



What works for digitalisation?

A review of international success

NZIER report to Xero NZ

March 2023

About NZIER

NZIER is a specialist consulting firm that uses applied economic research and analysis to provide a wide range of strategic advice.

We undertake and make freely available economic research aimed at promoting a better understanding of New Zealand's important economic challenges.

Our long-established Quarterly Survey of Business Opinion and Quarterly Predictions are available to members of NZIER.

We pride ourselves on our reputation for independence and delivering quality analysis in the right form and at the right time. We ensure quality through teamwork on individual projects, critical review at internal seminars, and peer review.

NZIER was established in 1958.

Authorship

This paper was prepared at NZIER by Michael Bealing.

It was quality approved by Todd Kriebler

The assistance of Sarah Spring is gratefully acknowledged.

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Registered office: Level 13, Public Trust Tower, 22–28 Willeston St | PO Box 3479, Wellington 6140

Auckland office: Ground Floor, 70 Shortland St, Auckland

Tel 0800 220 090 or +64 4 472 1880 | econ@nzier.org.nz | www.nzier.org.nz

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Key points

Xero New Zealand commissioned NZIER to review the international evidence on digitalisation to determine what works for promoting high levels of digitalisation.

The objective of this report is to investigate work actions, conditions and policies that promote the digitalisation of the economy and small businesses.

New Zealand lags behind the top performers in digitalisation

- In 2022, New Zealand ranked 27th out of 63 countries compared to an overall ranking of 19th in 2018.
- Compared to other countries, New Zealand's digital competitiveness has fallen behind in the major categories of knowledge, technology and future readiness.
- In some areas – such as the ease of starting a business, software piracy and e-participation – New Zealand ranked in the top 10 countries evaluated.
- However, New Zealand has some major weaknesses, including:
 - immigration settings to attract and retain skilled digital workers
 - lack of investment and prioritisation of staff training
 - city management that lags behind the top countries in digitalisation
 - low rankings on cyber security
 - fewer public-private partnerships
 - fewer pathways for investment in the digital economy and digitalisation.

What's needed for digitalisation in New Zealand

NZIER has developed a short list of actions for the government based on the OECD's recommendations about what works for digitalisation among small and medium-sized enterprises (SMEs). Many of these recommendations have been used in the top-ranked countries for digitalisation for many years. New Zealand can catch up. The highest priority actions are listed below in Table 1.

Table 1 The short list of high-priority actions for the government

OECD recommendations for encouraging digitalisation among SMEs	Timing	Impact	Actions for government
Encourage upskilling for staff and management through recommended training pathways and cost incentives	Immediate	Lower skills barriers	Develop industry-specific training pathways for digitalisation Assess and recommend specific training solutions Provide financial assistance for professional development
Invest in developing digital literacy	Immediate	Address digital exclusion and skills barriers	Embed digital literacy in core education Provide community-based training for adults
Raise the profile of cyber security and privacy management	Immediate	Establish new norms and improve trust in digital tools	Demonstrate good practice Assess and identify the needs of small business
Promote solutions that lower the transaction costs of digital and participating in the digital economy, e.g. mobile banking costs	Immediate	Address behavioural barriers such as choice paralysis and avoiding decision regret	Identify lower-cost solutions to lower behavioural barriers
Support SME knowledge-sharing networks, collaborative programmes and centres of excellence	Immediate	Lower the barriers to knowledge sharing	Lower behavioural barriers to digitalisation by facilitating SME networks
Facilitate collaborative and advisory groups	Immediate	More investment through the Digital Boost programme	Follow Singapore's example of providing access to low-cost advisor services on digitalisation for small business
Provide SME open-access technology and research on digitalisation	Ongoing	Lower the barriers to knowledge spillovers	Facilitate open-access solutions via digital R&D funding
Reform immigration law to attract and retain skilled people	Ongoing	Ensure a pipeline for skills, experience and international knowledge transfer	Develop efficient pathways for skilled labour from abroad to arrive and stay

Source: NZIER

The Digital Boost programme (New Zealand Government 2021) and the Digital Technologies Industry Transformation Plan (New Zealand Government 2022) are good starts on the journey to greater digitalisation, but it is the bare minimum of what is needed. Other countries have approaches that offer far more targeted support, training and financial assistance.

Denmark and Singapore offer great examples of what works

Denmark is at the forefront of digitalisation. If New Zealand invested the same amount per capita, the investment would be \$410 million over 5 years. Denmark's long-term approach to digitalisation includes four pillars that New Zealand could apply:

- digital literacy at all levels of society
- digital infrastructure to ensure access and productivity
- trust and security to maintain digital privacy and participation
- an integrated digital public service.

Singapore's approach offers a leading example of actively supporting digitalisation:

- A chief technology officer-as-a-service allows businesses to identify needs, access market-proven solutions and engage digital consultants for customised advice and industry-specific step-by-step guides.
- A foundation plan that offers competitively priced digital solutions such as pre-approved solutions for digitalisation that are supported through the Singapore Government's Productivity Solutions Grant.
- An advancement programme to build depth and resilience in digital activities that set out the steps to transition from entry-level to more-advanced digitalisation.

The road map for improving digitalisation in New Zealand

New Zealand has some basic foundations for improving digitalisation. Now it needs to build depth. In the short term, this means:

- developing a New Zealand Productivity Solutions Grant and foundation plan for setting out the road for successful digitalisation of small businesses in a range of industries
- establishing a chief technology officer-as-a-service to allow businesses to identify needs, access market-proven solutions and engage digital consultants for customised advice and industry-specific step-by-step guides
- developing an integrated digital public service system to enhance productivity and trust among users.

Taking a long-term view, New Zealand also needs to:

- actively invest in digital literacy at all levels of society
- promote and subsidise the acquisition of digital skills as part of continuous learning in the workforce and education
- review the level of investment and regulatory frameworks of government research and development of digital technology
- improve the competitiveness of tech sector immigration policy
- continue to invest in digital and urban infrastructure while also improving the efficiency of local and central government to enhance the productivity and attractiveness of cities for digital business leaders.



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1 Objectives and scope

Xero New Zealand commissioned NZIER to review the international evidence on digitalisation to determine what works for promoting high levels of digitalisation.

Research objectives

The objective of this report is to investigate work actions, conditions and policies to promote the digitalisation of the economy and small businesses.

Scope of the research

The scope of the research was limited to reviewing the international and domestic literature and evidence on the actions, conditions and policies that support and encourage the digitalisation of the New Zealand economy, including the businesses that drive its economic growth and development.

Primary research to develop new evidence was out of the scope of the research, resourcing and time constraints.

Funding statement

NZIER was funded to complete this research by Xero New Zealand independently.

Report structure

The report covers:

- the framework for investigating digitalisation
- an assessment of the payback period and potential benefits
- reviewing what the top 10 countries do better
- addressing the barriers to small and medium-sized enterprise (SME) digitalisation
- bringing it all together.



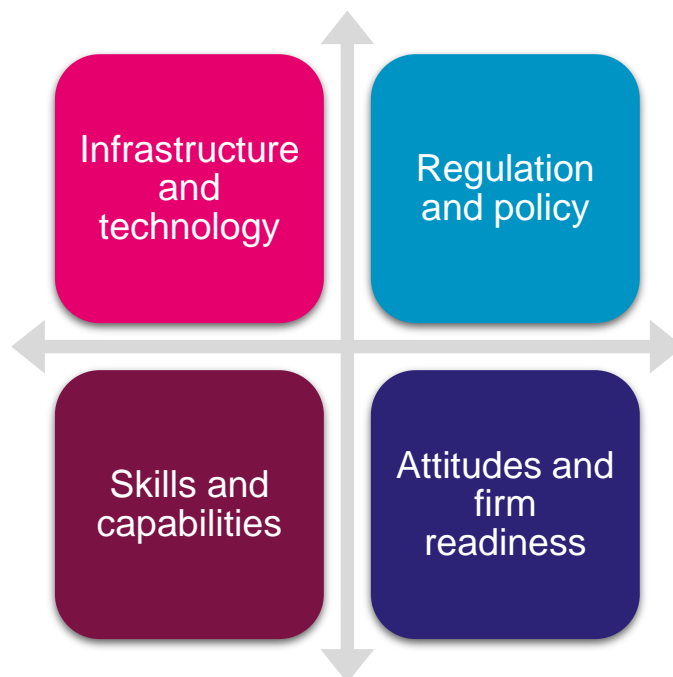
2 The framework for investigating digitalisation

Digitalisation is a complex economic process that requires a multi-faceted approach on many levels. Consequently, research into what works for digitalisation requires a framework to organise the investigation. Figure 1 shows the framework for investigating digitalisation applied throughout the report.

The framework includes four categories that influence digitalisation:

- Infrastructure and technology cover network connectivity, hardware and software systems such as cloud-based business tools, e-commerce applications and cyber security.
- Regulation and policy capture the core aspects of the role of government in providing an effective and efficient regulatory framework that is agile enough to accommodate current practice and medium-term developments. The government also has a vital public good responsibility in promoting digital inclusion.
- Skills and capabilities cover whether workforce and business people can access the education, training, accreditation or experience (learning by doing) to navigate and perform in an increasingly digitalised landscape (Arrow 1962; Sen 1997).
- Attitudes and firm readiness relate to how open business leaders are to digitalisation and whether they understand and implement the pre-conditions for digitalisation. The ongoing minimums include cyber security, privacy protocols, potentially an online presence, which will depend on the industry specifics, and cloud-based systems.

Figure 1 The framework for investigating digitalisation



Source: NZIER



3 The size of the prize from digitalisation

Digitalisation is the use of digital technologies to enhance business systems, processes and activities to provide new revenue and value-producing opportunities. The adoption of cloud-based business tools is an example of digitalisation.

The nature and level of benefits from digitalisation will vary by industry, firm size and the complexity of the digital transformation. Digitalisation can include:

- adopting cloud technologies
- developing online sales capability
- utilising big data analytics
- integrating custom relations management software
- using enterprise resource planning software.

Digitalisation offers a range of economic benefits for business:

- Increased efficiency from the automation of tasks and cost savings frees up time for management and staff to spend on higher-value activities. A range of studies has shown that digitalisation can reduce invoicing costs by between 40% and 80%.
- Reduced need for human data entry, duplication and processing, which also reduces the costs of human error.
- Enhanced flexibility and mobility of staff through cloud-based solutions and mobile apps.
- Increased revenue from better business analytics that allow for a greater understanding of customers and an improved customer experience from accurate automated processes with more tailored offerings.
- Increased scalability from the ability to subscribe to cloud-based information technology services rather than purchasing, maintaining and upgrading in-house IT infrastructure and services. Studies show that cloud computing can reduce in-house IT costs by between 20% and 50%.

The combination of benefits listed above is covered by what economists describe as multi-factor productivity improvements. Multi-factor productivity improvements are the overall business performance gains for business investment that lead to efficiency gains, greater market penetration, innovation and enhanced managerial practice.

Research into digitalisation across the OECD shows that the experience of digitalisation has been uneven between countries, within countries and between industries. Industries with a pre-existing higher level of digital intensity experienced higher multi-factor productivity improvement than lower-intensity industries (OECD 2019b), so it should be no surprise that the estimates of the benefits of digitalisation vary. Research also supports the existence of a learning curve associated with digital technologies. The learning curve is evident in the gradual improvement in multi-factor productivity over several years and that skills development is a significant barrier to digitalisation.

Research on digitalisation and productivity in European countries shows that increasing cloud computing uptake by 10 percentage points increases multi-factor productivity by



0.9% instantaneously, 2.3% after 3 years and 3.5% after 5 years (Gal et al. 2019; Sorbe et al. 2019).

A study of small businesses in the UK measured cloud computing productivity through sales per employee (Roper and Hart 2018). It found that cloud computing leads to an increase of 13.5% in sales per employee after 3 or more years, and cloud accounting software leads to an increase of 11.8% in sales per employee after 3 or more years.

In 2020, NZIER estimated the economic benefits for New Zealand from a 20% increase in the number of businesses adopting cloud-based business tools would be:

- GDP increasing by between \$3.5 billion and \$6.2 billion
- household spending increasing by between \$2.6 billion and \$4.6 billion and living standards are improved
- exports increasing by between \$341 million and \$618 million (NZIER 2020).

These benefits resulted from 1.5–3.5% multi-factor productivity improvements for those businesses that adopted cloud-based business tools. We were interested in the effects at maturity and ignored the learning curve. These results show material gains could be generated from greater adoption of cloud-based business tools in New Zealand.

In today's terms, the economic benefits would be equivalent to:

- GDP increasing by between \$4.4 billion and \$7.8 billion
- household spending increasing by between \$3.3 billion and \$5.8 billion
- exports increasing by between \$430 million and \$779 million.

These estimates of the benefits of such an increase in digitalisation do not consider any effect COVID-19 might have had on digitalisation. The responses to the pandemic such as working from home, lockdowns and more resilience in an online sales capacity have resulted in COVID-19 accelerating the current wave of digital transformation (Nicklin et al. 2022; Döhring et al. 2021). Further research is needed to understand how the economy has changed since 2020, what this means for the uptake of digital tools and how the size of the prize might have changed. Nevertheless, the better benefits of digitalisation are material. Investigating the payback provides some insight into what's at stake for business and the time in which the economic benefits offset the financial costs.

Every business is different. Therefore, business owners need to determine what level of digitalisation suits their business.

The costs of digitalisation can include:

- software-as-a-service subscription fees
- staff training costs – financial and time
- learning curve effects that mean a delay in realising the full potential (Johnson 2022)
- system migration costs
- time researching the right option.

All these costs suggest that some upfront investment is required in digitalisation.

For decision makers, the payback period is an important metric. The payback period of digitalisation is the time it takes for a business to recover the costs of implementing digital



technologies and processes through increased efficiency, reduced costs or increased revenue. The payback period will vary greatly depending on the extent and type of digitalisation efforts and the industry. In the case of ongoing subscription services and commitments, the payback period is the point at which the ongoing benefits exceed the ongoing costs.

Detailed modelling of the payback period across all the businesses that could adopt various digitalisation technologies is beyond the limitation and resourcing of this project.

The international literature suggests the payback period can be relatively short (1–3 years), depending on the level and complexity of the digitalisation activities.

NZIER modelled the financial effects of digitalisation on a small professional services firm of up to 30 employees. To model the benefits of digitalisation, total revenue was increased based on a multi-factor productivity improvement, which ramped up over 3–5 years. Some studies support this learning; however, studies also commonly find positive productivity effects in the first year (OECD 2019a). The costs of digitalisation were modelled by imposing annual software-as-a-service fees and staff time costs associated with a learning curve. The learning curve has high costs in the first year of adoption, and the costs reduce significantly in years 2 and 3. By year 4, the learning curve has resolved, and there are no learning curve costs.

The results for the scenario modelled show that:

- the payback period for digitalisation can be less than 2–3 years
- profits and taxes were 13–22% after 5 years, depending on how quickly the full productivity improvement could be realised
- learning curve costs can be higher than the software-as-a-service fees.

The finding about learning curve costs is consistent with research into common barriers to adopting cloud-based business tools. Skills deficits are a leading barrier to adoption. For small businesses, the costs of digitalisation could be reduced by hiring staff with existing skills and capabilities. For employees, experience and micro-accreditations in digitalisation and digital tools are a commercial advantage in a competitive labour market.

Digitalisation costs offset revenue and reduce taxes on profits, so they are already tax deductible. Our modelling of a small business indicates that increased taxes from increased revenue due to productivity improvement will exceed the costs of digitalisation after 6–7 years from implementation. Cost is a barrier to digitalisation for business; however, skills shortages and finding time for upskilling staff are often reported as an even greater barrier. To lower the cost of digitalisation, government would need to consider subsidies similar to R&D incentives. Making a case for a subsidy would require compelling evidence of a market or government failure.

4 Reviewing what the top 10 countries do better

A common frame of reference or set of measures is required to assess what works for digitalisation. There are several cross-country comparisons of digitalisation. The IMD World Digital Competitiveness Ranking 2022 was used to identify the top 10 countries in digitalisation (IMD 2022). In 2022, the top 10 countries were:

- Denmark
- USA
- Sweden
- Singapore
- Switzerland
- Netherlands
- Finland
- South Korea
- Hong Kong SAR
- Canada.

In 2022, New Zealand ranked 27th out of 63 countries compared to an overall ranking of 19th in 2018. Compared to other countries, New Zealand's digital competitiveness has fallen behind in the major categories of knowledge, technology and future readiness.

The competitiveness index is composed of 54 sub-measures. The scores for New Zealand were compared to the scores for the top 10 countries. Table 2 shows the top 10 gaps between the high performers by ranking the gap between each country and New Zealand. The table shows the gap ranks according to how often they appear compared to New Zealand. Only categories that appeared five times or more are shown here. If a sub-factor appeared at least five times, it was considered evidence of a consistent gap between practice among the top performers and the status quo in New Zealand. In essence, these gaps have identified the most significant areas for improvement in New Zealand.



Table 2 Major gaps between the top performers and New Zealand

Sub-factor	Frequency of occurrence	Digitalisation framework
Management of cities	10	- Infrastructure and technology - Regulation and policy
Funding for technological development	9	- Infrastructure and technology - Regulation and policy - Skills and capabilities - Attitudes and firm readiness
International experience	8	- Skills and capabilities
Digital/technological skills	8	- Skills and capabilities - Regulation and policy
High-tech grants	8	- Regulation and policy
Development and application of technology	7	- Regulation and policy - Skills and capabilities
Venture capital	7	- Regulation and policy
Employee training	6	- Regulation and policy - Skills and capabilities
Mobile broadband subscribers	5	- Regulation and policy - Skills and capabilities - Attitudes and firm readiness
Immigration laws	5	- Regulation and policy

Source: NZIER analysis

4.1 Urban environments need to be attractive business ecosystems

The management of cities encapsulates all areas within our framework for digitalisation. The first area relates to the infrastructure and technology of the local environment. The second is regulation and policy, which, in the context of city management, relates to the efficiency of the bureaucracy and the ease of doing business.

This measure is based on survey data where business executives were asked to rate whether the management of cities supports business development using an index of 0–10. Such survey ratings are subjective, but they also reflect the perception of executives. The management of cities supports business development through the ease of doing business and the attractiveness of the cities to business leaders, skilled staff and customers. The scale and depth of the digital economy will assist with the momentum of digitalisation and the business networks that contribute to knowledge sharing.

A survey of studies on the factors that attract or deter businesses when they are choosing where to invest in business development include:

- the overall quality and attractiveness of the built and natural environment
- the readiness of digital, physical and transport infrastructure
- city demography that matches the business employee and strategic needs

- flexible labour markets
- perceived viability of existing businesses
- proximity to suppliers and target markets
- the quality of education institutions, healthcare and social services
- a sense of community.

Factors that discourage business development include:

- economic and political instability or uncertainty
- corruption or a lack of transparency in decision-making processes by community leaders
- uncompetitive tax policy
- underinvestment in the development and maintenance of infrastructure
- barriers to spatial planning and the efficient development of shared spaces (Snieska and Zykiene 2015).

In a post-COVID-19 era of remote and hybrid working, New Zealand's cities will need to focus more on being attractive and supportive to businesses to compete in the global digital economy.

4.2 Government funding critical for technological development

Funding for technological development is linked to all parts of the framework for digitalisation. Primarily, funding for technological development is a feature of regulation and policy as the avenue through which government funding is designed and delivered. The level of funding, or the lack of it, filters through to infrastructure, technology, skills, training and firm readiness. Funding plays an important role for the government as an enabler of digitalisation, particularly concerning digital inclusion and equity of access.

New Zealand's score for funding for technology was much lower than the top 10 most digitally competitive countries. New Zealand ranked 45th out of 63 countries for funding for technological development, which seems contrary to New Zealand businesses' and consumers' potential to use digitalisation to overcome the tyranny of distance due to being in the South Pacific Ocean.

This measure focuses on whether funding for technological development is readily available from government or private investors. For most businesses in New Zealand, the capital needed for digitalisation will be available through banking and financial institutions. However, funding for technological innovation in New Zealand is limited, and R&D markets are thin. Budget 2022 provided an additional \$20 million over 4 years towards two key initiatives in the Digital Technologies Industry Transformation Plan. Those initiatives are funding the development of software-as-a-service applications and government-led marketing campaigns to promote our digital technology industry (Clark 2022).

International evidence suggests that funding from government and funding from private sources are complementary rather than substitutes (Branscomb and Auerswald 2002). Government funding for technological development is important in the early-stage development of technology. As such, government funding for technological development



contributes to the growth of the ecosystem that underpins the digital economy and influences attitudes and firm readiness for digitalisation.

4.3 Cultivating opportunities for international experience

International experience in the IMD survey is measured by surveying senior business managers. International experience contributes to the knowledge and skills of business leaders through familiarity and understanding of potential solutions. The cross-pollination of knowledge and ideas will also be empowering for business leaders.

International experience is undoubtedly beneficial for a business leader in general. The way it translates into digitalisation in New Zealand is more nuanced. The benefits of international experience for New Zealand critically depend on attracting citizens and international talent to New Zealand. This is a general challenge for New Zealand and many other countries. Attracting talent to New Zealand involves being internationally competitive in labour markets, wages, lifestyle, environment and affordability.

The specificity of international experience to the issues in the New Zealand arena will be important to supporting local innovation and digital transformation. International experience among SMEs only improves business and economic performance if the experience is relevant and deployable in the local market (Camisón and Villar-lópez 2010). The right experience matters.

4.4 Digital technology skills are a key barrier

Skills gaps have been recognised as a barrier to digitalisation among small businesses (Deloitte 2018; Deloitte Access Economics 2019). A lack of knowledge, skills and capabilities in New Zealand's labour force will impede the speed of adoption of digital tools at all levels of business. Small businesses compete with large organisations to attract skilled staff. Larger organisations have deeper pockets, allowing them to offer higher wages on a case-by-case basis. Larger organisations can attract more talent too, which can be important for employees who are attracted to organisations because they want to work with the talented team already part of the organisation.

The pace of digital transformation can be rapid. This requires a small business to adapt quickly and learn new systems, technology and skills to take advantage of the benefits of digitalisation. Small business leaders also face considerable time constraints and competing needs for their attention. A major barrier to the uptake of digital tools among small businesses is the time required to understand how digital tools could fit in with each unique business. Small businesses then need to have the capacity for skills and knowledge development needed to adapt and use digital tools.

Addressing this needs a policy that assists businesses to upskill and engage in continuous learning. Many countries have implemented digital transformation assistance programmes targeting small businesses. Those programmes often include:

- financial grants or incentives for approved tools
- subsidised micro-accreditation for training and development to lower the barriers to upskilling and continuous learning
- facilitated business networks and showcases to support leaders in sharing lessons and experiences (OECD 2013; 2021a; 2021b).



The government also has a fundamental role in developing a labour force that finishes education with knowledge, skills and the ability to engage in continuous learning.

4.5 High-tech grants that lead to patents

New Zealand lags behind the top 10 countries in the commercialisation of the development of digital technology, and this is not necessarily a bad outcome. With its large proportion of SMEs, New Zealand is more likely to be a technology adopter rather than the originator of new digital technology.

Even so, policymakers should review the settings that assist and encourage digital technology to be developed locally. The setting and incentives influence the attraction, development and retention of talent in digital technology. Leading innovators that can commercialise the technology successfully tend to attract more talent to New Zealand. Such attractive forces contribute to the cross-pollination of ideas and the development of localised digital technology ecosystems. These ecosystems have benefits that contribute to the attractiveness, vibrancy and economic performance of urban environments.

4.6 Development and application of technology

New Zealand ranked lower in the survey for how supportive the regulatory environment is for developing and applying technology. These scores are subjective but point to the need for New Zealand to take two actions:

- Review the competitiveness of its regulatory and policy framework to evaluate whether they remain fit for purpose and competitive in the context of global digital transformation.
- Promote New Zealand's regulatory and policy framework locally and abroad to contribute to attracting, developing and retaining talent in New Zealand's digital and technology industries.

4.7 Venture capital

Venture capital is an important funding source for digital technology development and entrepreneurship. The main benefits of venture capital for development and entrepreneurship are:

- resourcing start-ups to scale up development and activity to achieve market awareness and increased market penetration
- being a complementary source of funding alongside business loans, which lifts the overall level of funding in the tech sector.

Venture capital investors are interested in high returns from their investment and understand that they may need to take more risk to achieve higher returns. They are more open to investing in innovation and entrepreneurial organisations than the typical bank. Venture capital is more often associated with disruptive developments.

In the context of digitalisation and the digital economy, venture capital contributes to the overall ecosystem by supporting innovation, assisting talent and promoting entrepreneurship. It is part of the energy in the digital economy. For small businesses looking to digitalise, venture capital has an indirect effect. Small businesses are more likely



to use products that evolve from digital technology developers rather than small businesses being the direct users of venture capital.

This means governments need to be clear about the objectives and to design policies specific to what they want to achieve. Policies that encourage the expansion of venture capital in New Zealand's digital economy will enhance New Zealand's digital competitiveness and the vibrancy of the digital ecosystem but may not directly encourage digitalisation among some businesses. Increasing digitalisation among small businesses requires lowering the barriers. These barriers include financial constraints, skills gaps, attitudes and awareness.

4.8 Employee training is a high priority

Employee training is an important pathway to digitalisation and operating an increasingly digitalised economy. Training and business policies associated with employee training set the stage for continuous learning. Organisational culture needs to set the tone for continuous learning. Employees need to see that training is a clear priority in their organisation and that prioritisation is backed by funding and the personalisation of formal training plans. Skills gaps are frequently reported as a barrier to digitalisation among small businesses. Overcoming this barrier will require:

- active investigation into the skills gaps
- identification of pathways and options for skills acquisition
- resourcing the training, which will require an investment of paid time and financial expense.

Governments and industry associations can also play a key role in supporting employee training through:

- identifying pathways for skills acquisition to lower the barriers associated with researching the right training options
- subsidising courses to reduce the cost barriers for small businesses
- regulating the accreditation of training courses and pathways to lower risk and uncertainty barriers, which will also include a contribution to the creation and enforcement of quality standards
- designing core education curriculums that mean school leavers can engage in lifelong learning and digital participation
- promoting digital inclusion among communities that are more at risk of digital exclusion.

4.9 Mobile broadband penetration rates

IMD measured the mobile broadband penetration rates based on total active mobile 4G and 5G subscriptions, excluding broadband connections on dedicated data SIM cards or USB dongles. Data is given as a percentage of the total mobile market. In the digital economy, mobile broadband penetration rates measure access to high-speed technology. Such technology is the backbone infrastructure that supports the productivity and access benefits of digitalisation.



In the context of small business digitalisation in New Zealand, this measure will likely reflect lower awareness and readiness for the digital economy and the digitalisation journey. In the IMD rankings, New Zealand ranked 26th out of 63 countries in 2022, while in 2018, New Zealand ranked 18th. Future readiness comprises three composite measures: adaptive attitudes, business agility and IT integration. In 2022, New Zealand ranked 18th for adaptive attitudes. The ranking was dragged down by a ranking of 35th for smartphone possession. For business agility, New Zealand ranked 49th, which indicates that New Zealand's business agility in digital competitiveness is in the bottom half of the countries assessed. Major factors that led to a low ranking for business agility included:

- low level of automation and robotics
- a lack of agility in companies
- lower levels of knowledge transfer
- lower use of big data and analytics.

For IT integration, New Zealand ranked 27th in 2022. The measures that contributed to this sub-component were high and low scores. For example, New Zealand ranked second for software piracy and eighth for e-government. New Zealand is quite competitive in these areas. But for cyber security and public-private partnerships, it ranked 54th and 58th, respectively. These rankings suggest that businesses and consumers are vulnerable to cyber attacks. There are also likely to be economic benefits from the collaboration between business and government through public-private partnerships.

4.10 Immigration reform is needed to make New Zealand more attractive

Improvements to immigration laws will help to attract and retain international talent in the digital labour market. This means New Zealand could gain knowledge transfers and the cross-pollination of ideas that can come from immigrants. This accelerates the pace of digitalisation and reduces the skilled labour shortage. The government has a lead role in ensuring that New Zealand's immigration law settings support the competitiveness of the New Zealand economy. For the digital economy, this means creating immigration pathways that attract and retain skilled people. These people will provide benefits such as:

- filling skills shortages
- knowledge transfer within businesses and industry networks
- contributing to the vibrancy, depth and capability level of the economy.

NZ Tech (2021) made the following recommendations to improve the attractiveness of tech sector immigration:

- Immigration policy should be better integrated and coordinated with the government's education and industry workforce planning policies to ensure that the government is taking a holistic approach to the supply of labour in the future.
- Immigration policy should be simple, clearly signalled, permissive, progressive and designed to support the attraction of talent.
- Immigration policy should signal that New Zealand is open for business and wishes to attract the world's best talent, in particular globally scarce digital, tech and entrepreneurial talent.



5 Addressing the barriers to SME digitalisation

Digitalisation among SMEs throughout OECD member countries lags behind larger enterprises. The barriers to digitalisation that SMEs in the OECD face include:

- information and awareness
- internal skills gaps
- capital constraints for digitalisation
- a lack of readiness in terms of technology and organisational practice (OECD 2019c).

This short list of barriers covers a wide range of themes that suggests overcoming the impediments to going digital will require a systematic approach from business leaders. The effort and complexity of change may be most difficult for small businesses with low numbers of employees and limited capital reserves.

Other research (Deloitte 2018; Deloitte Access Economics 2019) reinforces the complexity of barriers to adopting more digital technology. Findings in studies of barriers to the uptake of cloud-based business tools in Australia and the US by businesses include:

- the time required to understand how it could fit in with each unique business
- skills and knowledge development are needed to adapt and use cloud-based tools
- concerns about the security and privacy of information in the cloud
- infrastructure and networks need to have access anywhere and at any time
- costs of cloud-based tools and changing to new systems.

Behaviour and thinking among SME leaders matter for adoption too

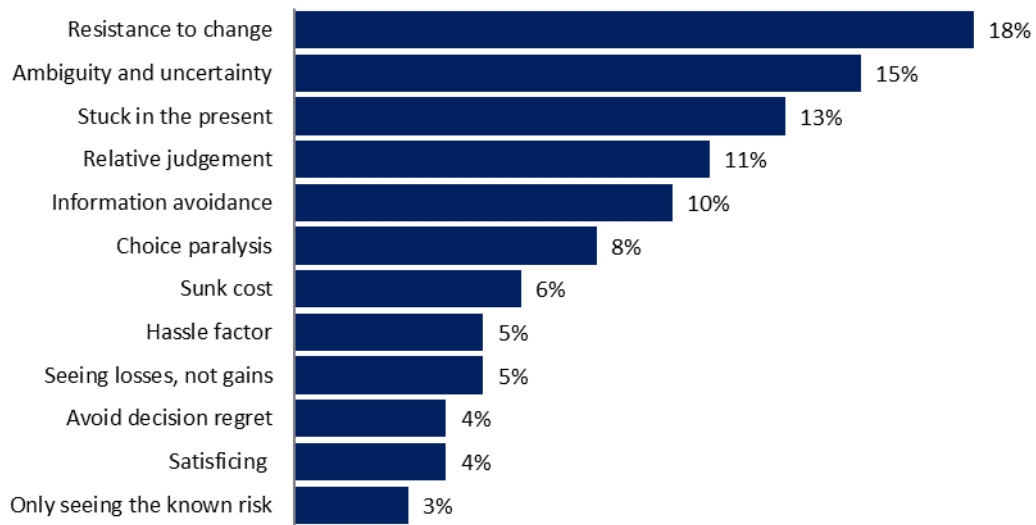
Xero published research into the behavioural barriers to digitalisation. Behavioural barriers are beliefs, motivations and perceptions that cause small business leaders to be reluctant about technology adoption. Xero found that there are 12 hurdles a small business must overcome to go digital (Xero 2021).

Figure 2 shows the relative impact of those barriers. These results indicate that resistance to change impacts technology adoption, which is three times the impact of sunk costs. Sunk costs are barriers to SME technology adoption and digitalisation because SMEs have already invested in the solutions they are currently using and wouldn't want this time, effort and money to go to waste by adopting a new approach.



Figure 2 Relative impact of barriers to technology adoption among SMEs

The relative impact of behavioural barriers



Source: Xero (2021)

The main behavioural barriers reported among businesses in New Zealand with fewer than 20 employees were:

- avoid decision regret
- seeing losses, not gains
- resistance to change
- relative judgement
- choice paralysis.

The main behavioural barriers reported among all businesses surveyed in New Zealand were:

- avoid decision regret
- seeing losses, not gains
- sunk costs
- relative judgement
- stuck in the present.

These businesses will need active and specific support to overcome uncertainties and concerns that they might be doing the wrong thing for their business.

5.1 The OECD recommends active assistance programmes

Some OECD countries have implemented government-funded technology support and assistance programmes to actively assist SME digitalisation. The OECD has published various studies into digitalisation, including the policy guidelines for supporting SMEs to go digital.



Table 3 shows the OECD’s recommended strategic policies to encourage SME digitalisation.

Table 3 Strategic government policies to encourage SME digitalisation

Strategy	Implementation
Focus on SMEs	Encourage upskilling for staff and management through recommended training pathways and cost incentives
	Build the data culture of SMEs through awareness campaigns, financial support and technical assistance
	Raise the profile of cyber security and privacy management
Lower barriers to digitalisation	Promote solutions that lower the transactions costs of digital and participating in the digital economy, e.g. mobile banking costs
	Encourage digital innovation as a source of digital tools that progressively lower costs through financial incentives for digital R&D
	Support SME knowledge-sharing networks, collaborative programmes and centres of excellence
	Provide SME open-access technology and research on digitalisation
Create a business environment that supports SME digital transformation	Set a supportive regulatory framework that sets standards on intellectual property rights, data privacy and enforcement of digital regulation
	Promote e-government and e-services for SMEs
	Develop high-quality digital infrastructure networks
Promoting a whole-of-government approach	Develop strategic action plans with coordinated actions
	Manage the governance of emerging policy areas such as artificial intelligence or blockchain
	Facilitate collaborative and advisory groups

Source: OECD (2021b)

The Digital Boost programme (New Zealand Government 2021) and the Digital Technologies Industry Transformation Plan (New Zealand Government 2022) are good starts on the journey to greater digitalisation, but it is the bare minimum of what is needed. Other countries have approaches that offer far more targeted support, training and financial assistance.

5.2 Singapore’s Go Digital Programme

The Singapore Government has developed and implemented a comprehensive programme to encourage the digitalisation of its economy (Infocomm Media Development Authority 2023). The programme includes assistance for SMEs, pathways for vendors to become pre-approved providers of digital solutions and a standardised way for the private sector to approach the government about public-private partnerships.

The programme includes the following sources of assistance for SMEs:

- A chief technology officer-as-a-service – a self-help platform that allows businesses to identify their digitalisation needs, access market-proven solutions and engage digital consultants for customised advice and project management services.



- Industry-specific digital plans that include solutions for each stage of a business's growth with a step-by-step guide for adopting digital technology to increase growth and productivity.
- A foundation plan that offers competitively priced digital solutions for the foundation of digitalisation.
- Pre-approved solutions for digitalisation supported through the government's Productivity Solutions Grant.
- Established business-to-business and business-to-consumer networks to support digital access to suppliers and consumers globally without a physical presence outside of Singapore.
- An advancement programme to build depth and resilience in digital activities.
- A nationwide e-invoicing system that digitalises invoicing for all participants.

The programme also includes features designed to support vendors of digital solutions as major providers for realising the benefits of digitalisation. The plan features for vendors include a standardised process to apply to be recognised as a pre-approved digital solution. The benefits for vendors are that pre-approved solutions are assessed by the Infocomm Media Development Authority to be effective, market tested and cost-effective. They may be eligible to be considered for various types of government incentive support.

There is also an established process for businesses interested in public-private partnerships for supporting digitalisation efforts. The three benefits of digitalisation of this prescribed pathway are:

- lowering the barriers to public-private partnership
- ensuring standardisation for government and business
- removing uncertainty about engaging in the process of discussing potential partnerships.

New Zealand would benefit from adopting such a well-developed and integrated approach to digitalisation.

5.3 How Denmark became a digital frontrunner

The Danish Government is investing DKK2 billion (NZD470 million) in the digital society over 5 years, with the ambition of strengthening common Danish welfare, accelerating the green transition and increasing growth, talent and exports through digitalisation (Ministry of Foreign Affairs Denmark 2022). Denmark has a population of 5.9 million, which is similar to the population of New Zealand. If New Zealand was to invest the same amount on a per capita basis, the investment would be \$410 million over 5 years.

Denmark ranked first out of 63 countries in the IMD World Digital Competitiveness Ranking 2022 (IMD 2022). Denmark embarked on a national plan to become a highly digitalised country 20 years ago. It has been investing in the digitalisation of businesses and consumers consistently since then.

From the outset, Denmark recognised that getting buy-in from the public and uptake of digital technology among businesses required the government to invest in four key areas:

- digital literacy at all levels of society



- digital infrastructure to ensure access and productivity
- trust and security to maintain digital privacy and participation
- a digital public service (Digital Hub Denmark 2018).

The joint focus on building trust and growing digital literacy is a foundation for an inclusive digital future in Denmark, independent of industry features or nuances. It has contributed to a basic level of understanding and engagement, making it a world leader. This is an important lesson about how to develop digital transformation in an inclusive fashion.

The key features of the Singaporean and Danish approaches are their strong strategic policy objectives and detailed implementation plans. The plans move beyond a wish list of what they would like to happen, and they include systems of support and active resourcing of digitalisation on multiple levels.

A lot of planning and investment was put into driving digitalisation in Denmark. For example, several initiatives were put in place, including the Strategy for Denmark's Digital Growth (The Danish Government 2018), aimed explicitly at active support of SMEs in Denmark:

- Grants for private consultancy in order to clarify and develop a company's digital opportunities, prepare business cases for digital transformation and effectively implement newly acquired digital solutions.
- Sparring between smaller digital SMEs and more advanced digital SMEs. SMEs were invited to participate in small sparring groups (2–5 peer companies) in which the challenges of transformation and the use of consultants were discussed to provide more long-term value.
- Strengthening the skills of business leaders via mentoring schemes, continuing education, identification of skills needed in the company and networking for business leaders.
- Grants to buy private consultancy regarding design to use digital technology to improve Danish design.

This level of active assistance is similar to the approach taken by Singapore. It focuses on partnering with SMEs to actively coach them through all stages of digitalisation from the first steps to advanced digitalisation. The cost barriers to digitalisation were addressed through the strategy rather than hoping that SMEs can simply access enough finance in general and specifically that finance will be lent for digitalisation.



6 Bringing it all together

IMD's assessment of New Zealand's digital competition revealed a mixed ranking. In some areas – such as the ease of starting a business, software piracy and e-participation – New Zealand ranked in the top 10 countries evaluated. However, New Zealand has some major weaknesses, including:

- adjustment required to immigration settings to attract and retain skilled digital workers
- lack of investment and prioritisation of staff training
- city management that lags behind the top countries in digitalisation
- low rankings on cyber security
- fewer public-private partnerships
- fewer pathways for investment in the digital economy and digitalisation.

6.1 What's needed for digitalisation in New Zealand

Other countries are well ahead of New Zealand on digitalisation. There are lessons to learn from them and steps to take to increase the rate of digitalisation.

Denmark is at the forefront of digitalisation. Its four-part approach sets a clear roadmap on what is required to be in the top 10 countries for digitalisation. The four themes that New Zealand should focus on are:

- digital literacy at all levels of society
- digital infrastructure to ensure access and productivity
- trust and security to maintain digital privacy and participation
- an integrated digital public service.

Denmark's approach took a long view and set the foundation for long-term success.

Singapore's approach offers a leading example of how to actively support digitalisation among SMEs. Singapore's digitalisation assistance programme includes the following features New Zealand can adopt:

- A chief technology officer-as-a-service – is a self-help platform that allows businesses to identify their digitalisation needs, access market-proven solutions and engage digital consultants for customised advice and project management services.
- Industry-specific step-by-step guides.
- A foundation plan that offers competitively priced digital solutions.
- Pre-approved solutions for digitalisation are supported through a government Productivity Solutions Grant.
- An advancement programme to build depth and resilience in digital activities

Bringing it all together shows what action should be taken in each of the four digitalisation framework components. These actions are multi-faceted. They draw on the approaches of world leaders in digitalisation and incorporate the recommendations of the OECD on



assisting SMEs in digitalising. They are also informed by the biggest gaps between New Zealand and the top 10 countries for digital competitiveness.

Table 4 provides an overview of the actions that can support improving the rate of digitalisation in New Zealand and where they sit in our framework for investigating digitalisation.

New Zealand has some basic foundations for improving digitalisation. Now it needs to build depth.

In the short term, this means:

- developing a New Zealand Productivity Solutions Grant and foundation plan for setting out the road for successful digitalisation of small businesses in a range of industries
- establishing a chief technology officer-as-a-service to allow businesses to identify needs, access market-proven solutions and engage digital consultants for customised advice and industry-specific step-by-step guides
- developing an integrated digital public service system to enhance productivity and trust among users.

Taking a long-term view, New Zealand also needs to do:

- actively invest in digital literacy at all levels of society
- promote and subsidise the acquisition of digital skills as part of continuous learning in the workforce and education
- review the level of investment and regulatory frameworks of government research and development of digital technology
- improve the competitiveness of tech sector immigration policy
- continue to invest in digital and urban infrastructure while also improving the efficiency of local and central government to enhance the productivity and attractiveness of cities for digital business leaders.



Table 4 What works for digitalisation

Action	Regulation and policy	Skills and capabilities	Attitudes and firm readiness	Infrastructure and technology	Timing	Priority	Actions for government
Encourage upskilling for staff and management through recommended training pathways and cost incentives	✓	✓	✓		Immediate	High	Develop industry-specific training pathways for digitalisation Assess and recommend specific training solutions Provide financial assistance for professional development
Invest in developing digital literacy	✓	✓	✓		Immediate	High	Embed digital literacy in core education Provide community-based training for adults
Raise the profile of cyber security and privacy management	✓		✓	✓	Immediate	High	Demonstrate good practice Assess and identify the needs of small business
Support SME knowledge-sharing networks, collaborative programmes and centres of excellence	✓	✓	✓	✓	Immediate	High	Lower behavioural barriers to digitalisation by facilitating SME networks
Facilitate collaborative and advisory groups	✓	✓	✓		Immediate	High	Follow Singapore's example of providing access to low-cost advisor services on digitalisation for small business
Promote solutions that lower the transactions costs of digital and participating in the digital economy, e.g. mobile banking costs	✓			✓	Immediate	Medium	Identify lower-cost solutions to lower behavioural barriers
Encourage digital innovation as a source of digital tools that progressively lower costs through financial incentives for digital R&D	✓	✓		✓	Immediate	Medium	Investment in digital innovation and a digital innovation strategy
Provide SME open-access technology and research on digitalisation	✓	✓	✓	✓	Ongoing	High	Facilitate open-access solutions via digital R&D funding



Action	Regulation and policy	Skills and capabilities	Attitudes and firm readiness	Infrastructure and technology	Timing	Priority	Actions for government
Reform immigration law to attract and retain skilled people	✓	✓			Ongoing	High	Develop efficient pathways for skilled labour from abroad to arrive and stay
Promote e-government and e-services for SMEs	✓	✓			Ongoing	Medium	Digital leadership from all of government
Develop high-quality digital infrastructure networks	✓	✓	✓		Ongoing	Medium	Assess, identify and fund future digital infrastructure needs
Develop strategic action plans with coordinated actions	✓				Ongoing	Medium	Develop a digitalisation plan that actively seeks to invest in digitalisation and lower the barriers to digitalisation
Manage the governance of emerging policy areas such as artificial intelligence or blockchain	✓				Ongoing	Medium	Facilitate multi-lateral collaboration between research, business and government to identify future governance needs

Source: NZIER



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