Microsoft submission to the New Zealand Productivity Commission

Inquiry into technological change and the future of work

1. INTRODUCTION

Microsoft welcomes the opportunity to submit to the New Zealand Productivity Commission's (the Commission's) Inquiry into technological change and the future of work. We thank the Commission for granting us an extension in order to make a substantial submission on this important report.

At Microsoft, our mission is to empower every person and every organisation on the planet to achieve more. To fulfil this mission, Microsoft develops, manufactures, licenses and supports a wide range of technology products and offerings, including computing devices, software programs and services.

This submission aims to provide the Commission with context about how Microsoft understands technology, in particular Artificial Intelligence (AI) and automation, could impact jobs and skills in New Zealand. At Microsoft, we think of AI as a set of technologies that enable computers to perceive, learn, reason and assist in decision-making to solve problems in ways that are like what people do. With these capabilities, how computers understand and interact with the world is beginning to feel far more natural and responsive than in the past, when computers could only follow pre-programmed routines.

This submission will also offer some thoughts as to how government and business can maximise the benefits that come from technological change and mitigate the expected impact. Depending on the nature and automatability of tasks, job displacement could also vary greatly across sectors.

Taking into account the research and insights available to Microsoft,[1] we believe that in some industries there will be new jobs and possibly even more jobs, however there is no doubt that many industries will be affected by the increase in automation and possibly have fewer jobs overall. The overwhelming view is that tasks within jobs will change with many tasks being eliminated through automation. Because of this, there is a significant emphasis that needs to be placed on worker retraining and reskilling, education fit for future jobs and tasks within jobs, ensuring digital inclusion and equality, and that technological change supports wellbeing.

2. SUMMARY OF KEY POINTS

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[1] Microsoft-IDC survey in 2018 for New Zealand; Microsoft (2018), *The future computed*; Microsoft-IDC APAC AI survey (2018)

New technologies will have far-reaching effects on New Zealand's economy. It has been estimated that AI has the potential to increase New Zealand's GDP by up $54 billion by 2035, with the range of enhanced labour productivity benefits in the professional, scientific and technical services sectors projected to be between $2.2 billion and $5 billion.[2]

However, existing literature on the implications of AI on jobs and skills in New Zealand presents a mixed picture. While business leaders and governments appear to be positive about the benefits AI could bring to advancing productivity at work, there is also general concern about potential job displacement. Estimates of the impact on jobs and skills also appear to vary across different studies.

While the job displacement risks of AI in New Zealand are real, technology has the potential to create many new jobs within sectors. Current job displacement estimates for the country range widely from 16% to 46%, depending on the approach and assumptions used in the study. Depending on the nature and automatability of tasks, job displacement could also vary greatly across sectors, from 6% in education to 36% in manufacturing. At the same time, AI has the potential to create new jobs through three key channels: directly in the technology sector to support AI development, indirectly in other sectors to support its adoption, as well as at the broad economy level through wider income effects. While digital skills will continue to be critical in the future, 'soft skills' such as interpersonal and creativity skills will be critical for New Zealanders in the AI age. AI could also boost workforce participation rates through job-matching platforms, tools that enhance the employability of disenfranchised groups and by creating opportunities for new flexible forms of labour.

Technology has the potential to increase work quality and incomes, and with adequate reskilling and transition programmes, these benefits can extend to all workers. Studies reflect that AI could allow the country to reap substantial employee productivity gains of almost 40% in just two years. This overall productivity impact, together with a shift to higher-order tasks and potential switches to new AI-supporting roles, could enable income rises for some workers. However, adequate worker retraining will be required to facilitate job transitions for workers who could otherwise be displaced. By removing the most mundane and dangerous parts of jobs, AI also presents intangible benefits for workplace safety and job satisfaction.

Microsoft has analysed the best practice approaches and lessons learnt across its broad global network, including Asia Pacific, to develop possible interventions for AI in New Zealand. The agenda is split into three broad areas of focus with eight actions. Where possible, we have provided examples or case studies where the action is already being undertaken.

3. TECHNOLOGY AND THE LABOUR MARKET

Technology change and disruption has the potential to impact overall employment in New Zealand. Whilst there will be job losses, and we acknowledge the impact on affected individuals will be negative, we think that the overall impact should be put into context.

Technological disruption will not lead to mass unemployment in New Zealand across all sectors.

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[2] AI Forum report (2018), *Artificial Intelligence: Shaping a Future New Zealand*

Current job displacement estimates for New Zealand range from 16% to 46% in different studies, depending on the approach and assumptions used. The NZ Institute of Economic Research analysed automatability of different occupations and assumed identical task structures for each occupation.[3] They concluded that 46% of jobs will be displaced by automation over the next few decades.

In comparison, PricewaterhouseCoopers (PwC) analysed automatability of tasks within jobs.[4] Jobs were deemed to be at high risk of automation if they are 70% or more automatable in task. PwC determined that 24% of jobs were at high risk of automation by the mid-2030.

Finally, an online survey of 410 workers in New Zealand by Hays Recruitment asked respondents whether their job responsibilities today have been "significantly" impacted by automation, with their roles "changing completely" or "becoming redundant".[5] 16% of jobs were stated to be already at risk today.

Job displacement could also vary greatly across sectors, ranging from 6% in education to 36% in manufacturing. Two studies, one by the AI Forum for New Zealand[6] and the other by PwC,[7] both in 2018, showed that sectors with a higher degree of human interaction (e.g. education, healthcare) face lower displacement risk than sectors with more routine and repetitive tasks (e.g. manufacturing and retail).

While these studies paint a picture of displacement, these should be placed into careful context. There are also studies completed which outline the job creation from technological disruption. Technology is predicted to create significant job creation, and more higher value jobs. Historical waves of technological disruptions in New Zealand reflect an adaptable labour market that adjusted to these waves without incurring mass job losses. On average, the skills a New Zealander is trained for in one job is transferable to 12 other jobs.[8] This indicates existing resilience to displacement risks. It also demonstrates the importance of retraining and upskilling to make the most of these potential new opportunities to minimise job displacement.

Technological disruption will create new jobs, not all of which will be in digital.

A Microsoft-IDC survey in 2018 showed that only 7% of workers in New Zealand believed AI could create new jobs. In fact, new technologies could create new jobs through three channels: directly within the effected sector (direct effect); indirectly in other related sectors (spillover effect); and at the broad economy level (income effect).

Direct effect (in the tech sector): people will be required to create, maintain and improve technologies. ICT jobs in New Zealand have been growing at about 4% a year over the past ten years – 3 times faster than employment as a whole.[9]

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[3] NZIER (2015), *Disruptive technologies risks & opportunities – Can New Zealand make the most of them?*
[4] PWC (2018), *Will robots really steal our jobs? An international analysis of the potential long-term impact of automation*
[5] Hays Recruiting (2019), https://www.hays.net.nz/press-releases/HAYS_2026113
[6] AI Forum for New Zealand (2018), *Artificial Intelligence: Shaping a Future New Zealand*
[7] PWC (2018)
[8] AlphaBeta and NZ Tertiary Education Commission (2018), *Hidden links New Opportunities*
[9] AI Forum for New Zealand (2018)

Spillover effect (in related sectors): new jobs that do not exist today will require people to do them. These jobs will involve supporting the adoption of technology in situations where it does not completely replace humans. It is challenging to predict the new jobs that could arise in New Zealand, but other APAC countries such as India have observed that jobs experiencing the fastest growth over the past decade were those supporting the deployment of automation technologies. One example is the growth in Computer Numerically Controlled Operators and Programmers, highly specialised individuals who handle computer-programmed machinery that perform a wide variety of functions, such as drilling, cutting, or shaping materials.

Income effect (economy-wide): people will be required in jobs that produce the higher level of goods and services that will be demanded in an economy where technology-enabled productivity gains have led to increased incomes as a result of higher output per hour worked. While there has been no study specifically for New Zealand, studies across Asia, particularly in China, have projected these increased income effects that could more than offset displacement effects to create net job gains (12% net increase by 2037 for China).

Studies also challenge the view that any new job growth will be digital-only. A World Economic Forum report in 2018 showed that jobs directly created by new technology could account for less than a fifth of future 'in-demand' positions. Comparatively, 60% of future positions could be jobs involving interpersonal, creative or strategic decision-making tasks, for example customer service workers.[10] In 2016, Microsoft announced is 'human-in-the-loop' product offering in partnership with CrowdFlower. At a high level, human-in-the-loop allows businesses to benefit from both the efficiency of machine-learning as well as the quality of human judgements – machines can automate a majority of the work, while humans can come to assist when the machine is uncertain. These types of end-to-end human-in-the-loop solutions can be very effective and demonstrates that jobs will still exist.

While digital and programming skills will continue to be important in the future, 'soft skills' such as social, emotional and higher cognitive skills will still be crucial for New Zealanders. 54% of New Zealand business leaders identified critical thinking and decision making as being important skills to have over the next three years, with other desirable skills including adaptability and continuous learning (41%) leadership and managing others (41%), and communication and negotiation skills (40%).[11]

New technologies could potentially increase workforce participation by disenfranchised groups.

Findings across Asia show that AI-enabled job matching platforms could generate greater workforce participation that could account for over 60% of their projected GDP impact.[12] Instead of reducing workforce participation, AI-enabled work tools and applications could bring about the greater inclusion of disenfranchised groups in the workforce.

Currently, inclusion of disenfranchised groups in the New Zealand workforce is relatively low. On average, disabled people in New Zealand are three times less likely than non-disabled people to be employed; they are also more likely to work part-time.[13] AI-enabled universal access tools can help make both the classroom and workplace accessible to people with disabilities. Examples include

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[10] World Economic Forum (2018), *Future of jobs 2018 report*
[11] Microsoft-IDC survey (2018)
[12] McKinsey Global Institute (2015), *Connecting talent with opportunity in the digital age*
[13] Statistics New Zealand (2018), *Labour market summary by disability status*

speech recognition typing tools for people with impaired vision, and real-time subtitles for people with impaired hearing.

Youth from low-income families or rural locations do not get the same level of access to digital education as others. In 2018, one in eight young people aged under 25 in New Zealand was not earning or learning. AI-enabled personalised learning assistants can simplify learning by making tutoring services and learning materials accessible to all students, regardless of where they are located, provided they have adequate broadband access.

People who have not been employed for some time face difficulty in accessing job opportunities. Nearly half of people in New Zealand's jobless households have not worked in more than two years, suggesting a pattern of entrenchment in joblessness.[14] Natural language processing AI technology can allow at-risk individuals to access free or affordable online digital skills courses from anywhere in the world and in any language.

The possibilities for a more inclusive future workforce are positive. A survey of employers in the Asia-Pacific region suggests technological developments will offer more opportunities for new flexible forms of labour that could help increase overall workforce participation rates. Up to over 60% and 50% of employers in the East Asia and Pacific region, including New Zealand, are "very likely" to hire temporary staff and freelancers respectively to address skill gaps.[15]

Consideration must be given to Government regulation that's fit for purpose to ensure this flexible labour force are not exploited through the 'gig economy' or increasingly task based work. This means ensuring this flexible employment is not subject to discrimination or unfair work practices around wages and benefits.

Increased demand for such flexible forms of labour can help include currently excluded groups in the workforce, such as parents seeking re-employment on flexible terms that allow them to have work-life balance, workers who live in areas with traditionally limited job opportunities, or retirees seeking short-term employment.

4. LABOUR MARKET POLICIES AND INSTITUTIONS

Wages and income

There is a perception that worker wages will decline as more work tasks become displaced by technology. While there is a potential for wages to be reduced through the displacement effect, there are three other channels through which technology could cause wages to rise: the productivity effect; shifts to higher-value tasks; and switches to new technology-supporting jobs.

Productivity effect: technology could improve the productivity of workers and boost the quality of their work, allowing them to command higher wages in the labour market. The Commission itself has demonstrated that wages have tended to follow productivity increases. Over the period 2000-2008, a 1.5% rise in labour productivity growth led to an equivalent increase in real wages paid by firms.[16]

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[14] Statistics New Zealand (2017), Jobless households in New Zealand June 2017 quarter
[15] World Economic Forum (2018), *Future of jobs report 2018*
[16] Productivity Commission Working Paper 2015/1, *Who benefits from productivity growth? The labour income share in New Zealand* (2015)

Shifts to higher-order tasks: by taking care of repetitive and routine tasks, technology frees up more time for workers to perform higher-order tasks, allowing them to command higher wages. Surveys reflect that New Zealand workers who can perform cognitive, non-routine tasks command higher wages due to the growing need to add value to what computers can do in a digitalising era.

Switches to new technology-supporting jobs: completely new jobs that arise to support the deployment of new technology across different sectors typically have a wage premium attached to them due to shortage of the requisite skills in the labour market. A 2018 study of salaries in New Zealand found that increasing demand for digital skills – particularly in machine learning – has driven up the median base salary for digital professionals across a variety of sectors (e.g. financial services, construction, public administration) by 13% in just over six months. If we can retrain current workers and prepare our future workforce to be able to take up these positions, we are well-placed as a society to reap the benefits of such new technologies.

It has been found that displaced workers in New Zealand incur larger earning losses relative to other countries, as most of them do not qualify for the unemployment benefit while retraining for re-employment. Adequate retraining to aid job transitions will be critical to reduce potential increases in income inequality. An Australian study showed that retraining 75% of displaced workers could reduce future increases in income inequality, from 27% to 11%.[17]

Displacement

One of the biggest challenges for the workforce as a result of implementation of technology will be in human displacement. Job losses are more likely to be in rural and regional parts of the country with new jobs likely to be created in the main cities. The social impact of displacing people from their homes, their families, their social networks would have an enormous impact on the nation's wellbeing. This makes retraining a significant challenge - can you retrain workers to do new jobs that will exist in the places they live, especially in regional areas?

We are encouraged by the initiatives being undertaken by the New Zealand government to address the potential issues of displacement created by new technology adoption, including:

- Regional Growth Fund to drive innovation, growth, skills and enterprise away from the main centres.
- The Just Transition programme to transition regional economies to modern, high-value economy based on the skills, enterprise and knowledge of the regional people.
- The Future of Work Tripartite Forum with a focus on business, workers and government working on the areas of Just Transition, learning for life, technology and workplace productivity.
- The establishment of the Prime Minister's Business Advisory Council to harness the expertise of the private sector to inform government policy in the areas of skills, investment, infrastructure, sustainability and regional development.
- The Review of Vocational Training and Education focus on creating a system of training and skills that is more flexible and agile, to get people with the right skills into the right jobs – especially in regional New Zealand.
- The establishment of a Future of Work unit within the Ministry of Business, Innovation and Employment (MBIE).

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[17] AlphaBeta (2017), *The automation advantage*

5. EDUCATION AND SKILLS SUPPLY

Education about the right skills and associated job opportunities are crucial for creating awareness around reskilling needs.

To fully harness the potential benefits of technology for jobs and work in New Zealand, we must address the challenges the country faces. These challenges include a highly varied technology adoption landscape across organisations, inadequate levels of business investment in reskilling, an emphasis on 'qualifications' rather than 'skills', risks faced by disenfranchised groups, and inadequate social protection measures for flexible workers.

Governments and businesses could stimulate greater technology adoption and worker reskilling efforts by promoting a shift in emphasis from 'qualifications' to 'skills' in educational curriculums and building inclusiveness to ensure that the benefits extend to all workers. Most employers in New Zealand still prioritise paper qualifications, although a future economy demands greater emphasis on specific skill sets to excel at work.

For example, the 'Microsoft Learn' platform allows companies to reskill their workers through customisable online digital skills training courses tailored to their specific roles. Online courses in digital skills are organised based on nine different job roles, ranging from 'AI engineer' to 'business analyst'. Upon course completion, workers gain industry-recognised Microsoft certifications. The Microsoft partner network employs more than 1,400 Microsoft Certified Professionals in New Zealand in support of upskilling workers.

Although business leaders in New Zealand say they prioritise upskilling workers into the future, many have yet to implement plans. There is a lack of financial incentives for businesses to retrain their workers and perceived fiscal costs of training schemes could also be a stumbling block for greater public investment.

As an example of how businesses can lead in this area, Microsoft has developed a 'skills library' for its employees to identify emerging skills in the industry and take a proactive approach to developing those skills to create new opportunities for themselves. New Zealand organisations are also doing this: the Port of Auckland has implemented a Future of Work programme where staff and their families undertake workshops to think about how coming changes will affect them, followed by retraining to future proof their employment.

6. FIRM AND ECONOMIC POLICIES

There is a misconception that the largest productivity beneficiaries of new technologies will come from digital sectors. A New Zealand study reflects that non-digital sectors such as manufacturing and construction could reap up to over four times the productivity benefits received by digital sectors.[18]

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[18] AI Forum for New Zealand (2018), *Artificial Intelligence: Shaping a Future New Zealand*

Sectors that currently have a manual labour force (e.g. manufacturing, agriculture) and high capacity to integrate emerging technologies into their business model (e.g. financial services, retail operations) are most likely to benefit from new technologies. On the other hand, sectors with relatively small labour pools and low technology penetration could expect lower productivity benefits.

New Zealand is projected to receive productivity gains of 39% from AI in just 2 years; this is substantial even when compared to its other high-income counterparts in Asia. We rank above Singapore, Australia, and South Korea on the projected rate of AI-enabled employee productivity gains by 2021.[19]

There is a problem with uneven adoption of technology leading to productivity inequality. A survey of over 100 business leaders in the country revealed that only 12% had adopted AI as a core part of their business strategy, while 21% had not started to even consider these new technologies yet.

Targeted technological applications, investments in the right talent and tools, good data management practices and high levels of security are critical to supporting technology adoption. Australia is focusing much of its applied AI research in its agriculture and tourism sectors, for example using AI to detect potentially dangerous plants and animals entering the country.[20]

One way to level the playing field on adoption of new technologies is to focus on making more data available to enable better training for AI and models. Open data is an enabler, and Microsoft supports the Government's work in the Open Government Partnership and the additional support for the Chief Data Steward.

7. CONCLUSION

At Microsoft we see the benefits of new technology adoption including AI and machine learning. While job displacement remains a concern, we believe there are great advantages and examples where new technologies will create further opportunities for government, business and workers. It's about harnessing these positive opportunities and preparing/planning for the likely disruption and job displacement by being adaptable and forward thinking.

We think that the Government's existing work and focus areas for anticipating the changes likely to be brought about by new technologies e.g. retraining and reskilling, education that's fit for purpose, productivity benefits, mitigating displacement issues, and creating more wellbeing and inclusivity, are the right areas of emphasis. This work needs to be encouraged and accelerated so New Zealand can be best placed to harness the benefit of technological change.

We're also supportive of the government's multiple workstreams to address the issues the workforce could face as a result of technology adoption: Future of Work unit in MBIE, Just Transition, Reform of Vocational Education, Future of Work Tripartite Forum, Regional Growth Funding, and the Prime Minister's Business Advisory Council.

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[19] Microsoft-IDC APAC AI survey (2018)
[20] ABC News, *Artificial intelligence being designed by biosecurity experts to keep Australia pest free* (2018)

Further to this, we urge the Government to continue developing a national strategy around new technologies and AI. It should consider how government can take advantage of the economic and societal benefits and create a framework to develop policy solutions for challenges that AI brings – investment in skills development, new standards and ethical considerations, and targeted efforts to remove bias from AI algorithms and data sets.

This inquiry represents an opportunity to consider how the government can accelerate the adoption of new technologies to address future workforce needs and put in place the safety net for those who will be adversely impacted.

We recommend the Government adopt a position that the best time to act is now, the opportunities are now, and there is no advantage in holding back and becoming late adopters of new technologies.

APPENDICES

For further information, attached to this submission is Microsoft's publication "The Future Computed – Artificial Intelligence and its role in society": https://news.microsoft.com/uploads/2018/01/The-Future-Computed.pdf