those that are out of the control of individual businesses or an industry. These include factors relating to the environment, social, globalisation and regulation. While these elements are outside the control of boards, managers, and shareholders, they will pose threats to companies' profitability, returns and ability to create value. Business forces of disruption refers to those related to a business's internal operations and more directly

under the control of boards, managers, and shareholders. These include aspects related to an industry structure such as projected skills shortages, use of technology, competition, profit variance and volatility.

In Deloitte's disruption map, we examine 18 industries¹ and compare their exposure to these external and business disruptive forces.

To assess the degree of disruption for each industry, Deloitte Access Economics considered a range of factors considered most relevant to assess the respective disruptive forces (Table 1.1). These factors were categorised into distinct pillars, with six pillars for business forces and four pillars for external forces.

Our approach: the disruption map



Table 1.1

External and business disruption forces

Force	Pillar	Description
Business	Technology	The importance of new technologies such as IoT, intelligent software systems and data analytics. The importance of cyber security and the potential for employees to work from home.
Business	Staff	Forecast skills shortages by industry
Business	Market	Profit variance and volatility in recent years
Business	Supply chain	The proportion of businesses facing supply chain disruptions by industry
Business	Innovation	Venture capital and private equity funding by industry. The proportion of innovating businesses in an industry and business expenditure on research and development.
Business	Consumer	How reliant businesses in an industry are on the general public for revenue, rather than business or government. The degree of competition in an industry. Intangible assets as a share of total assets.
External	Global	How exposed industries are to globalisation and reliance on trade and foreign direct investment.
External	Regulation	The degree of regulation by industry
External	Social	Presence on social media
External	Environment	Carbon dioxide emissions by industry

The underlying metrics were gathered from a range of data sources for industries across the region including the Australian Bureau of Statistics (ABS), IBISWorld, the Organisation for Economic Co-operation and Development (OECD) and Deloitte Access Economics.

For each pillar, industries were ranked and normalised to an index from 1-10, with one representing the least disruptive and 10 the most disruptive. This provides a ranking of how different industries will be affected by each type of disruption.

More detail on the construction and underlying methodology of the Map can be found in Appendix C: Deloitte's disruption map.

Source: Deloitte Access Economics

The cloud imperative: Asia Pacific's unmissable opportunity



Disruption across industries

The analysis combines hard data and insights gathered from consultations with Deloitte's subject matter experts (SMEs) and sector specialists. This provides a contemporary lens from SME's in-depth experience and judgement, supported further by historical trends based on wellestablished data collection.

The Map (chart 1.4) plots the position of the industries based on the assessment of their exposure level to disruption caused by the combination of business and external forces. Below is an overview of our findings.

Industries facing significant disruption

Businesses operating in mining, finance, manufacturing, information, media and technology (IMT), wholesale and arts and recreation services are expected to face the most significant level of disruption. These industries comprise around 50% of the Asia Pacific economy.²

Manufacturing and energy and resource companies

Companies in the manufacturing industry are expected to face a significant level of supply chain disruption and disruption from their exposure to globalisation and trade. They will also face disruption posed by increasing preference of consumer demand for clean energy and a switch to more environmentally friendly technologies such as electric vehicles. Meanwhile, energy and resource companies will need to manage the volatility of commodity prices and exposure to trade and foreign investment. They also face increasing social and political demands to reduce emissions and for cleaner energy usage.

Information, media and technology

IMT companies face an array of potential disruptions from greater dependence and reliance on fast-changing technology, cyber issues, venture capital funding and a more permanent structural shift in employee work practices as more employees work from home.

Finance

Those operating in the finance industry may face high levels of regulatory disruption as governments react to corporate governance problems within the industry. The finance industry is also relatively dependent on technology and exposed to potential future skills shortages.

Wholesale and arts and recreation

The wholesale and arts and recreation industries are more exposed to shifts in consumer sentiment. While this is more indirect for the wholesale industry, it also faces higher competitive pressures and, as a result, the need to innovate more. As COVID-19 has shown, the arts and recreation industry can be highly volatile in such an uncertain environment. Due to the public-facing nature of the industry, organisations in arts and recreation are also reliant on their reputation and goodwill from the public.

Industries exposed to elevated levels of external disruption, but lower levels of business disruption include utilities, accommodation and food services and agriculture, collectively making up 9% of the Asia Pacific economy. These industries are exposed to a range of external disruptive forces. For example, the utilities industry is more exposed to disruption from environment and climate change because of its carbon emissions as well as facing relatively higher levels of regulation. The agriculture industry is also a relatively high carbon emitting industry and is exposed to volatile commodity prices and globalisation. The accommodation and food services industry is mainly exposed to potential disruption from shifts in consumer sentiment on social media.

Industries facing elevated external disruption



Industries with lower disruption

Industries where exposure to disruption from both business and external forces are expected to be low are public administration, education, construction, transport, property services and healthcare, representing around 29% of the Asia Pacific economy. Organisations operating in these industries are more likely to have stable patterns in demand, on average, at least compared with other industries.

These industries tend to have lower levels of innovation and less business research and development and lower levels of profit volatility and, other than the construction industry, they have lower dependence on complex supply chains. Similarly, they are less reliant on venture capital funding – with the exception of the healthcare industry. They also tend to be less consumer facing nor highly globalised.

However, there is still potential for these industries to face disruption. For example, businesses operating in public administration, education, healthcare and transport tend to deal with disruption from greater regulation, while construction and property services face some disruption from higher competition.

Industries with higher business disruption and lower external disruption

Finally, industries with higher exposure to disruption from business forces and lower exposure from external forces are retail, professional services and administrative services. These industries comprise approximately 12% of the economy in the region. Businesses operating in these industries will be faced with a diverse set of disruptive forces. The retail industry is more exposed to potential disruption from competition and consumer sentiment while professional services will be confronted by issues around skills shortages. Both professional services and administrative services also potentially face more disruption from cyber related issues.

These industries are typically low emission emitters and less exposed to globalisation and foreign investment. However, organisations operating in these industries will still have to deal with disruption caused by external forces, outside of their direct control or influence. For example, businesses in the retail industry will potentially face greater challenges than others around the management of their social media presence.

"Embedding sound cyber and privacy principles into your cloud transformation will give you the resilience needed to succeed in the new normal, enabling you to build the longer term confidence and trust of your customers. Not doing this is not an option." **James Nunn-Price** Partner, Cyber & Strategic Risk Leader, Deloitte Asia Pacific





Chart 1.4

Deloitte's disruption map

= \$US1 trillion (size of bubble represents size of industry in APAC).



"Cloud sets the foundation for organisations to truly embed Artificial Intelligence (AI) across all facets of their business – which unlocks new ways of solving problems, delivering value and creating competitive advantage. Organisations that are serious about embedding AI across their business will understand cloud + AI delivers much more than the sum of their individual parts."

Dr Kellie Nuttall

Partner, Future of Mobility Lead, Deloitte Australia



Disruption across sectors

The 18 industries are mapped to six broader sector categories which will be the reference categories referred to across our survey results and in the rest of this report. The six sector categories and the two largest forces for disruption in each category are:

- **Consumer** This sector has a high share of intangible assets and greater social media exposure leaving it vulnerable to shifts in consumer sentiment and strength of its brand value and reputation.
- Energy, resources and industries Supply chain and carbon emissions are the biggest sources of disruption with an increasing focus on environmental regulation and the need for high-skilled employees to drive innovation and growth.
- **Financial services** Increasing regulation and more permanent workforce shifts with continued home working are the largest sources of disruption for this sector as governments respond to financial misconduct and digital technologies enable new ways of working.
- **Government and public services** The public sector faces potential disruption from skills shortages and increasing level of regulation as the government and education sectors expand. Bureaucracy and red tape could also hamper innovation and growth.

 Life sciences and healthcare – Significant disruption for this sector will come from skills shortages and increasing regulation, as the sector requires larger numbers of high-skilled employees due to an ageing population and extended life expectancy because of medical research advances. This sector has long been highly regulated with this expected to continue.

• **Technology, media and telecommunications** – Businesses operating in this sector are likely to attract a higher share of venture capital funding. This means the sector is more exposed to new and emerging technology and capital driving disruption.

There are also likely to be differing levels of exposure to forces of disruption **within sectors**. For example, the education industry overall faces low level of disruption. This is primarily because the industry is dominated by the government sector, which has low levels of business and external forces. However, tertiary education service providers will face higher exposure to disruption given its greater dependence on international students which have fallen dramatically due to COVID-19. Similarly, while the public healthcare sector has lower levels of disruption, certain private sector businesses (in pharmaceuticals, for example), may face higher levels of disruption. There are many other dimensions to consider when it comes to assessing sources of disruption for an industry. Geography and business size are also important. For example, business in countries that may be hit by an economic downturn might leave those operating in similar industries in other countries unaffected. Smaller businesses may face more competition and be exposed to a small number of suppliers or buyers while larger businesses may be more exposed to factors of disruption from globalisation.



1.3 How cloud can help organisations navigate disruption

While business faces an array of traditional and emerging sources of disruption, there is a silver lining. Digital technologies are often seen as accelerating the pace of disruption, but they can also provide solutions to effectively navigate around it. Cloud is one such digital technology.

The adoption of cloud technology can make organisations more agile and resilient, helping to address known and unforeseen challenges – but only if companies manage the adoption process effectively.

Cloud plays a vital role in preparing businesses for the future. Around 80% of organisations surveyed stated that by implementing cloud they were better prepared to address future challenges and organisation needs. A similar proportion indicated that cloud enables them to innovate more quickly and frequently, and 7 out of 10 respondents indicated that cloud allows them to instantly scale up or down.

How cloud tackles disruption

These results show that cloud can be vital in making businesses more flexible, agile and prepared to respond to disruption.

Cloud technology includes a range of services including Software as a Services (SaaS), Infrastructure as a Service (laaS) and Platform as a Service (PaaS), all of which can help support organisations to manage complexity that will arise from the interplay of business and external forces of disruption.

Deloitte has developed a list of 100 use cases across the six sectors listed above that provide specific examples of how cloud can be used to tackle organisations' challenges, providing a sound foundation for organisations to confront potential disruptions.

• Improved business agility – In an increasingly complex business environment, organisations need to be able to respond quickly to changes in market dynamics and consumer sentiment. Companies need the ability to quickly understand customer experience and adapt to meet changing preferences. Cloud infrastructure can be harnessed to rapidly adapt products to new and broader consumer segments, business channels, and geographies. It is easier for companies to configure solutions using cloud than on-premise, enhancing the agility of their operating model. By adopting cloud infrastructure, companies are better positioned to benefit from emerging technologies such as quantum computing, virtual reality, 3-D printing and AI to meet new business requirements.

Here is a sample of the use cases to show how cloud technology can help organisations:



Case study: Providing powerful weather intelligence services through the cloud in New Zealand

With a dedicated 240-strong team located across NZ, Australia, Asia and Europe, the Meteorological Service of New Zealand's mission is to combine scientific rigour, valuable data and insights, and leading-edge technology to create ground-breaking new products and services that redefine the weather industry and benefit both business and individual customers. A state-owned enterprise, the MetService recently faced a number of challenges. It had to move its on-premise data centre after an earthquake hit and made the building unsafe, it had to reduce a large tech debt, and its leading research scientists were using aging data systems which posed significant risks to its ability to deliver mission-critical operations and be truly innovative in the future.

Deloitte New Zealand and AWS teamed up to define MetService's optimal future state architecture – and how to successfully map and migrate over 120 servers and mission-critical aviation weather systems to the cloud within a year. Not only was the migration a success, MetService's cloud journey also included retiring over 200 redundant servers to consolidate its environment and help reduce its overall operating costs. The new cloud platform is less complex to operate for the team, saving valuable time with inbuilt codes, reusable templates, simplified customer billing and stronger resilience in service provision. In future, time-to-market for product enhancements and service improvements are expected to be shorter and more reliably delivered. This successful large-scale migration can inspire other organisations to explore the benefits of cloud, create new business models that increase revenue potential, and find better ways to provide valuable services to customers and citizens. Cloud has significantly contributed to MetService's business continuity and its ongoing weather-related services that are vital to New Zealand's citizens, businesses, industries and government and that contribute to the smooth functioning of its economy and society.



- Enhance business scalability Organisations are never static, there could be times when they will need differing technology resources, such as during a new product launch or during an end of financial year sale when there will be an increased level of customer transactions. As well as enabling business agility, cloud technologies can help businesses to easily upscale or downscale IT requirements, providing on-demand infrastructure capacity and computing power as and when required to accommodate varying business needs. Scalability provides the ability for companies to be flexible and efficient to grow the business without having to incur 'static' costs associated with traditional server systems.
- Improve business resilience Through more resilient architecture, public cloud services can reduce system downtime and risk associated with cyber security and customer data breaches. Both of which can expose companies to reputational damage, increase costs and complicate regulatory compliance issues. Cloud can improve platform integrity through automated and embedded security processes. These features can boost business resilience with a streamlined and improved technology capability across a business.
- · Accelerate product development and innovation -With increasing exposure to global competition and adoption of digital technologies, there is a constant need to innovate. Digital technologies have accelerated product lifecycles and helped reduce barriers to entry in many industries. As a result, time to market is more important than ever. This means businesses need to be able to rapidly design, produce, market and sell new products and services. Through cloud, organisations can gain access to instant on-demand, scalable computing and storage capacity, both of which are critical elements in building and launching new products and services. Cloud also enables companies to experiment with new applications, offerings and business models at lower cost.

Cloud can be harnessed to accelerate or enable innovation using advanced technologies such as big data, automation technologies and IoT. This enables companies to face potential disruptions associated with emerging technologies and pursue innovation-driven growth.

• Better use of resources – Cloud can help reduce manual controls and processes through automation, standardisation and Application Programming Interfacebased (API) models (for example, through Infrastructure as Code). Combining the benefits of agility, speed and scalability offered by cloud, businesses that effectively shift to cloud can create additional value by retooling and reskilling their workforce to focus on more useful activities, such as research and development or new product and service innovations that offer a greater value to the business.



Table 1.2

Top cloud uses by sectors

Sectors	Top uses of cloud technology		
Consumer	Improved platform stability	Scalability of systems/services	Al/machine learning data analytics insights
Energy, resources and industry	Data integration to enable analysis of mine site data	Predictive maintenance of equipment to better manage and extend asset life	Integration of supply chain
Financial services	Enhanced customer data security	Fraud detection	Real time transaction visib
Government and public services	Data consolidation across multiple business units, divisions and agencies	Share information, communications and technology (ICT) resources among multiple business units, division and agencies	Enhance team collaboratio
Life sciences and healthcare	Real time data sharing and interoperability between different delivery services	Secure payment methods for clients	Remote monitoring of pati
Technology, media and telecommunications	Enhanced data security	Intelligent human resource screening	Smart contracts with supp and business customers

Source: Deloitte Access Economics' survey

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Deloitte Cloud Services Use Case Bank

Deloitte has compiled a list of 100 cloud use cases that provide specific examples of how cloud services can help benefit companies to tackle disruption and create value. These use cases have been developed using Deloitte's in-house expertise in cloud service and market knowledge.

The use cases have been developed across the following six sectors:

- Consumer
- Energy, resources, and industries
- Financial services
- Government and public services
- Lifesciences and healthcare
- Technology, media and telecommunications.

Across these sectors the use cases identity how cloud services can benefit companies including through:

- Capital savings
- Collaboration
- Cost reduction
- Enhanced security
- Improved accuracy
- Increased revenue and growth
- Personalisation
- Time and efficiency savings.

The 100 use cases demonstrate how cloud can assist in dealing with challenges and disruptions. For example, how a financial services organisation may use cloud to enhance data and payment security or how energy, resources and industrial companies can use cloud to reduce maintenance costs and expand asset life.





Across Asia Pacific, governments are at different stages of their cloud journey. From making significant investments to introducing new policies, all are focused on the future and the role cloud will play in driving efficiencies and improvements.

Australia

1.0% GDP \$US15.3B

The Australian Government's vision for Australia is to become a leading digital economy and society by 2030, enabled by government as a platform. In 2017, the Government's **Digital Transformation** Agency developed its Secure Cloud Strategy to guide government agencies in their transition to and adoption of cloud.

All agencies are encouraged to adopt a cloud-first approach to provide simple, clear and fast public services to Australians. In June 2021, the Agency announced its investment in new cloud software to modernise and streamline its services primarily because the pandemic had changed the way Australians interact with government services. Modernising how government services and data are managed and recorded will help drive Australia's digital agenda.

China



China's appetite for cloud infrastructure services continues to outpace the rest of the world, with the government making it one of its top strategic priorities driven by continued expansion of online services and digitisation of processes and operations within enterprises and government organisations.

In March 2021, **Premier Li Keqiang** confirmed the Chinese government seeks to nurture digital industries such as artificial intelligence, blockchain and cloud computing. In its 14th five-year plan released that same month, Li spoke of a digital China: "Accelerate digitised development, forge new digital economy advantages, cooperate to push forward digital industrialisation and industrial digitisation transformations, accelerate the pace of digital society construction, raise the level of digital government construction, construct a good digital ecosystem, and build a digital China."

0.4% GDP \$US 83.2B



To sustain its position as Asia's leading digital city, in late 2020 the **Government Cloud Infrastructure Services** was launched to become the new generation of government cloud services – and facilitate agile development and delivery of digital government services.

In June 2021 Victor Lam, CIO, Hong Kong Government provided an update on the role of cloud, "Through the effective use of cloud and other technologies, we strive to support the Government to achieve policy outcomes in the years ahead, and our community's speedy recovery from the pandemic aftermath... We will keep making use of cloud technology to help government departments to achieve lower costs, shorter time-to-market, and modernised IT system delivery."

Japan

The Japanese government will introduce a new **Digital Agency** in late 2021 to pave the way for digital transformation and make it easier to distribute COVID-19 related stimulus checks to its 126 million residents.

In January 2021, Takuya Hirai, Digital Transformation **Minister**, said, "The agency is a symbol for regulatory reform, a major pillar of our growth strategy; we want to change the mindsets of every governmental agency... our country is far behind on digitalisation."

Soon afterwards, in April 2021 the government introduced compelling tax incentives for companies to improve productivity. This incentive is valid until March 2023 and applies when companies invest in and use cloud-based systems to create new demand, or improve productivity by developing new products or introducing new sales

methods.

0.6% GDP \$US 29.3B



New Zealand

1.4% GDP \$US 3.2B

"In late 2020 the New Zealand Government started building its **Cloud Centre of Excellence** initiative to accelerate the uptake of cloud and execute well-designed and governed cloud migrations across NZ's public sector. This builds on the government's **Cloud-First policy** announced in 2016 and its more recently launched digital strategy in late 2019.

The Strategy for a Digital Public Service sets a direction to develop a modern public service and the systems which will meet the needs of people in a modern, changing world, so it is easier for people to have seamless access to the government services they want and need. **Paul James, Government Chief Digital Officer**, is overseeing support for the development of digital for the public sector and recently said, "We have a lead role on behalf of government to support a more connected, responsive and consistent digital public service... this reflects our purpose to work with and through agencies to drive and deliver customer-centred digital government."

Singapore



The Singapore government continues to make progress on its shift to the cloud. By centering on efficiency and the contribution towards public service, Singapore has built one of the best digital government frameworks in the world. The national **Digital Government Blueprint** is designed to broaden the local digital economy, and to develop Singapore into a smart, digital society. Its threepronged approach seamlessly integrates digital services and governing standards across citizens, businesses, and public officers. Government agencies can also subscribe to a **Government Commercial Cloud** to drive digitisation.

The government is also committed to nurturing a strong digital talent pipeline by encouraging coding training from primary school, and technology internships from high school. **GovTech** has five capability centers for engineering to incubate technology talent and its IT team has grown from seven people to a group of 800 engineers and developers since 2015.

\$US**6.0**B



South Korea 0.2%GDP \$US4.2B

The South Korean government was early in establishing a national cloud computing strategy, presenting its first blueprint to promote cloud computing in 2015. To stimulate the sector, in 2018 the government released new guidelines for the public sector on using private cloud services, followed by plans to transfer all public information systems to the cloud by 2025.

In January 2021, the government announced it will invest \$53.5 billion (58.2 trillion KRW) in the **Digital New Deal** by 2025 to prepare the South Korean economy for the future and lay the foundations for a digital economy that will spur economic growth and innovation. **Lim Hye sook**, the newly appointed **Minister of Science, ICT** recently said, "It's time for the government and civil society to work together so that digital transformation, which has been accelerated by COVID-19, leads to inclusion and communication instead of exclusion and discrimination."

Asia Pacific total 0.5%GDP \$Us159.8B

It is important to consider the speed at which the adoption of cloud will occur in the years to come. The more rapid the adoption of public cloud, the greater the productivity benefits it will deliver.

Deloitte Private – Digital transformation/cloud migration global study

Never before has digital technology been more important – and particularly so in a private sector context. Although private businesses can be more agile and nimble in their approach, they are often more susceptible to external change and influence.

The onset of COVID-19 was unprecedented and rapidly brought forward a critical need to adopt, adapt and embrace digital and cloud technologies. However – the race is long and many private business leaders around the world recognise the need to embed digital into their organisations in order to drive long term growth and sustainability.

In January 2021, Deloitte Private undertook a global study to examine how private businesses around the world commit to and engage digital and cloud within their organisations. This study focused on both digital and cloud, recognising the importance of both in a private sector context.

Below are some key insights gathered through the study.

1. Digital transformation is increasingly being seen by private business leaders as a critical growth strategy.

In April 2021, over 2000 private business leaders around the world responded to a Deloitte Private global survey. Almost half (43%) of all respondents cited digital transformation as a primary growth strategy over the coming 12 months. COVID-19 aside, it's clear that private business leaders recognise the pivotal role that digital plays in long term business growth and competitiveness.

Company's growth strategies N12M

What are your company's main growth strategies over the next 12 months?



Deloitte Private – Digital transformation/cloud migration global study

2. Private business leaders look to digital to help them better engage with their clients as well as increase operational efficiency.

The Deloitte Private global survey (2021) highlighted that private businesses generally consider – and invest – in digital in order to enhance the way in which they engage with their clients (17%), increase sales (16%), strengthen management capability and reduce costs (15%).

Digital and data are important consideration in the growth strategies of private businesses. Investment into cloud-based CRM platforms enable businesses to gather data and use analytics to effectively, "get closer to the customer". These valuable insights are supporting private businesses to respond more quickly to changing needs and circumstances, while remaining relevant and competitive in the market. Further research has highlighted that cost reduction and operational efficiency are important drivers for investment in digital or cloud technology. Private business leaders are looking to digital to find new ways to streamline and automate operations – reducing operating costs and other overheads. Whether for customer engagement or cost reduction, projects must demonstrate a clear return on investment.

3. In private businesses, digital transformation is led from the top

In most private businesses, any sort of investment in digital or cloud is generally signed off at the C-suite or board level, or indeed by the business owner. Digital transformation creates change – and for that change to be successful it requires commitment, engagement and alignment from business leaders. Interestingly, we found that the more 'digitally savvy' a private business leader is, the more likely that business is innovating, investing in new technologies and pushing contemporary boundaries. Awareness is linked to risk – and where there is more digital awareness at the top, there is often a greater appetite for risk when it comes to investing in digital.

4. Having the right internal capability is key to successful digital transformation...

It is widely acknowledged that digital transformation is less about 'digital' and more about 'business'. That said, private business leaders recognise the imperative of having (or bringing in) the right internal skills and capability to drive the digital transformation journey. Private businesses need the capability of 'someone who has done it before' however also understands business intent, processes, systems, people and culture. The success of digital is underpinned by the extent to which it is fully embedded in 'business as usual', being culture, processes and people.

...however the right capability must be supported by robust systems and processes

The Deloitte Private global survey (2021) highlighted effective systems and processes as the most important factor in advancing digital transformation, but also rated technical expertise and training as important drivers. The vast majority (87%) are concerned about their organisation's capacity to undertake digital transformation, with half seeing the issue as a medium or greater risk to their company's growth over≈the coming year.

Deloitte Private – Digital transformation/cloud migration global study

5. There needs to be a dedicated project management office capability to lead the transformation

Successful digital transformation starts with a dedicated project management office (PMO) – with the right capability, experience and insight - to adequately manage the transformation. This is key from both a resourcing and scoping perspective, but also to manage communications with staff, stakeholders and management. Furthermore, the PMO capability should not be solely delegated to an in-house IT team – rather a focused capability that has the requisite technical (and non-technical) skills to support effective digital transformation.

6. And most importantly, people need to be supported through the change

For most businesses, people are their greatest asset. Any sort of 'transformation' will have an impact on staff and therefore needs to be managed carefully. Our research highlights that private businesses do this in different ways some will empower the internal human resource capability to lead the transformation, others will delegate change management responsibility at the business unit level, and others will establish a dedicated change management team to work alongside the transformation. Regardless of which way you look at it, managing change and supporting people is one of the most important parts of digital transformation particularly in a private sector context.

Digital transformation – important factors when undertaking

What was the key driver behind your company's digital transformation?







Key findings

- IT **spend in cloud is forecast to triple** across our eight Asia Pacific markets by 2024 to more than **\$116 billion**
- Industries leading in cloud adoption: TMT; financial services
- Industries **lagging** in **cloud adoption:** consumer; life sciences and healthcare; energy, resources and industries
- Most cloud-ready markets: China and India
- Least cloud-ready market Japan.

In the last decade, cloud has been the driving force of technology change in the business environment.

Enhanced enterprise security capabilities in online technologies, coupled with the business benefits around productivity, cost reduction and the scalability these technologies could bring, provide a compelling case for businesses to redefine their business models to operate within the cloud environment.

This chapter provides the state of play of cloud adoption across the focus markets and sectors, looking at the historical and expected investment to come in cloud technology, reasons why organisations are switching to cloud and cloud readiness across the industries.



2.1 Public cloud spending Across Asia Pacific

Public cloud services growth across Asia Pacific has soared in the last five years, with an average of 40% growth each year between 2015 and 2020 – reaching \$43 billion across the eight focus markets in this study (table 2.1). This compares to traditional spend in information and communications (ICT) in the last few years which broadly aligns with GDP growth, and is forecast to remain on a similar trend line in the short term.

The region will continue to lead the way in the adoption of public cloud services over the next few years, with IT cloud spend forecasted to triple by 2024 to more than \$US116 billion.

Table 2.1

Annual spend in public cloud services (2015 to 2024)

	2020	2024	2015-2020
Markets	Spend (USD millions)		CAGR
Australia	\$5,157	\$10,018	30.1%
New Zealand	\$1,115	\$2,292	30.9%
Hong Kong, SAR	\$710	\$1,508	33.2%
Singapore	\$2,030	\$3,704	29.2%
China	\$19,444	\$67,637	66.4%
Japan	\$9,737	\$20,258	28.4%
India	\$3,529	\$7,943	45.5%
South Korea	\$1,419	\$2,699	21.7%
Total Asia Pacific	\$43,142	\$116,058	40.8%
Worldwide			N/A

Note: Spend of total Asia Pacific only includes spend from the eight focus markets in this study.

Public cloud spend for some markets outside Asia are not available prior to 2019.

Source: Deloitte Access Economics using IDC Blackbook (Mar 2021) and Public Cloud Services Spending Guide (Jan 2021)

18.1% 19.7% 20.7% 16.2% 36.6% 20.1% 22.5% 17.4% 28.1% 19.4%	2	020-2024
18.1% 19.7% 20.7% 16.2% 36.6% 20.1% 22.5% 17.4% 28.1% 19.4%		
19.7% 20.7% 16.2% 36.6% 20.1% 22.5% 17.4% 28.1% 19.4%		18.1%
20.7% 16.2% 36.6% 20.1% 22.5% 17.4% 28.1% 19.4%		19.7%
16.2% 36.6% 20.1% 22.5% 17.4% 28.1% 19.4%		20.7%
36.6% 20.1% 22.5% 17.4% 28.1% 19.4%		16.2%
20.1% 22.5% 17.4% 28.1% 19.4%		36.6%
22.5% 17.4% 28.1% 19.4%		20.1%
17.4% 28.1% 19.4%		22.5%
28.1% 19.4%		17.4%
19.4%		28.1%
		19.4%



With growth in public cloud spend forecast to continue to outpace spend in total ICT services, this will see share of cloud spend double from 4% in 2020 to 10% by 2024 across Asia Pacific. However, the pace of growth in public cloud spending will happen at a different pace and scale across the markets.

China will maintain its position in the region as the market with the highest growth and demand for cloud services, with total public cloud spend expected to grow 250% between 2020 and 2024 to reach \$US68 billion. China's demand for public cloud services is fuelled by the market's focus on digital transformation driven by forward-looking government policies for digital infrastructure development. While not matching China's growth rate and scale, demand for public cloud services across the other key markets in the region will continue to push ahead at strong double-digit growth rates over the next few years, with **Japan** the next largest market, based on size in spend and pace of growth (chart 2.1).

Chart 2.1

Public cloud spend in 2024 and forecast annual growth (2020 to 2024)



Source: Deloitte Access Economics using IDC Blackbook (Mar 2021) and Public Cloud Services Spending Guide (Jan 2021)



Across industries

2020 has been a pivotal year for organisations as many adapted and transformed with digital technologies to enable business continuity and facilitate remote interactions with customers, employees and suppliers. COVID-19 provided the clarity of purpose and sense of urgency to accelerate this digital transformation. A global study by Twilio showed that COVID-19 fast-tracked digital transformation strategies of organisations by an average of six years.

Digital transformation will look different for every organisation. In general terms, digital transformation refers to the integration of digital technology across all business functions, fundamentally changing how a business operates and delivers value to its stakeholders and customers. It is very much both a technology and cultural transformation, requiring organisations to challenge status quo and reimagine new ways of doing business in the digital age. Cloud is a key enabler of digital transformation, providing organisations with the tools to drive innovation, agility and automation. In fact, it is an integral part of an organisation's digital transformation process.

Cloud leaders and laggers

Examining the size of public cloud expenditure relative to the size of each industry in the region gives an indication of the importance of cloud to each industry and highlights which ones are lagging in cloud adoption (chart 2.2). Leading the charge are TMT and financial services with the cloud spend in these sectors comprising a larger share of the sector output value. Cloud industry laggers are the consumer, life sciences and healthcare, and energy, resources and industries – there is significant potential across these industries to increase cloud adoption in the future. "To-date, the cloud journey for many has been an opportunity to remove legacy infrastructure, laudable but hardly the highest propriety for many executives. Today, everyone is seeing leading businesses integrating cloud solutions to improve their agility in the face of change, scalability in response to opportunity, resilience in a crisis, efficiency for profitability and innovation to secure their future."

Rob Hillard Consulting Lead

Consulting Leader, Deloitte Asia Pacific



The acceleration of cloud adoption was already in progress prior to the crisis, with an average 40% growth in annual spend in cloud services (table 2.1). As organisations responded to COVID-19 with a fundamental shift in how they managed their business, there has been a renewed focus on cloud strategies and, for many, led to an acceleration of their cloud migration journeys.

Across all key industries, demand for public cloud services will continue, with an average annual growth of around 28% between 2020 and 2024.

Chart 2.2



Public cloud spend as a share of sector output across Asia Pacific, 2018

Source: Deloitte Access Economics' analysis using IDC and UN data


Case study: University of Newcastle – digitising its student and researcher experience on the cloud in Australia

With over 39,000 students and five campuses, the University of Newcastle is a well-established Australian public university with an excellent reputation for research excellence.

With the knowledge that technology and digital capability are key enablers of innovation, the University of Newcastle began migrating the majority of its application portfolio to the AWS cloud in 2019. Although a phased migration approach was originally planned over 18-24 months, the leadership team learned that its physical data centre was scheduled for demolition and the facility had to be vacated by September 2020. This prompted the decision to perform a full migration to AWS. The University believed a cloud-first strategy would further help it compete and differentiate itself in the higher education sector. Leaving the data centre also aligned with its environmental sustainability commitment. Deloitte, AWS and cloud operations partner CSA worked together to plan an effective full migration to the cloud, tailored to meet the University's needs while delivering on its renewed digital strategy. The team collaborated to modernise the University's IT infrastructure and redesigned and fixed decades of legacy architecture with sparse documentation. By June 2020, after just nine months, the project was completed. In total, 72% of applications were re-platformed and 23% were refactored — to achieve 95% transformation (up from the original target of 65%). In addition, a quarter of all legacy applications were decommissioned, effectively reducing the University's technical debt.

The University is the first Australian university to achieve this digital transformation milestone – and is enjoying a number of anticipated benefits. For example, it can now introduce system changes in 0.5 days instead of three weeks, has reduced infrastructure operations costs by 20%, accelerated the speed of research by improving access to academic resources, improved its disaster recovery framework and resiliency, has automated threat detection and security monitoring, and is set to achieve 100% renewable energy supply.



2.2 The use of cloud

With cloud transformation a key priority for technology investment by business, (Deloitte Access Economics survey data shows this is the case for more than half of businesses across almost every industry) we now look at how cloud is used by businesses across the region.

Most businesses surveyed have made large strides in investing and adopting cloud technology (chart 2.3) and overall, only 7% of business leaders indicated their organisations had not adopted any. However, of those organisations that have, the sophistication and level of adoption vary significantly, with only 11% indicating an advanced level of adoption.

There are significant differences across industries. The TMT sector has 18% of businesses as advanced adopters, more than triple those in consumer and government and public services sectors.

Chart 2.3



Current adoption of cloud technology

(O representing no adoption and 5 advanced adoption). Source: Deloitte Access Economics' survey



The top current cloud uses

For businesses already operating in the cloud the most common uses are primarily to support operational functions – procurement and invoicing are the top two (chart 2.4). This is aligned with operational efficiency indicated as the key factor in influencing technology investment, as discussed earlier. Comparatively less important uses of cloud are business planning, information sharing and customer relationship management.

However, across all industries more than 85% of cloud adopting business are already using cloud for these functions.

Chart 2.4 Current use of cloud technology



Source: Deloitte Access Economics' survey

The technologies cloud supports

The benefits of cloud computing are realised from the technologies it supports and by examining the current and expected adoption of exponential technology we can provide insights into future adoption of cloud, and the technologies it will support.

Our survey discovered that more than half of the organisations are already adopting some form of Al in their businesses (chart 2.5).

In the next five years, the region will see greater take ups of technologies such as quantum computing, autonomous vehicles and robotics, propelling organisations further into industry 4.0 and fuelling increased cloud adoption.

Chart 2.5

Exponential technologies currently used or expected to be used



Source: Deloitte Access Economics' survey



2.3 Cloud readiness

The level of cloud adoption varies across industries and markets. Across markets, cloud readiness can be affected by the industry structure of the economy, government policies and the market's economic development. Across industries, cloud adoption will be affected by the respective industries' investment in technology, level of disruption occurring in the industry (e.g. ease of new entrants) and intensity of competition. Most companies will already be using some cloud enabled functions, however, there would be more business benefits and value gained by them being more prepared and ready to progress towards a greater level of cloud adoption.

Using responses from the survey, organisations were assessed to measure their cloud readiness to progress in their cloud journey.

Four domains were used to assess their readiness:

- Cloud base: the number of applications of cloudenabled technology organisations are currently using.
- **Cloud momentum:** the degree to which firms responded to the new business models required by COVID-19 by increasing their use of digital technologies.
- Cloud techs: the extent to which organisations are currently using cloud technologies, data analytics, machine learning and AI.
- **Cloud future:** the outlook for each business, level of cloud use in three years' time, whether they have a plan to transfer to cloud storage, and how much progress has been made.

Overall, most businesses already have basic use of cloud, though only 1 out of 10 has a high degree of readiness (chart 2.6). How cloud ready companies are, will be important for the next steps they take. Organisations that have a 'primed' (high) level of cloud readiness will proceed with cloud investments differently to those which are 'hesitant' about cloud (low cloud readiness) or 'unprepared' (not at all cloud ready). With 46% of companies in the region unprepared or hesitant around cloud technology, this could indicate there is business value to be realised in getting organisations better positioned to adopt cloud.

Chart 2.6

Cloud readiness across focus markets and industries in Asia Pacific







Case study: Leading Chinese dairy FMCG – achieving better consumer operating efficiencies with data-driven insights

This Deloitte China client is a wellestablished leader in the dairy industry, specialising in baby formula products.

To achieve ambitious sales acceleration targets in an increasingly mature market, this client wanted to acquire new consumers and increase the number of repurchases from existing consumers.

To deliver, the client identified the need to become more digitally intelligent and optimise operational efficiencies. In particular, our client wanted to be able to use the latest customer insights to drive buying decisions at key customer touchpoints. Gathering these insights required seamless data integration across its off-and on-line operations, ranging from retail storefronts to digital campaigns and loyalty programs. Supported by Alibaba Cloud's data mid-end platform solution, our client assessed its data analytical requirements by designing multiple practical scenarios for investigation. Relevant consumer and sales activity data stored on legacy applications were identified and appropriately harnessed to extract consumer insights for each operational area. The resulting insights were drawn and shared via a business intelligence reporting tool and consumer tagging application.

This investigation and research phase helped the client identify a number of issues that stopped the business from running efficiently. Subsequently, the new cloud platform solution was designed to support different consumer touchpoints with the right data to support precision marketing, sales, and repurchasing efforts. The client's cross-functional and business units' operational issues and inconsistencies were solved through the design and adoption of standardised processes across the entire business.



Cloud readiness across markets

Considering the same set of factors across the eight focus markets, the analysis found the two most cloud ready markets are **China** and **India** based on average cloud readiness score (chart 2.7). Japan ranks the lowest in the cloud readiness score across the eight markets, which is consistent with observations published in 2020. According to a survey undertaken by the Japanese Ministry of Health Labour and Welfare, only 27% of employees in Japan worked from home during the voluntary lockdown in April and May 2020.

A separate study reported that only 28% of surveyed Japanese firms had an online system that allowed staff to work remotely.

Chart 2.7



Cloud readiness score by markets

3.00%



Cloud readiness by sector

Organisations in financial services and TMT are likely to be the most cloud ready with those in government and public services and consumer sectors least ready (chart 2.8). Within these industries there can be significant variation in cloud readiness. For example, within consumer products the retail, wholesale and hospitality subsectors have very low levels of cloud readiness while the transport and logistics subsector has above average cloud readiness levels.



Chart 2.8







Key findings

- 72% of organisations rank 'operational efficiency' as cloud's top organisational benefit
- Public cloud services will contribute **\$US160 billion to the Asia Pacific** economy (across our eight focus markets) from **2020-2024**
- All markets are expected to see **larger benefits** from cloud in the **next five years** than the previous five.

Cloud has real and significant benefits to business, but of the organisations surveyed, 33% said they haven't noticed any differences between operating in cloud or on-premise.

To fully understand its benefits as they move into the cloud environment, organisations need to find the right approaches to identify and quantify them. Once they have been able to do this, it will provide defined goals and target outcomes to guide appropriate allocation of investment and senior management buy in.

Cloud services and related technologies, such as AI and IoT, will be front and centre in transforming the dynamics not only for businesses, but also the economy, government, and society.

Benefits to businesses and industries will lead to benefits in the broader economy — importantly growth in productivity, job creation and better living standards.

The cloud imperative: Asia Pacific's unmissable opportunity



3.1 Business benefits of cloud

Across those surveyed, business leaders in the region identified several core organisational benefits associated with implementing cloud technology. **Operational efficiency** ranks top, with 72% of business leaders stating they were already experiencing benefits (chart 3.1). This is closely followed by ability to expand to **new customer segments** and **revenue and profit growth.**

These trends indicate that business leaders are expecting investments in cloud technology to have an impact on the future bottom line, by helping to streamline everyday business operations today.



Chart 3.1 Cloud technology benefits



The better organisations are prepared and ready to embark on their cloud journey, the more likely they are to see an impact from their investments in cloud technology (chart 3.2).

Decisions influencing cloud investments

Initial cloud investment decisions are often driven by a cost-reduction mindset or to quickly grow revenue. Over time, as use of cloud matures and becomes more sophisticated, organisations will look to leverage cloud to further add value to their investment. Business outcomes at this later phase could be geared to address external challenges, such as longer-term outcomes like improving operational efficiency, increasing market share, improving speed of new product development and enhancing innovation capability.

The most significant factors influencing the allocation of technology investment are the ability to improve operational efficiency and to grow revenue. Around a fifth of organisations in the region rank these as the most critical factors in their technology investment. Also important are increasing market share and reducing costs. The least important factors are maintaining existing systems and regulatory compliance, with less than 10% of businesses ranking these as their number-one priority.

Chart 3.2

Positive impact seen from investment in cloud technology



Source: Deloitte Access Economics

These factors could reflect how the benefits of cloud adoption and technology investment materialise over time.

Cloud computing has proven to be an enabler in times of disruption and has underpinned value creation over the last decade. The way business is conducted is always evolving, and with the potential of cloud and the advanced technologies it can enable, there will be new business value-creating opportunities the world has yet to realise.

Cloud will continue to unlock and fuel innovations, which will lead to the formation of new, as yet unimagined, businesses in the future.

3.2 Economic value of cloud Productivity benefits

Beyond operational efficiencies and lower business costs, cloud services, along with other digital technologies, create significant value throughout the broader economy by helping to drive the productivity growth. Productivity is a measure of how efficiently an economy uses labour and capital resources when producing and delivering goods and services. It is the fundamental driver of economic growth and key to long-term improvements in living standards. Importantly, productivity is not only about efficiency and hard work, but also innovation and the creation of new and improved products and services.

One way to improve productivity is through technological enhancements. Cloud contributes to labour and capital productivity by increasing the effectiveness and efficiency of both. It enables workers to more easily collaborate and improves the efficiency with which computing resources are deployed. Cloud services also act as an important enabler for other digital technologies, such as AI, which are themselves driving productivity growth.

Looking forward, the growing adoption of cloud services, their ever-increasing sophistication, and the forecasted take-up of cloud-based applications, suggests that the productivity benefits of cloud will only increase. Of course, productivity is only one measure of economic welfare. It does not capture all the benefits of cloud. For example, it may not capture the social welfare benefits to consumers associated with the convenience and multi-purpose functionality of being able to use cloudbased storage and communication tools.

"It has been great to see the South Korean government's growing commitment to investing in digital and cloud transformation through the Digital New Deal. Increasingly, cloud is helping South Korean organisations explore what's possible. Progressive companies are maximising technologies such as Al, big data, 5G and cloud to innovate, deliver competitive advantage and improve the experience for customers and citizens." **Hyun Jung Kim**

Partner, Digital Technology & Transformation Lead, Deloitte South Korea



Case study: Baba Products – driving efficiency, enabling exceptional customer service and support growth decisions

Baba Products (BABA's) is Malaysia's leading curry powder, spice and flour mixes brand, and sells almost 100 different products nationwide. With a workforce of 1,250 people who serve over 50,000 customers, BABA's also operates in Singapore and Brunei, and is planning to expand into Australia, UK, Indonesia and China. Keen to operate more effectively and efficiently, this Deloitte South East Asia client had a number of objectives it wanted to achieve by migrating to an SAP ERP solution on the AWS cloud. BABA's Group of Companies' Head of Finance, Mr Ilaventhan says the benefits included "reducing ordering and delivery times caused by our legacy system, modernising or automating traditional functions, getting access to data on the mobile of our van sales staff, and providing exceptional customer service which has been our first priority from day one – while saving costs that come with running on-premise server facilities, and facilitating real-time decision making with more accessible and relevant data."

BABA's worked closely with Deloitte to revamp and transform its traditional and relatively basic sales functions, accounting, finance, and warehousing to a centralised, digital system with SAP S/4 HANA supported by SAP Direct Store Delivery. The new cloud-hosted solution meets and exceeded all its objectives. Highlights include increased efficiency and productivity in field and van sales – especially in terms of the sales and delivery cycle across Malaysia, Singapore and Brunei. It has embedded the new CRM, and streamlined its system support to maximise the new system's effectiveness and the cloud is now supporting key business activities in real-time, such as the new finance function which now gives accurate cash flow visibility.

Mr Ilaventhan concludes, "BABA's is using the cloud as the single source of truth to provide the right data to the leadership team, supporting critical business decisions and inspiring confidence to venture into other parts of the world."

Key findings

We find that, between 2015 and 2024, public cloud services will contribute \$US257 billion to the Asia Pacific economy (2019 real terms), equivalent to 0.8% of GDP. These productivity impacts are also increasing over time, with most of the benefits yet to be realised. We estimate that only 38% of this contribution (or \$US98 billion) occurred between 2015 and 2019, with the majority (\$160 billion) still to come.

Translating cloud technology improvements into productivity benefits

Digital technology is evolving faster than ever, and the speed of this evolution will intensify as organisations harness more sophisticated technology to kick-start the post-COVID-19 economy.

In the past, the economic benefits of such technological advancements have not been easy to measure.

However, as digital technologies become more widely adopted across firms and industries, the visibility of technology-related productivity enhancements also increases. The advancement of digital technologies throughout the economy, not just in ICT-intensive sectors, has also made it easier to measure the impact of technology on productivity.³

Productivity benefits to Australia

Previous studies have highlighted the productivity benefits delivered by cloud. For instance, from 2014 to 2018, the cumulative productivity benefits delivered by cloud services in Australia was worth an estimated \$AU9.4 billion (or approximately \$US7.1 billion). This benefit is equivalent to the size of the Australian government's total IT spend in the 2016-17 financial year.⁴

APAC cloud spend and contribution to GDP

Extending on this work, Deloitte Access Economics models the impact of public cloud services using data on current and future cloud expenditure as a proxy for the adoption of cloud services. Data collected by IDC indicates that public cloud expenditure grew at an average annual rate of 42% across the eight focus markets between 2015 and 2019, increasing from \$US7.8 billion to \$US32.1 billion. We estimate that, between 2015 and 2019, the adoption of cloud services contributed \$US98 billion (in 2019 real terms) to GDP in the Asia Pacific region.

Productivity benefits across markets

Looking across individual markets, the contribution of cloud varies with the level of cloud maturity and the size of the individual economy. Based on IDC public cloud expenditure data, the most cloud mature markets from a per capita expenditure perspective are **Singapore**, **New Zealand** and **Australia.** These markets also received the largest productivity benefits from cloud technology between 2015 and 2019.

In comparison, **South Korea, China** and **India** all had low public cloud expenditure and correspondingly received a smaller economic contribution from cloud.



Estimating the benefits of cloud services to the economy

Quantifying the economy-wide productivity benefits of cloud is more than an arithmetic exercise. Some improvements will translate into economy-wide gains by improving the overall efficiency of firms, resulting in a flowon benefit for consumers and improving living standards (Productivity Commission, 2017). However, other productivity improvements will result in a shift in profits between firms, rather than an increase across the board. Businesses that adopt the new technology will benefit, but largely at the expense of the technology 'laggards' (Weir 2018). In such instances, the net productivity impact will be much more modest. As such, it is necessary to take a whole of economy view when estimating the productivity benefits of cloud technology.

The econometric analysis in this report follows previous Deloitte Access Economics and OECD research in taking a panel approach to identify the growth effects of digital technology and cloud, controlling for policy and institutional influences. To estimate the current and future benefits of cloud services to the economy, we use data from IDC on expenditure on public cloud services in each market as a proxy for the adoption of cloud technology. This approach implicitly assumes that expenditure on cloud is highly correlated with the value of cloud services. Estimates of cloud expenditure are combined in an econometric model with other measures of digital technology adoption and data on non-digital factors which may influence productivity growth to estimate the contribution of cloud to GDP. A more in-depth discussion of model specification, choice of variables and forecast methodology is available in **Appendix A**.

It is important to note the limitations of this modelling when interpreting these results. The approach relies on proxies for the entire contribution of digital technologies to GDP per capita, namely mobile cellular penetration, fixed broadband penetration, real ICT expenditure and the percentage of the population with internet access. It also relies on determining the share of digital productivity gains attributable to cloud using data on public cloud expenditure. This is challenging as there are complex interactions between technologies which drive productivity growth. For example, in many cases mobile devices, telecommunications networks, application software and cloud services are all required to deliver productivity enhancing services. Where non-cloud-based substitutes are not readily available, expenditure will likely fail to capture the full benefits delivered by cloud.

In light of these limitations and given that cloud services are likely to become more sophisticated (per dollar spent) in the future, the benefits of cloud will likely be much higher than those reflected by forecasts which rely on expenditure alone. As such, these estimates should be viewed as a conservative estimate of the productivity benefits of cloud.



Chart 3.3

Cloud contribution to GDP, % (2015 to 2019)



Source: Deloitte Access Economics

Table 3.1

Contribution of cloud services, % of GDP and \$billion (2015 to 2019)

Market	Contribution of cloud (% GDP)	Contribution of cloud (\$US billion)
Australia	0.6%	\$8.3
China	0.4%	\$52.3
Hong Kong, SAR	0.3%	\$0.9
India	0.4%	\$10.7
Japan	0.3%	\$17.5
New Zealand	0.7%	\$1.5
Singapore	0.9%	\$3.6
South Korea	0.2%	\$2.8
Total	0.4%	\$97.7

Source: Deloitte Access Economics

Contribution to APAC's economy

It is important to consider the speed at which the adoption of cloud will occur in the years to come. The more rapid the adoption of public cloud, the greater the productivity benefits it will deliver.

IDC forecasts that, across the eight focus markets in this study, public cloud expenditure will grow at 28% per annum, from \$US32.1 billion in 2019 to \$US116 billion in 2024. This rapid growth in expenditure and adoption will deliver significant productivity benefits.

Overall, Deloitte Access Economics expects the adoption of cloud services to contribute a further \$US160 billion to the Asia Pacific economy from 2020 to 2024.

This is a substantial increase from the estimated contribution during the last five years and reflects the expected step up in the adoption of cloud in the Asia Pacific region. Importantly, all markets are expected to see larger benefits from cloud in the next five years than they have witnessed during the previous five.



The forecasts predict that markets already investing heavily in cloud will continue to do so and they will see the largest benefits. However, markets currently in the earlier stages of adoption will also scale up their investments and increase the sophistication of their use of cloud.

It is important to acknowledge that government regulations and policies in the future will have a major influence on organisations' investment decisions. The potential implications of such measures will have a significant impact on productivity, which have not been considered in the modelling.

Table 3.2

Contribution of cloud services, % of GDP and \$billion (2020 to 2024)

Market	Contribution of cloud (% GDP)	Contribution of cloud (\$US billion)
Australia	1.0%	\$15.3
China	0.4%	\$83.2
Hong Kong, SAR	0.5%	\$2.0
India	0.5%	\$16.7
Japan	0.6%	\$29.3
New Zealand	1.4%	\$3.2
Singapore	1.5%	\$6.0
South Korea	0.2%	\$4.2
Total	0.5%	\$159.8

Source: Deloitte Access Economics

Chart 3.4

2.0%



Source: Deloitte Access Economics

Cloud contribution to GDP, % (2020 to 2024)



Key findings

- **70%** of business leaders indicated cloud has enabled their teams to experiment and innovate quickly and frequently, and they feel more prepared to address future challenges and organisation needs
- **Top four challenges organisations** say they have faced on their cloud journey: security issues; skills shortages; regulation complexity; legacy issues
- Our **top six** ways to prepare your organisation for cloud: implement a leader-led cloud strategy; don't let legacy systems hold you back; be bold in experimenting; work with partners; develop a cloud-fluent workforce; rethink risk.

While the pandemic created an immediate need for many organisations to embrace the cloud, it is critical that business leaders are committed in the long term to avoid a piecemeal approach in their system integrations, which could lead to unnecessary cost and disruption.

As well as infrastructure investment, business leaders will need to have a clear workforce plan to prepare for new skills needed to continue operating in a cloud environment.



Most of business leaders across the region recognise the benefits cloud technology can bring to their organisations. Cloud has become an integral component of their organisation strategy and more than 70% of business leaders indicated cloud has enabled their teams to experiment and innovate quickly and frequently, and they feel more prepared to address future challenges and organisation needs (chart 4.1).



4.1 Future digital innovation

Cloud services provide the catalyst for organisations to reinvent themselves and the next leap is when organisations start to tap on cloud-based resources for a wide range of transformative use cases by enabling the next wave of innovative technologies. Cloud services provide the catalyst for organisations to reinvent themselves. As discussed, cloud adoption drives productivity growth and should be at the heart of business investment decisions. Businesses risk being left behind if they are reluctant to take on opportunities for innovation and growth that could be accelerated by cloud-enabled technologies such as AI and big data analytics.

Around 6 out of 10 organisations surveyed expect their level of cloud adoption to grow in three years' time, with just under 30% expecting adoption to remain unchanged (chart 4.2). Organisations operating in consumer industries are most likely to expect their level of adoption to remain at current levels, while 1 out of every 10 organisations in the government public services industries expects a decreased level of cloud usage in three years' time.



"Cloud technology enables organisations to build an arsenal of fit-for-purpose technologies to prevent, detect and mitigate financial crime. Importantly, it also creates agility for organisations looking to experiment to enhance the effectiveness of their financial crime technology suite. But what excites me most about cloud in the fight against financial crime are the possibilities it opens up for intelligence and information sharing; teamed with advances in privacy-enhancing technology, there is enormous potential for organisations and law enforcement in this area."

Lisa Dobbin

Partner, Financial Crime Lead, Deloitte Australia and Asia Pacific

4.2 Overcoming challenges

While most organisations recognise the benefits of cloud services, many have indicated challenges they have faced in the cloud transformation journey. These perspectives provide valuable insights to those considering moving to cloud services or at the early stages of their adoption journey.

Security issues

Security issues are top on the list of challenges (chart 4.3). As more data and applications move to the cloud environment, this creates unique security threats for organisations. With increasing use of public cloud services, there will be a greater volume of sensitive data potentially at risk, which creates legitimate reasons for organisations to be concerned with security issues. This could also be the reason many are experiencing challenges in changing from legacy systems (third cited challenge) as security concerns are top of mind, which inevitably leads to increased level of scrutiny during the transition process.

Skills shortages

Cloud transformation requires highly technical and specialised expertise which many organisations might not already have in-house. Knowledge and skills in cloud are in higher demand than even before. As organisations move towards cloud, there is a rising demand for skilled professionals, leading to a crunch in qualified cloud and IT talent – this is one of the major concerns facing businesses in the region.

Regulation complexity and legacy issues

The regulatory landscape of cloud computing has become increasingly complex as policymakers and regulators seek to balance the benefits of increasing cloud adoption across organisations and the potential adverse effects, largely around privacy and data breaches. It is not surprising to observe that managing cloud compliance around complex regulation governing cloud technology is the third most cited challenge for organisations, alongside concerns around transitioning from legacy system.



Chart 4.3



Challenges in implementing cloud technology



Case study: Leading global quick service restaurant chain – cloud transformation solves system failure in Japan

In late 2018, this Deloitte client's data centre in Tokyo, Japan experienced a significant outage involving six complete system failures, impacting an additional 40 systems, and affecting restaurant operations for two months.

Not only was important HR data lost, its point-of-sales system, promotional menu and new product rollout system were impacted. Supplier systems for food ordering and delivery were also interrupted, so that the data centre failure had spill-over impact on customers. In total, recovery efforts from the outage cost the client approximately \$US6 million. With a national network of 1,000 restaurants which employs thousands of people and serves many more citizens and tourists, this was a huge challenge for the company's C-suite. The leadership looked to cloud transformation to fix and build a sustainable systems infrastructure to streamline operations and protect its brand well into the future. Together with its cloud service providers, Deloitte analysed the client's entire application portfolio, developed a business case for cloud modernisation, and designed a future-state operating model to address executive's concerns.

After a successful cloud migration the national quick service restaurant chain has experienced a number of benefits from its cloud investment, including a 50% reduction in annual steady-state costs by migrating its applications to the cloud, and a total of \$US2.5 million in annual savings for steady-state operations. Today, the client cloud infrastructure and many of its business applications are managed by Deloitte's Cloud Managed Services team, and support this world-famous brand to deliver the best possible experience for its customers and crew.



4.3 Preparing your organisation

The benefits that cloud technology brings to businesses far outweighs the challenges. To maximise cloud benefits, it is essential for organisations to start planning to extend cloud capabilities to think of new innovative ways of operating to remain relevant to their customers and to use cloud as a competitive differentiator to manage business disruptions.

"To capitalise on the huge economic growth potential of Asia, businesses need to make cloud an immediate priority. When organisations use cloud effectively they can unlock innovation and new growth opportunities, become more resilient to disruption, and more agile and responsive. It's all about finding the fastest way to respond to shifting market demands and staying one step ahead of your competition. Cloud is an imperative opportunity for Asia Pacific."

Cindy Hook

CEO, Deloitte Asia Pacific

The cloud imperative: Asia Pacific's unmissable opportunity

We outline the **top six actions** for organisations to get ready and advance cloud across their business.

Leader-led cloud strategy

As important as it is to have a technical plan for migrating to cloud, organisations with foresight should look to integrate their cloud migration strategy within the overall organisation strategy to keep it top of mind for senior management and boards. To truly demonstrate management's commitment to the adoption of cloud, designing relevant key performance indicators (KPIs) and assigning them to senior leaders in the organisation will drive accountability.

This set of KPIs should extend beyond specific technology targets from cloud initiatives. They should be targeted at value-enhancing business outcomes, such as enabling innovation, improving collaboration across business units or driving employee satisfaction.

Leaders should actively share and communicate progress and successful use cases of cloud transformation, especially those that have delivered the top-level KPIs. Open recognition can act as the catalyst to enhance a cloud-enabled culture, generate further interest to upskill and simulate new, complementary innovation across the organisation.

Do not be held back by legacy systems

Legacy systems might have fuelled business growth in the past, but they can reach maturity point and become a financial burden to maintain, hindering organisations' ability to grow and innovate to meet evolving customer demands and business challenges. Modernising legacy systems and transferring them to the cloud environment is an opportunity to retire obsolete systems that could be inhibiting progress.

Organisations need to overcome any reservations on moving to cloud, embrace the opportunity and act on it, as cloud is here to stay.

Be bold in experimenting

Cloud is a catalyst for innovation and can transform businesses at a rapid pace – its potential is immense. The pandemic has forced many organisations to rethink their use of cloud technology. As much as the pandemic is causing disruption to the world, organisations can look to tap into the disruptive transformation of cloud to experiment with new business ideas to drive growth.

The very reasons why organisations move to cloud – scalability, agility, speed and transformation – will support organisations to go further with business innovation and become more cloud ready.



Work with partners, don't go it alone

Organisations don't need to embark on their cloud journeys alone. There are many industry-leading partners that are there to support from the onset. The cloud transformation process requires organisations to reconcile complex ecosystems of legacy technologies onto the cloud environment and, where possible, undertake this process with minimal disruption to business operations.

Cloud-proven consultants and providers have the knowledge and experience to guide organisations through their cloud migration journeys while anticipating and managing potential risks and uncertainties.

Develop a cloud-fluent workforce

It is common to see many organisations, especially those in the early stage of their cloud migration journey, focus resources on the technology front of cloud rather than the workforce, but operating in cloud requires a talent pool with new skillsets.

Technology and a cloud-enabled workforce need to co-exist in a considered and connected manner for both to progress together and at pace. It is vital for organisations to plan and define the workforce and skillsets they require to ensure employees can work effectively in a cloud-enabled work environment to realise the transformative power of cloud.

Through collaboration with cloud migration partners, organisations stand to upskill their workforce capabilities to bridge the cloud divide quickly, drive productivity and value during the transformation process. A cloud-ready workforce and culture will support the organisation to leverage cloud to deliver results.

Time to rethink risk

A move to cloud requires business leaders to rethink their approaches to business risk. Operating in the cloud environment provides organisations with speed and agility. Launching a new customer service could be a matter of days and weeks rather than months. These benefits bring new challenges and require organisations to look at risks with a new lens. For example, speed to market provides a competitive advantage, but could also expose businesses quicker to other operational challenges (which add to risk) in the areas of customer service and order fulfilment.

The increasing uptake of cloud services will continue to drive change in the risk landscape, particularly around cyber-related risks. The legal ramifications of a successful cyber-attack can be very costly to a business, from substantial fines, enforcement notice or investigation to reputational damage, which could extend to longer-term impacts through loss of customer trust and ultimately revenue and profits.

The cloud computing era is evolving fast. As organisations increasingly move into cloud, business leaders need to shift approaches to how they manage access, control and risk. These will have implications not just on how an organisation operates internally, but also in its interactions with suppliers, partners and customers.

Chapter one describes the potential risks organisations could be exposed to from the forces of disruption. This provides the business context for organisations to consider as they reassess the business risks they will face as they continue to leverage on innovative cloud solutions.



Case study: Global automotive manufacturer – achieving an insight-driven operating model in China

This global car manufacturer and leading technology company is headquartered in the UK and famous for building iconic British vehicles. Today, it has vehicle assembly plants all around the world, including China. To become a truly insight-driven organisation and maintain and increase its market share, the client recognised it had to embed analytics into its various business decision-making processes. However, its data was stored in several siloed systems, some files required manual updates, and there was a lack of transparency and security.

In collaboration with AWS, Deloitte implemented a comprehensive data lake architecture – where data is stored until it's needed, and analytics are run to decide how best to use the data going forward – to help this client design its optimal operating model. A comprehensive technology stack was built on AWS's cloud platform to provide traditional data warehousing, business intelligence solutions, and AI-enabled advanced analytics. This allowed the manufacturer to connect data assets across business functions, improve data transparency, and use data for useful insights to inform decision-making. Areas such as sales planning and performance, stock optimisation and marketing can now be enhanced by better and faster decisions. This transformation journey has provided the client with one single data platform to integrate and orchestrate its data across the entire company ecosystem, providing one single source of truth.

To continue operating as an insights-driven organisation, the client also needed to ensure its workforce was equipped with the right skills for the future. As part of the cloud transformation journey, workforce skills gaps were identified, and new roles and capabilities were defined to support future growth.



A.1 Theoretical modelling framework

This report follows previous Deloitte Access Economics Deloitte Access Economics and OECD research in taking a panel approach to identify the growth effects of digital technology and cloud, controlling for policy and institutional influences. The econometric methods employed largely follow the approach of Qu, Simes and O'Mahony (2016), and Bassanini, Scarpetta and Hemmings (2001).

The modelling approach adheres to previous research with some changes to the main variable of interest. The underlying framework is based on a human-capital augmented Solow-Swan model where output at time *t* is given by:

 $Y(t) = K(t)^{\alpha} H(t)^{\beta} \left(A(t) L(t) \right)^{1 - \alpha - \beta}$

Y,K,H and *L* are respectively output, physical capital, human capital and labour, α and β are the partial elasticities of output with respect to physical capital and human capital, and A(t) is a composite measure of technical progress $\Omega(t)$ and economic efficiency *I*(*t*):

$$A(t) = I(t)\Omega(t)$$

Economic efficiency includes a range of 'enabling services', $V_{i}(t)$, such as advertising, trade, transport and logistics, professional and support services, and innovation. These enabling services provide support to firms at all stages of production. In addition to measures of digital technology and cloud, controls are included for each market's urbanisation rate, research and development expenditure and trade exposure, all three of which are widely recognised as key determinants of economic efficiency. Other technological progress, $\Omega(t)$, is assumed to be exogenous and to grow at a rate g(t).

The following equations can be used to describe the time paths of the various factors of production over time.

> $\dot{k}(t) = s_{k}(t)A(t)^{1-a-\beta}k(t)^{a}h(t)^{\beta} - (n(t) + d + g(t))k(t)$ $\dot{h}(t) = s_{k}(t)A(t)^{1-\alpha-\beta}k(t)^{\alpha}h(t)^{\beta} - (n(t) + d + g(t))k(t)$ $\dot{A}(t) = g(t)A(t) = g(t)I(t)\Omega(t)$ $\ln I(t) = p_0 + \sum_{i} p_i \ln V_i(t)$ $\dot{\Omega}(t) = g(t)\Omega(t)$

> > $\dot{L}(t) = n(t)L(t)$

Where $y = \frac{Y}{L}$ and $k = \frac{K}{L}$ are output and physical capital in intensive terms, $h = \frac{H}{L}$ stands for average human capital, s_{μ} and s_{μ} are the investment rate in physical and human capital respectively, n(t) is the growth rate of labour, g(t) is the rate of technological change and d is the common (time-invariant) depreciation rate.

Under the assumption that $\alpha + \beta < 1$ (decreasing returns to scale in human and physical capital), this system of equations can be solved to obtain steady-state values of k^* and *h** defined by:

 $\ln k^{*}(t) = \ln A(t) + \frac{1-\beta}{1-\alpha-\beta} \ln s_{k}(t) + \frac{\beta}{1-\alpha-\beta} \ln s_{h}(t) - \frac{1}{1-\alpha} \ln(n(t) + d + g(t))$ $\ln h^{*}(t) = \ln A(t) + \frac{\alpha}{1 - \alpha - \beta} \ln s_{k}(t) + \frac{1 - \alpha}{1 - \alpha - \beta} \ln s_{h}(t) - \frac{1}{1 - \alpha} \ln(n(t) + d + g(t))$

 $\ln y^{*}(t) = \ln A(t) + \frac{\alpha}{1-\alpha} \ln s_{k}(t) + \frac{\beta}{1-\alpha} \ln h^{*}(t) - \frac{\alpha}{1-\alpha} \ln(g(t) + d + n(t))$

These steady-state values of physical and human capital can be used to express the steady state output per capita as:



Steady state human capital, h^* , is unobservable, but it can be expressed as a function of the actual level of human capital, h(t).

$$nh^{\star}(t) = \ln h(t) + \frac{1 - \psi}{\psi} \Delta \ln \left(\frac{h(t)}{A(t)}\right)$$

Substituting this into the previous expression for steady state output per capita yields:

$$\ln y^{\star}(t) = \ln A(t) + \frac{\alpha}{1-\alpha} \ln s_{k}(t) + \frac{\beta}{1-\alpha} \left(\ln h(t) + \frac{1-\psi}{\psi} \Delta \ln \left(\frac{h(t)}{A(t)} \right) \right) - n(t)$$

Adding convergence dynamics and expanding the productivity term A(t) yields the transitional equation for output per capita.

$$\Delta \ln y(t) = -\Phi \left(\ln y(t-1) - \frac{a}{1-a} \ln s_k(t) - \frac{\beta}{1-a} \ln h(t) + \frac{a}{1-a} \ln(g(t) + n(t) + d) - g(t)t - \ln A(0) \right) \\ + \frac{1-\psi}{\psi} - \frac{\beta}{1-a} \Delta \ln h(t) + \left(1 - \frac{\phi}{\psi}\right) g(t)$$

This last equation represents the functional form that was empirically estimated in this report. The coefficient estimate ϕ represents the convergence parameter, which reflects the speed at which countries converge to their new steadystate output.

Theoretical limitations

It is important to recognise that under the conditional convergence model used in this paper, various forms of capital as well as policies and institutions are assumed to have a permanent impact on cross-market differences in GDP per capita levels but only temporary effects on growth rates. This means the observed growth in output in any given period, abstracting from cyclical fluctuations, is a combination of three different forces:

- Exogenous growth in other technological progress
- A convergence process towards the steady-state path of output per capita
- Shifts in steady state output per capita that arise from changes in policies and institutions, productivity enhancing services, as well as capital investment rates and changes in population growth rates.

It should also be noted that the framework is derived under the assumption of equilibrium employment and hence that variations in the intensity of labour utilisation are not explicitly taken into account.

A.2 Empirical approach

equation can be re-written as:

 $\Delta \ln h y_{i,t} = - \Phi_i \left(\ln y_{i,t-1} \right)$

This form effectively represents an error-correction model where θ_1 represents the long-run elasticity of steady state GDP per-capita with respect to changes in the rate of capital accumulation, θ_2 the long-run elasticity of steady state GDP per-capita with respect to changes in observed human capital and p_i the long-run elasticity of steady state GDP per-capita with respect to changes in productivity enhancing policy variable V_{it} .

In this report we have used a standard growth equation from the human-capital augmented Solow-Swan model. When empirically estimating this equation, some simplifications can be made. Specifically, to the extent that g(t) is not observable, it cannot be empirically distinguished from the constant term. Thus, the estimated growth

$$-\theta_1 \ln s_{i,t}^k - \theta_2 \ln h_{i,t} + \theta_3 n_{i,t} - \alpha_{1t} + \sum_i p_j \ln V_{j,t} - \theta_{0,i} + \alpha_2 \Delta \ln h(t) + \epsilon_{i,t}$$



To estimate this equation the empirical work in this report employs a pooled mean-group estimator (PMG). The PMG approach provides an effective middle ground between imposing homogeneity on all slope coefficients when using a dynamic fixed effect estimator (DFE), and the imposition of no restrictions when using a mean group estimation approach (MG) (Qu, Simes & O'Mahony, 2016). The validity of DFE depends on the assumptions of common technology and convergence parameters that in turn require both common technological change and population growth across countries. These are very strong assumptions which almost certainly do not hold empirically. On the other hand, the MG estimator is consistent, but the number of parameters required to be estimated is so large it makes it implausible for use in cases such as ours with relatively short panels for some countries (small *T*) and with many independent variables. Given the significant drawbacks both DFE and MG estimators have in situations such as ours the PMG estimator is the best available approach.

It is worth noting the PMG approach is not without its limitations. Chiefly, PMG still requires the estimation of a large number of parameters, which can cause likelihood convergence issues and estimates sensitive to model specification changes (Qu et al., 2016). In practice, this means that controlling for a large number of policy and institutional variables can be difficult. To help avoid this problem we take a parsimonious approach to the controls we include in our estimates and then check that our results are consistent across other specifications with different combinations of control variables.

Digital index motivation

In order to estimate the productivity benefits of digital technology, we have employed an index approach to capture the effect of multiple digital variables. This decision was motived by theoretical and empirical reasons. Theoretically, it is difficult to separate the effect of different digital technologies as there is often significant crossovers between them. For example, dongles use the mobile network on PCs and other devices that are usually considered to be part of the fixed network, such as when using fixed broadband penetration as a proxy. Estimating the combined impact of multiple technologies partly captures this integration. Empirically, an index of digital variables also accounts for the limitations of the PMG estimator, through the ability to simultaneously control for, and measure, the impact of several digital variables. Including multiple explanatory variables of interest in the same model often resulted in convergence problems or estimates highly sensitive to model specification changes. The index of digital variables measures the contribution of the entire digital industry.

To estimate the contribution of cloud, we create two versions of the digital index. The first includes a measure of cloud technology adoption (proxied by expenditure), while the second excludes cloud. The impact of cloud is then estimated by examining the difference in the estimated contribution of each index to steady state GDP per capita.



Index methodology

The methodology underlying the creation of the digital index in this report is based on the ICT Development Index (IDI) developed by the International Telecommunications Union (ITU) (2019). To capture the effect of digital technology on productivity growth, we use a combination of four measures of digital technology adoption: mobile phone penetration, percentage of individuals with access to the internet, real ICT spending per capita (including real expenditure on cloud related technologies) and fixed broadband penetration. It is important to note that these variables do not provide a perfect measure of changes in digital technology adoption and use. However, in the absence of reliable data that could reflect these underlying changes in technology over a sufficient time period, these variables serve as a good starting point to measure the impact of digital technologies.

In order to combine the four variables into a single index, each is first normalised and then combined using the following weights (table A.1).

Table A.1

Index weights

Parameters	Direct
Fixed-broadband internet subscriptions per 100 inhabitants	0.25
Percentage of individuals using the internet	0.25
Mobile-cellular telephone subscriptions per 100 inhabitants	0.25
Real ICT spending per capita	0.25
Source: Deloitte Access Economics and International Telecomr Union (2019)	nunications

A.3 Data and modelling results

The modelling in this report uses a sample of 31 countries with data drawn from the period between 2006 and 2019. Where appropriate, data is converted to constant Purchasing Power Parity US dollars, consistent with OECD standards.

Table A.2 Market list			
Market list	t		
Australia	Finland	Italy	South Africa
Austria	France	Netherlands	Spain
Belgium	Germany	Norway	Sweden
Canada	Greece	Poland	Switzerland
Chile	Hungary	Portugal	United Kingdom
Denmark	Ireland	Slovak Republic	United States
Estonia	Israel	Slovenia	

Source: Deloitte Access Economics



Table A.3

Data sources

Parameter	Variable	Source
Y_t	Gross domestic product per capita	OECD
h(t)	Human capital (avg. years of schooling)	Worldbank
n(t)	Total population growth	OECD
<i>S</i> _{<i>k</i>} (<i>t</i>)	Gross capital formation (% of GDP)	Worldbank
V_{1}	Urbanisation (% of population in urban areas)	Worldbank
V_2	Exports and imports of goods and services (% of GDP)	Worldbank
V ₃	R&D expenditure (% of GDP)	Worldbank
V_4	Index of digital variables	ITU, Worldbank & IDC Technologies

Table A.3 outlines the variables used in the econometric modelling. In addition to controls for primary factors of production such as physical capital accumulation, the stock of human capital and population growth, the model also takes into account the contribution of other productivity enhancing factors, such as a market's degree of trade openness, R&D expenditure and urbanisation.



Table A.4 and table A.5 present the estimated long run coefficients for the effect of digital technology and other controls on steady state GDP per capita, including and excluding cloud. Importantly, the results suggest that the impact of digital technologies on output per capita is substantial, along with the effect of trade exposure (imports and exports), gross capital formation and increases in human capital. Interestingly, urbanisation does not have a statistically significant effect on GDP per capita, although this may be due partly to the lack of variation overtime in the sample of highly urbanised nations used in this analysis. The negative relationship between R&D expenditure and GDP per capita is also somewhat surprising, although this result mirrors the findings of Qu et al. (2016) and Bassanini et al. (2001), who suggest that such a result may represent the effects of public R&D expenditure crowding out private investment. R&D expenditure may also be a lagging indicator, such that annual changes in R&D expenditure are not reflected in changes in GDP per capita. Given the significance of the estimated effect of R&D expenditure and the fact that the digital productivity results are robust to alternate specifications which do not include a control for R&D expenditure, this model remains our most preferred option.

Table A.4

Model results			
Parameter	Variable		
Long-run co	Long-run coefficients		
In <i>h</i> (<i>t</i>)	Human capital (avg. years of schooling)		
In <i>n</i> (t)	Total population growth		
$\ln s_k(t)$	Gross capital formation (% of GDP)		
$\ln V_{\eta}$	Urbanisation (% of population in urban areas)		
$\ln V_2$	Exports and imports of goods and services (% of GDP)		
$\ln V_{3}$	R&D expenditure (% of GDP)		
$\ln V_4$	Index of digital variables		

Source: Deloitte Access Economics

Notes: t-statistics are reported in parenthesis. *p<0.10, **p<0.05, ***p<0.01

Coefficient

0.523***	(5.08)
-0.504*	(-2.01)
0.388***	(15.80)
0.0271	(0.11)
0.306***	(8.43)
-0.268***	(-8.23)
0.269***	(6.60)



The estimated coefficient for the digital index, $V_{4'}$ can be interpreted as the long-run elasticity of output per-capita with respect to changes in the levels of this index. If the digital index increases by x%, then the resultant percentage change in long-run steady state GDP per capita, y, is approximately given by,

$$y = V_4 \cdot x = 0.269 \cdot x$$

Put another way, a 1% increase in the digital index leads to an approximate 0.269% increase in steady state GDP per capita. The impact of cloud is estimated by comparing the difference between the estimated impact of the digital index including cloud and the digital index excluding cloud.

Table A.5

Model results, excluding cloud

Parameter Variable

Long-run coefficients

In <i>h</i> (<i>t</i>)	Human capital (avg. years of schooling)
In <i>n</i> (t)	Total population growth
$\ln s_k(t)$	Gross capital formation (% of GDP)
$\ln V_{\eta}$	Urbanisation (% of population in urban areas)
$\ln V_2$	Exports and imports of goods and services (% of GDP)
$\ln V_{_3}$	R&D expenditure (% of GDP)
$\ln V_4$	Index of digital variables (excluding cloud)

Source: Deloitte Access Economics

Notes: t-statistics are reported in parenthesis. *p<0.10, **p<0.05, ***p<0.01.

Coefficient

0.543***	(5.28)
-0.504*	(-2.01)
0.395***	(16.72)
-0.072	(0.30)
0.299***	(8.74)
-0.262***	(-8.17)
0.261***	(6.46)



A.4 Forecast

Index forecast methodology

To forecast the future contribution of digital technology, this report combines modelling estimates of the effect of changes in digital technology with individual variable forecasts from Cisco's (2018) VNI index and forecasts of cloud and ICT expenditure from IDC technologies.

First, digital index growth is estimated by aggregating the predicted growth of the individual elements. Growth in ICT and cloud expenditure are sources from forecasts provided by IDC. To predict changes in the percentage of the population with internet access, this report utilises Cisco VNI index forecasts for the percentage of each market's population with internet access in 2023. The annual forecast growth rate is then used to estimate access in 2024. Growth in mobile penetration forecasts is based on Cisco forecast growth of Networked Devices (excluding M2M) from 2018-2023. Finally, the growth of fixed broadband connections is estimated using Cisco forecasts for the increase in fixed internet users as a percentage of the population.

Second, forecast index growth is combined with the econometric modelling results to predict the effect on steady state GDP per capita.



Appendix B: Survey respondents

Deloitte Access Economics conducted a survey in May 2021 of 599 organisations across eight markets in Asia Pacific. The primary focus of the survey was to build an understanding of the extent to which organisations use cloud technology, and its impacts on business operations. The survey was conducted online by Ipsos and was designed for business leaders responsible for IT strategies and digital transformation in their business to respond.

Tables B.1 to B.4 show the breakdown of respondents by their job titles, where they are located (markets), sectors and organisation size by employee counts.

Table B.1 Respondents job titles	Table B.2 Number of respo		
Job title	# of respondents	% of respondents	Market
CEO, MD, President,	89	15%	Australia
Business Owner			New Zealand
Senior Management Executives (CFO, CTO,	105	18%	Singapore
CMO, CIO, Partner, etc.)			India
High-Level Executive (EVP,	103	17%	China
SVP, VP, General Manager, Director, etc.)			Hong Kong, SAR
Mid-Level Executive	176	29%	Japan
(Senior Manager,	-		South Korea
department head, etc.)			Total
Manager (in a business unit, group, etc.)	126	21%	Source: Deloitte Acces
Total	599	100%	

Source: Deloitte Access Economics' survey



% of respondents	# of respondents
13%	80
7%	39
13%	80
13%	80
13%	80
13%	80
13%	80
13%	80
100%	599

Access Economics' survey



Appendix B: Survey respondents

Table B.3

Number of responses by sectors

Sectors	# of respondents	% of respondents
Consumer	125	21%
Energy, resources, and industry	77	13%
Financial services	100	17%
Government and public services	67	11%
Technology, media and telecommunications	190	32%
Life sciences and health care	40	7%
Total	599	100%

Table B.4

Number of responses based on organisation size by employee counts

Organisation size (# employees)	# of respondents	% of respondents
Under 200	42	7%
Between 200-499	38	6%
Between 500-999	48	8%
Between 1,000-2,499	97	16%
Between 2,499-5,000	80	13%
Between 5,000-9,999	74	12%
Over 10,000	95	16%
Only operates in home market	99	17%
Don't know/unsure	26	4%

Source: Deloitte Access Economics' survey

Source: Deloitte Access Economics' survey


Appendix C: Deloitte disruption map

The Deloitte disruption map (the map) was created by Deloitte Access Economics and considers two dimensions: external and business disruption.

The Map is based on 19 forces that affect the challenges and disruption faced by businesses in each industry.

Deloitte Access Economics looked at 19 indicators of disruption and collated the views from SMEs across Deloitte, drawing on what Deloitte believes will happen down the track. This approach is not precise nor perfect, but it is designed to help business and government leaders think about disruption in a granular and contemporary way.

For each type of disruption (external and business) the individual measures were normalised and indexed to a value between 1 and 10 (1 being the lowest level of disruption and 10 being the highest level of disruption) for each industry. The following weights were applied to the measure to construct the dimensions for external and business disruption for each industry.

Table C.1
External disruption weights

Pillars	Measure	Weight
Global	Globalisation	10%
Global	Trade	10%
Global	Foreign investment	10%
Regulation	Industry regulation	10%
Social	Social media presence	30%
Environment	Carbon emissions	30%

Table C.2

Pillars	Ν
Technology	C
Technology	l
Technology	V
Staff	S
Market	F
Market	F
Supply chain	S
Innovation	9
Innovation	\vee
Innovation	E
	9
Consumer	A
Consumer	S
	f
Consumer	1
	t

Business disruption weights

leasure	Weight
Tybersecurity	6%
mportance of technology	6%
Vorking from home potential	6%
kill shortages	17%
Profit variance	8%
Profit volatility	8%
Supply chain exposure	17%
6 innovating businesses	6%
enture capital funding	6%
Business research Ind development	6%
bsence of competition	6%
hare of business income rom general public	6%
ntangible assets % otal assets	6%

Note: Due to rounding the total may sum to more than 100%.



Appendix C: Deloitte disruption map

This analysis was undertaken using data from a range of sources including Deloitte, IBISWorld, the ABS, OECD and other publicly available sources.

External disruption

External forces of disruption are those that are out of control of individual businesses or an industry. These include factors relating to the environment, social, globalisation and regulation. While these forces are outside the control of boards, managers, and shareholders, they will pose threats to companies' profitability, returns and ability to create value.

For external disruption the six forces are measured as follow:

· Globalisation

The industry globalisation indicator from IBISWorld was used to measure how globalised an industry is and whether the intensity globalisation was increasing, decreasing or remained steady for the industry.

· Foreign investment

Data from the OFCD was used to derive the inward share of foreign investment by industry to measure how reliant an industry is on foreign investment.

Regulation

Data from IBISWorld was used to measure how regulated an industry is and whether regulation in an industry was increasing, decreasing or remained steady.

• Environment

Data from the Australian Department of Industry, Science, Energy and Resources on direct emissions by industry (relative to the size of the industry) was used to measure the disruption arising from climate change.

\cdot Social

Data from the OECD was used to determine the proportion of business by industry that had a social media presence to measure an industry's exposure to brand and reputational risk around social media.

\cdot Trade

Indicators from IBISWorld were used to examine how reliant industries were on exports and imports and whether this reliance was increasing, decreasing or remained steady.

Business disruption

Business forces of disruption refers to those more related to a business internal operations and more directly under the control of boards, managers, and shareholders. These include aspects related to an industry structure such as projected skills shortages, use of technology, competition, profit variance and volatility.

For business disruption the thirteen forces are weighted and measured as follow:

Technology

· Skills shortages of work is human'.

Data from the ABS was used to measure how important technology was to businesses. This included the importance of mobile internet, high speed broadband, e-commerce, intelligent software systems, cloud, data analytics, IoT, and radio frequency identification devices.

Forecast skill shortages by 2030 for workers in each industry was sourced from Deloitte's Building the Lucky Country report 'The path to prosperity: Why the future



Appendix C: Deloitte disruption map

· Work from home

The degree of disruption in the workplace was proxied by the potential for workers to work from home for each industry. Data was sourced from McKinsey on the effective potential for employees to work from home.

· Competition

The disruption from high levels of competition was measured using data from the ABS on the proportion of businesses in each industry that face no effective competition.

· Profit volatility

Profit data by industry over the past decade was used to measure the profit volatility for each industry.

· Profit variance

Profit data by industry over the past decade was used to measure the profit variance by industry, or how profit differed between 'winners' and 'losers' in each industry.

• Reliance on consumers

Data from the ABS was used to derive the share of business income from the general public, reflecting the dependence on consumers and consumer sentiment.

\cdot Supply chain

Data from the ABS was used to work out the proportion of businesses experiencing supply chain disruptions.

· Venture capital funding

ABS data on venture capital funding by industry was used to measure the disruption in each industry.

· Intangible assets

Data from IBISWorld on intangible assets as a share of total assets was used as the proxy to identify industries' exposure to a range of disruptions including brand value, goodwill and intellectual property.

 \cdot Innovation

Data from the ABS on the proportion of innovating businesses in each industry was used to determine the level of innovation in each industry.

· Business R&D expenditure

Data from the OECD on the proportion of business expenditure on research and development expenditure by industry was used to measure the level of innovation in each industry.



Appendix D: Charts and tables

Chart 1.1: Responses to the statement 'My organisation has insufficient capability today to rapidly adapt to a shift in consumer/client preferences'

- Chart 1.2: Organisations readiness to respond to scenarios
- Chart 1.3: Degree of impact of COVID-19
- Chart 1.4: Deloitte's disruption map
- Chart 2.1: Public cloud spend in 2024 and forecast annual growth (2020 to 2024)
- Chart 2.2: Public cloud spend as a share of sector output across Asia Pacific, 2018
- Chart 2.3: Current adoption of cloud technology
- Chart 2.4: Current use of cloud technology
- Chart 2.5: Exponential technologies currently used or expected to be used
- Chart 2.6: Cloud readiness across focus markets and industries in Asia Pacific using the four domains
- Chart 2.7: Cloud readiness score by markets
- Chart 2.8: Cloud readiness by sector Asia Pacific Industry
- Chart 3.1: Cloud technology benefits
- Chart 3.2: Positive impact seen from investment in cloud technology
- Chart 3.3: Cloud contribution to GDP, % (2015 to 2019)
- Chart 3.4: Cloud contribution to GDP, % (2020 to 2024)
- Chart 4.1: Business leaders' positive perspectives on cloud technology
- Chart 4.2: Expected adoption level of cloud technology in three years' time
- Chart 4.3: Challenges in implementing cloud technology



3

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Appendix D: Charts and tables

- Table 1.1: External and business disruption forces
- Table 1.2: Top cloud uses by sectors
- Table 2.1: Annual spend in public cloud services (2015 to 2024)
- Table 3.1: Contribution of cloud services, % of GDP and \$billion (2015 to 2019)
- Table 3.2: Contribution of cloud services, % of GDP and \$billion (2020 to 2024)
- Table A.1: Index weights
- Table A.2: Market list
- Table A.3: Data sources
- Table A.4: Model results
- Table A.5: Model results, excluding cloud
- Table B.1: Respondents job titles
- Table B.2: Number of responses by markets
- Table B.3: Number of responses by sectors
- Table B.4: Number of responses based on organisation size by employee counts
- Table C.1: External disruption weights
- Table C.2: Business disruption weights



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- 1 The 18 industries examined correspond to the ANZSIC industries (with the exception of the 'Other Services' industry which is not included in this analysis).
- 2 Asia Pacific refers to China, Japan, Korea, Hong Kong, Singapore, India, New Zealand and Australia. Data is from the United Nations database 'National Accounts Analysis of Main Aggregates'. Where required this was supplemented by data from countries' national statistical offices.
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The cloud imperative: Asia Pacific's unmissable opportunity



"Cloud isn't just a future technology. It's driving business and government right now – and making what once seemed impossible, possible. Organisations can embrace cloud to respond to external disruption, and instigate industry-wide improvements and necessary transformation. Our latest research says many organisations are unable to adapt, or respond quickly, to challenges. Cloud is the key – and it's great to see investment in cloud is soaring. I'm really excited about the role cloud plays, and will continue to play, in improving the way we live and work."

Dan Newman

Partner, Cloud Transformation Leader, Deloitte Asia Pacific







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