

New Zealanders' attitudes towards robots and AI

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The New Zealand Productivity Commission

Te Kōmihana Whai Hua o Aotearoa¹

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¹ The Commission that pursues abundance for New Zealand

Overview

Robots, artificial intelligence (AI) and other digital technologies have become very newsworthy around the globe (NZPC, 2019). The news coverage is overwhelmingly pessimistic – for individuals and society in general. But does that coverage translate into negative attitudes for the population as a whole?

The Productivity Commission asked 1 001 New Zealanders about their attitudes to emerging digital technologies in February 2020. The questions asked were a subset of those asked by the European Commission across 28 EU countries in March 2017, allowing for an (admittedly imperfect) cross-country comparison.

Accepting those imperfections, New Zealanders were, overall, much more negative than those in EU countries about the effects of emerging technologies on the economy and on society. By contrast, they are very positive about the effect of these technologies on their own quality of life, and about the quality of their own digital skills.

New Zealanders' attitudes to robots and AI were somewhat mixed. They are relatively negative about socially positive uses of robots, yet relatively unconcerned that robots would "steal peoples' jobs".

New Zealander's responses to most questions did not vary much by age. However, older New Zealanders are less confident than younger ones that their digital skills are sufficient for a hypothetical future job.

New Zealanders with incomes less than \$50K showed less favourable attitudes to digital technologies than those earning more than \$50K. This effect was particularly pronounced in responses to the statement "robots steal people's jobs". There was little difference between those earning \$50–100K and those earning above \$100K.

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1 A survey of 1 001 New Zealanders

1.1 Methodology

The Productivity Commission engaged Colmar Brunton to survey 1 001 New Zealanders on their attitudes to robots and artificial intelligence (AI).

The Commission's questions were included in Colmar Brunton's February 2020 OmniJet online survey of a panel of New Zealanders. Colmar Brunton interviews a representative sample of the online population by taking a sample of its research panel members and inviting them to do the survey. Quotas and post-weighting of the data ensures a representative sample of the population in terms of gender, age and region. The data were weighted to the numbers reported by Stats NZ from the 2013 census.

The questions asked were a subset of those asked in 28 European Union (EU) countries by the European Commission in March 2017 (European Commission, 2017).² This allows for a cross-country comparison of the New Zealand responses. The results of such comparisons need to be treated with caution, however, because of differences in sampling and methodology for the two surveys.

1.2 Sampling and methodological differences

Timing

The three-year gap between the two survey dates means that the two surveys are not directly comparable. Few people have direct experience of robots and AI in a workplace setting, even today. So, the attitudes of the bulk of the population are likely to have been shaped by what they have read or heard from others. There has been a significant amount of media hype, both positive and negative, about these technologies over the intervening three years. The results reported here may be different from those of a hypothetical survey of New Zealanders in March 2017.

This research note presents the results for New Zealand alongside those of the 28 EU countries, inviting a direct comparison. However, there is no way of knowing the extent to which the relative positioning of New Zealand has changed during the intervening three years.

Online vs. face-to-face

The New Zealand survey was conducted online. Excluding those least familiar or comfortable with digital technologies introduces a potential bias. By contrast, the EC survey was conducted face-to-face. Seventeen percent of EC survey respondents reported that they never use the internet, and the

more often respondents use the Internet, the more likely they are to have a positive [attitude to robots and AI]: 68% of daily users have [a positive attitude], compared to 33% who never use the Internet. The same pattern applies for the use of online social networks (European Commission, 2017, p. 60).

By contrast, around 6% of New Zealanders aged 16+ did not use the internet in a 2017 survey (Díaz Andrade et al., 2017).

This sample selection difference might be expected to bias the New Zealand results towards being more accepting of digital technologies.

An older cohort in New Zealand

A further difference is that the minimum age in the New Zealand survey was 18 years, while in the EC survey it was 15 years. In the EC survey, younger people have more positive attitudes to robots and AI:

² The EC surveyed 27 901 people aged 15 years and over in 28 countries. In Italy, Lithuania and Malta, approximately 500 people were surveyed. In each of the other 25 countries, over 1000 were surveyed.

Respondents aged 15–24 (70%) and 25–39 (68%) are more likely to have a positive attitude, especially compared to those aged 55+ (51%) (ibid, p. 60).

The New Zealand survey does not show such dramatic differences by age. For example, respondents aged 18–29 years have around the same likelihood of reporting positive impacts of the most recent digital technologies on society (56%) than those aged 60+ years (58%). Similarly, respondents aged 18–29 years were as likely to agree that robots and AI steal people's jobs (54%) than those aged 60+ years (52%).

A plausible explanation is that this apparent lack of age-related differences is a selection effect. By using an online sample, the New Zealand survey omits more older than younger people. The sampling design makes up for this lack through additional recruitment and post-sample weighting. However, the older cohorts that remain are both more technology savvy and have more positive attitudes to technology.

On balance, omitting 15–17 year olds will most likely bias the New Zealand results towards being less accepting of new technologies.

1.3 A baseline for future research

This survey was conducted as part of the Commission's inquiry into technological change and the future of work.³ As such, it is a one off. The Commission believes this survey would form a useful baseline for future research, and will share the full survey results on request.

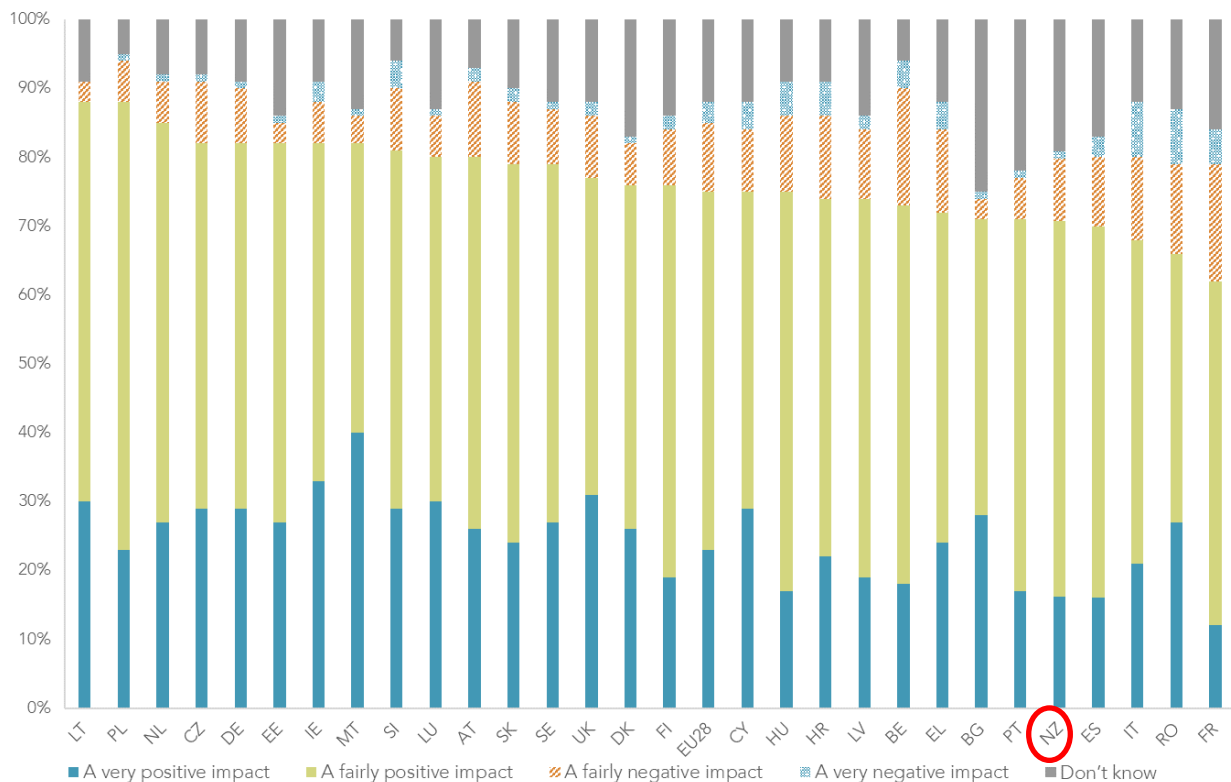
³ See <https://www.productivity.govt.nz/inquiries/technology-and-the-future-of-work/>.

2 Impact of recent digital technologies

The graphs in this section sort countries with the most positive attitudes towards technology on the left, to those most negative on the right. Specifically, countries are in descending order of the total of “very positive” and “somewhat positive” impacts. “Don’t know” responses are treated as negative (or indicating disagreement) for sorting purposes, consistent with the presentation in European Commission (2017).

2.1 What impact do the most recent digital technologies currently have on the economy?

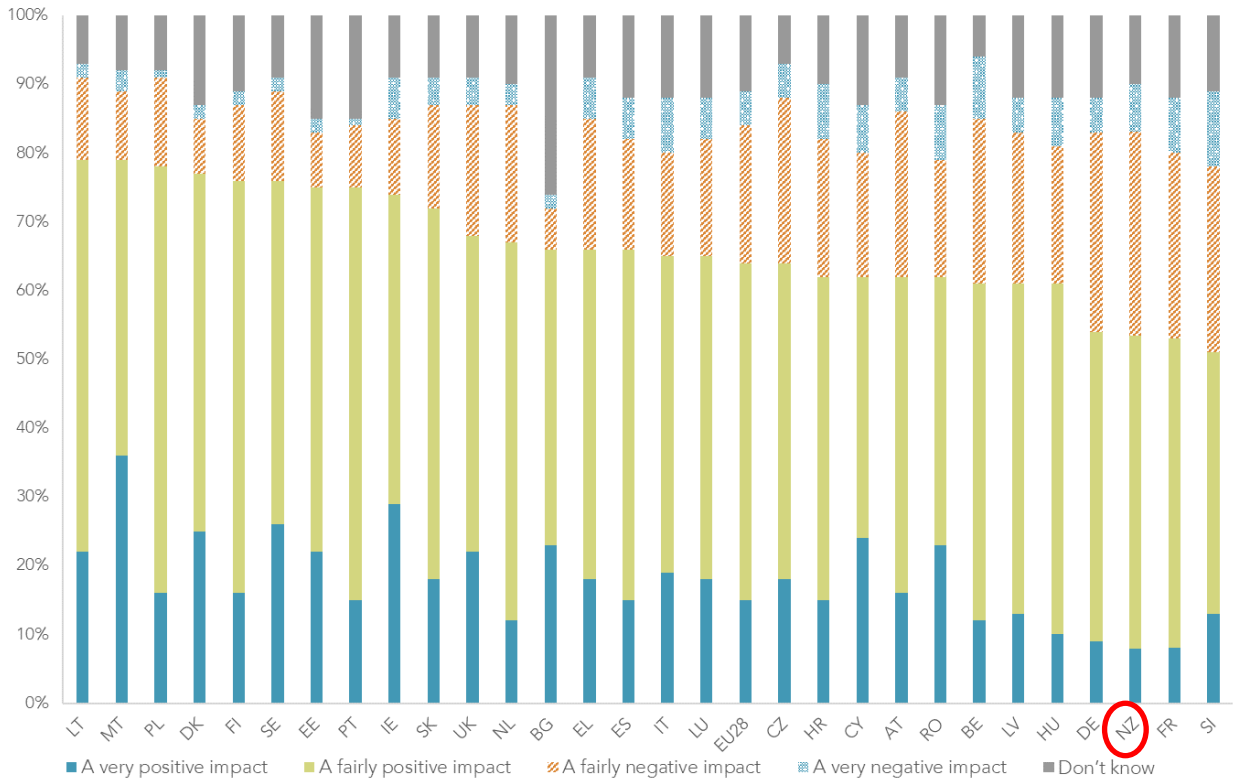
Seventy-one percent of New Zealanders responded that they thought the impact was positive on the economy. This puts New Zealand among the least positive countries.



Appendix A explains the country codes.

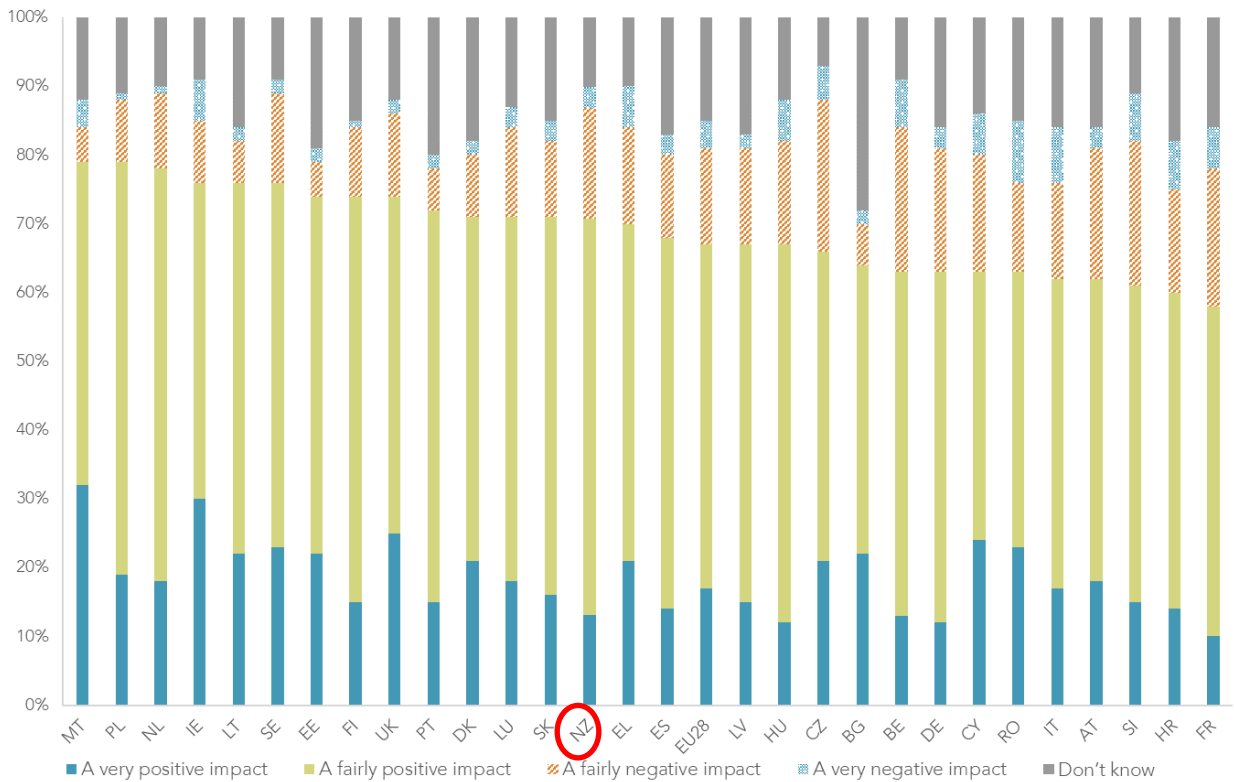
2.2 What impact do the most recent digital technologies currently have on society?

Fifty-three percent of New Zealanders responded that they thought the impact was positive on society. Again, this puts New Zealand among the least positive countries.



2.3 What impact do the most recent digital technologies currently have on your quality of life?

Seventy-one percent of New Zealanders responded that they thought the impact was positive on their own quality of life. They are more positive about the effect if these technologies on themselves, rather than on society more generally. New Zealand sits around the middle of countries.



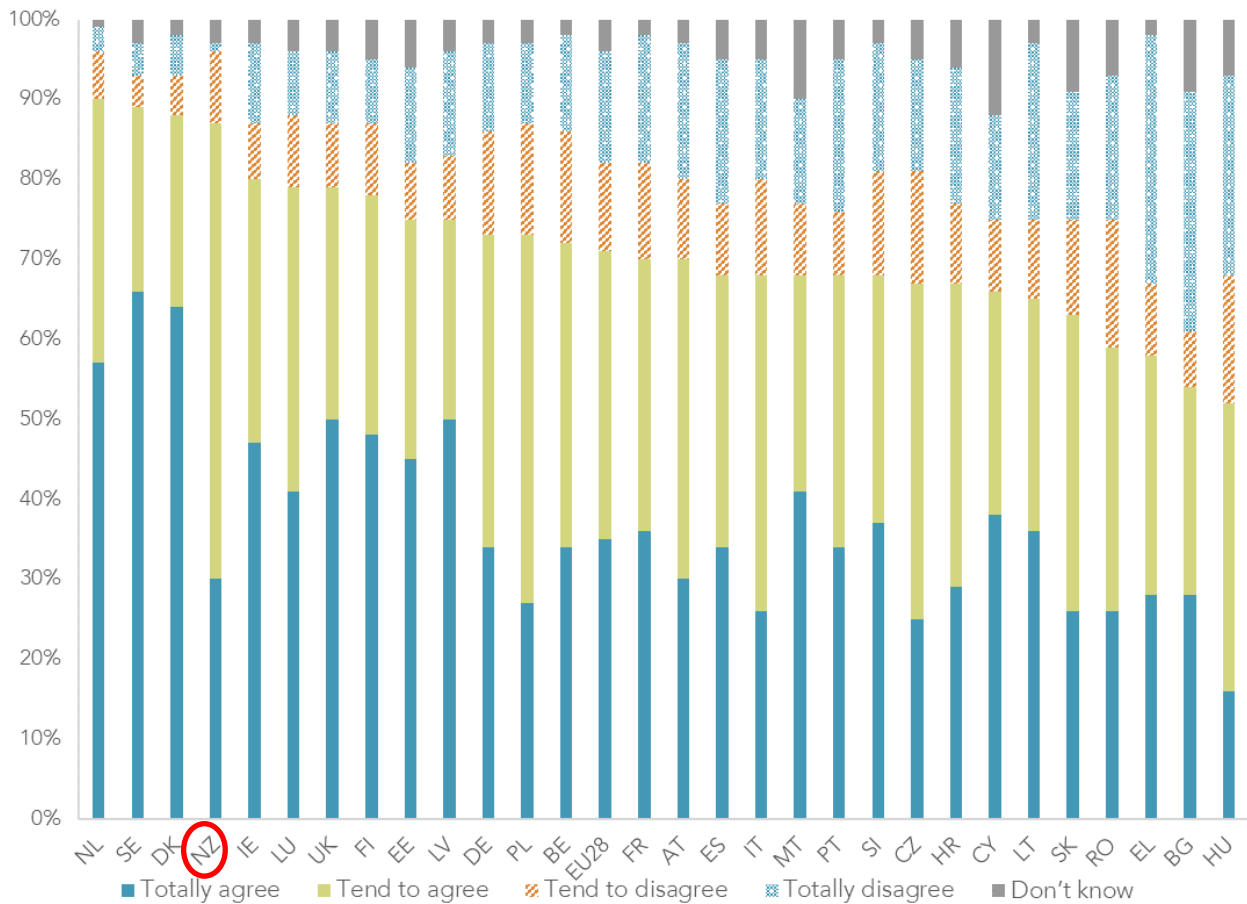
3 Digital technology skills

New Zealanders appear very positive about their own digital technology skills.

The graphs in this section sort countries reporting the highest assessment of respondents' skills on the left, to those with the lowest assessment on the right. Specifically, countries are in descending order of the total of "totally agree" and "somewhat agree" impacts. "Don't know" responses are treated as negative (or indicating disagreement) for sorting purposes, consistent with the presentation in European Commission (2017).

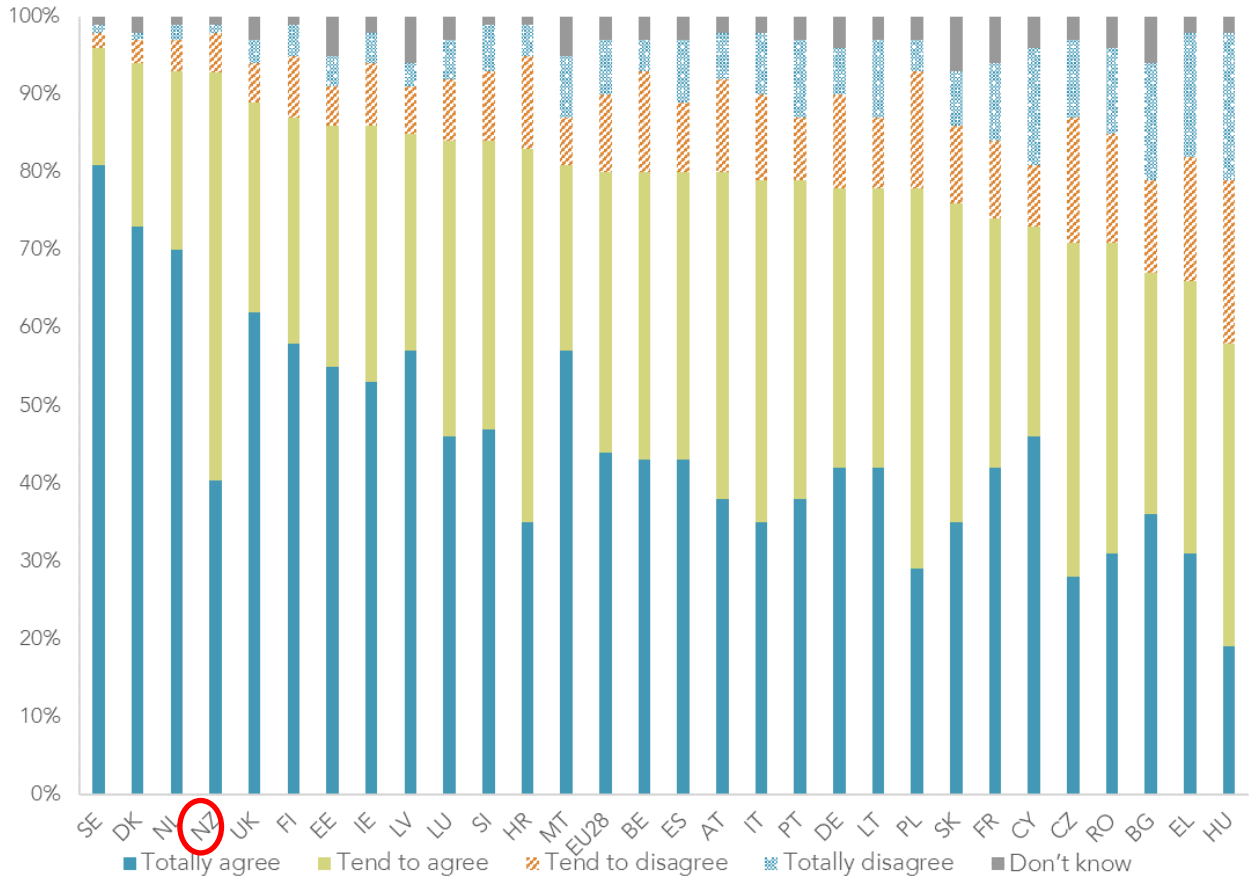
3.1 Are you sufficiently skilled in the use of digital technologies – in your daily life?

Eighty-seven percent of New Zealanders agreed that they were sufficiently skilled in the use of digital technologies in their daily life. New Zealanders seem confident about their own skills and abilities compared with those in other countries.



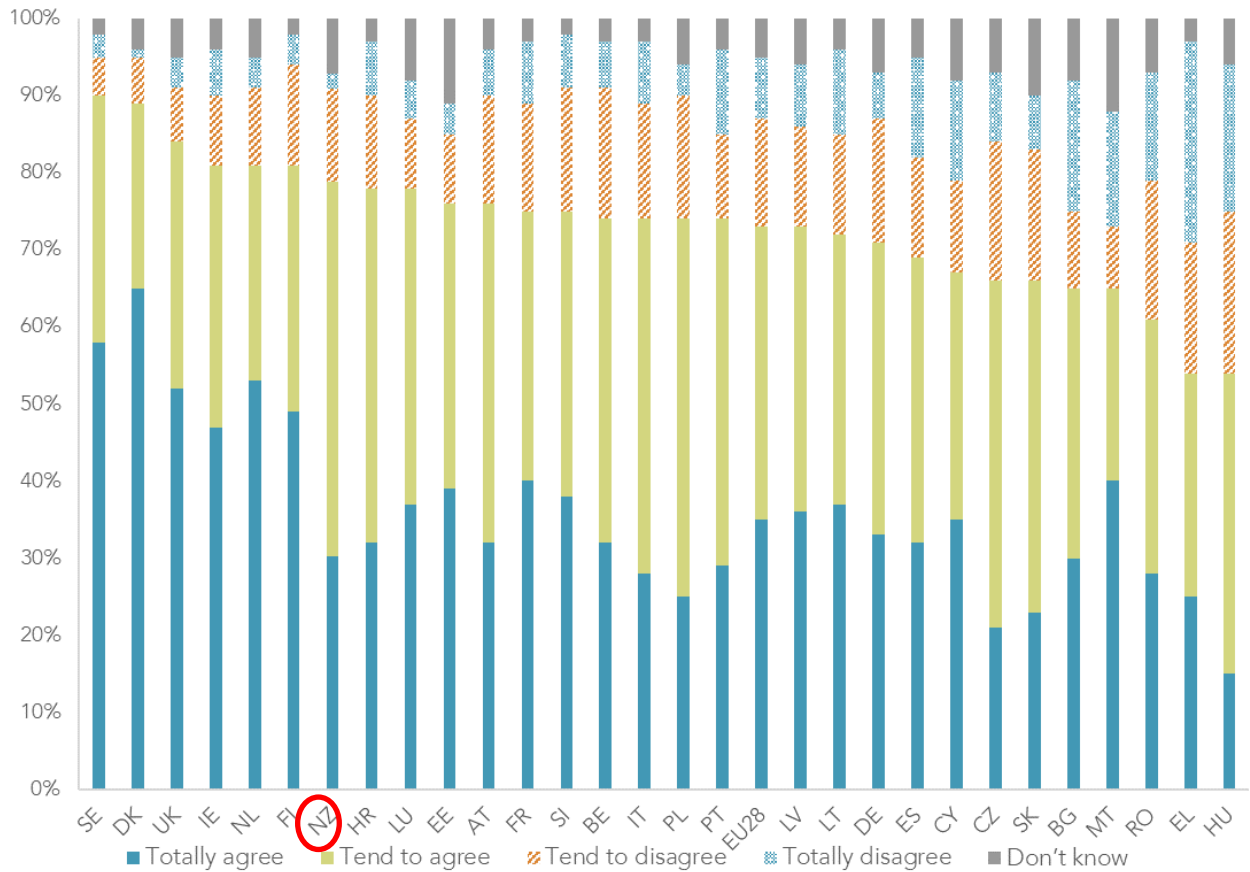
3.2 Are you sufficiently skilled in the use of digital technologies – to do your job?

Ninety-three percent of New Zealanders agreed that they were sufficiently skilled in the use of digital technologies to do their job. This is a high level of agreement compared with other countries.



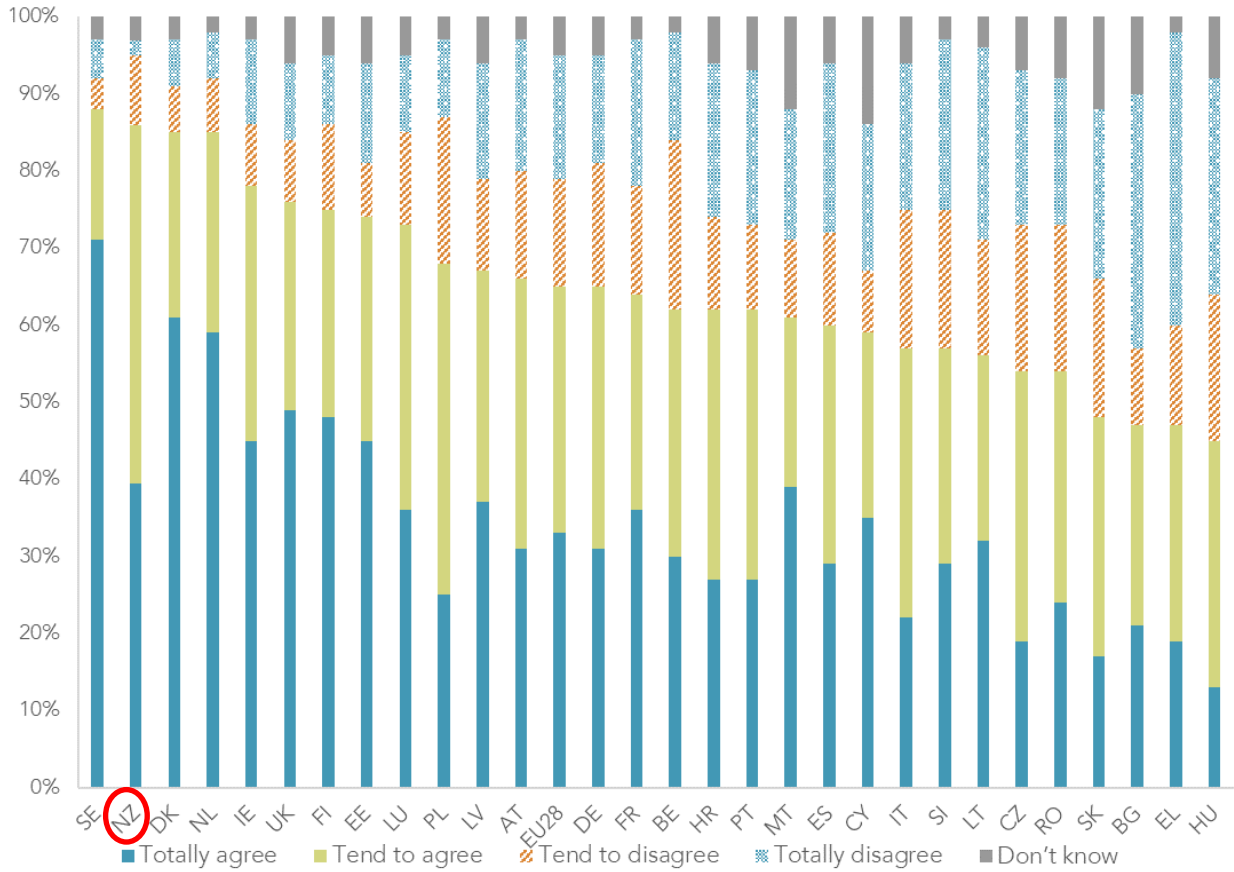
3.3 Are you sufficiently skilled in the use of digital technologies – to do a future job if you were to find a job or to change jobs within the next 12 months?

This question asks New Zealanders about a hypothetical future job. Seventy-nine percent of New Zealanders agreed that they were sufficiently skilled.



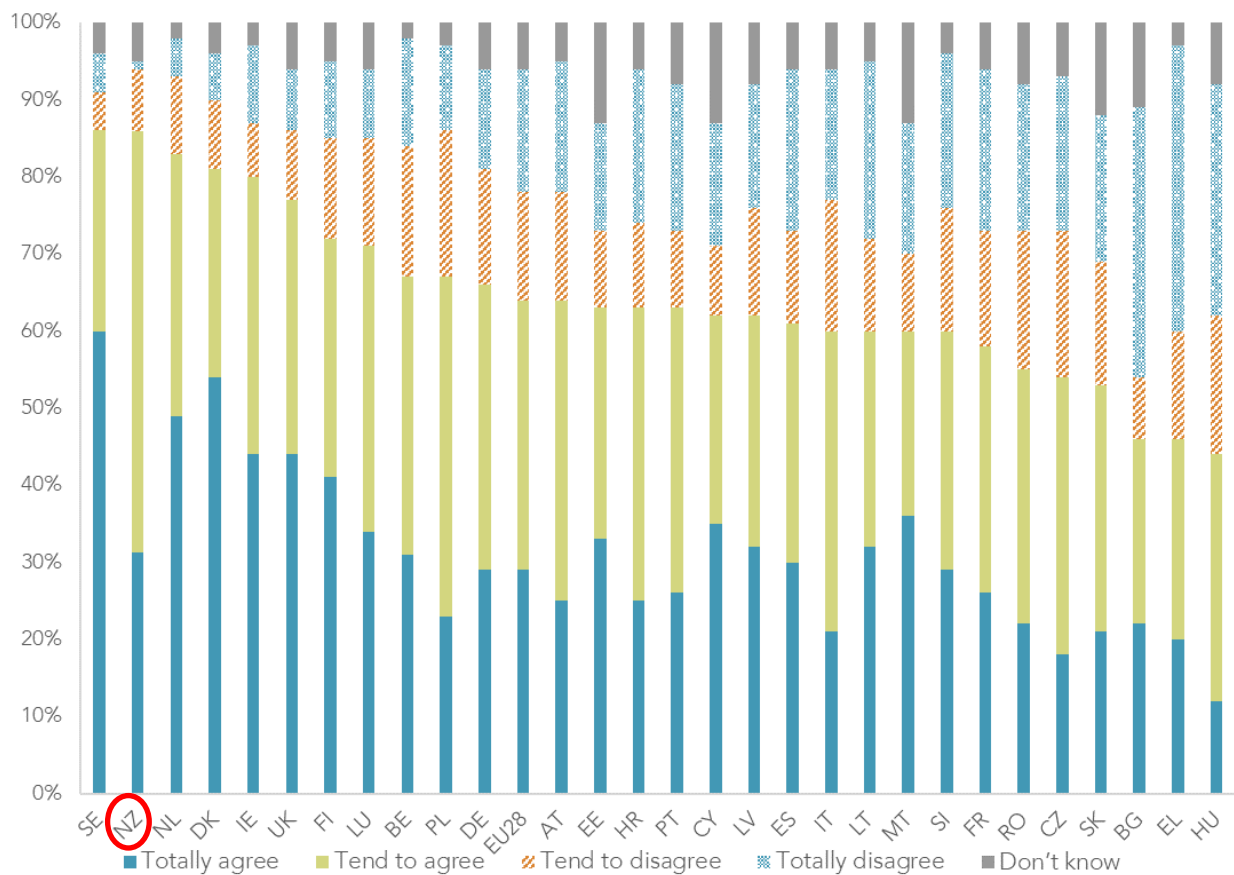
3.4 Are you sufficiently skilled in the use of digital technologies – to use online public services such as filing a tax declaration or applying for a visa online?

Eighty-six percent of New Zealanders agreed that they were sufficiently skilled for this task. This is high in international comparison, with New Zealand sitting between Sweden and Denmark. And quite far ahead of Estonia (code EE), often considered the benchmark country for online public services.



3.5 Are you sufficiently skilled in the use of digital technologies – to benefit from digital and online learning opportunities?

Eighty-six percent of New Zealanders agreed that they were sufficiently skilled for this task. Again, this is high in international comparison, with New Zealand sitting between Sweden and the Netherlands.



3.6 New Zealanders' confidence in their own digital skills appears well grounded

New Zealanders' confidence in their own digital skills is consistent with the results of the OECD's survey of adult skills (OCED, 2016). The OECD surveyed the skills of 16–65 year olds, and reported that "adults in New Zealand score above the OECD average in literacy, numeracy and problem solving in technology-rich environments" (p. 1). More specifically, in the OCED's cross-country assessment of problem solving in technology-rich environments,

- 10.2% of New Zealand adults were at level 3, the highest proficiency level. New Zealand had the highest proportion of adults scoring at this level (and almost twice the OECD average).
- 34.0% of New Zealand adults were at level 2 compared with the OECD average (25.7%).
- 45.3% of New Zealand adults scored at or below level 1, slightly above the OECD average (42.9%).
- 4.9% of New Zealand adults indicated no prior experience with computers or lacked basic computer skills, only one-third the OECD average (14.7%).
- A substantially smaller proportion of adults in NZ (3.4%) chose to opt out of the computer assessment, compared with the OECD average (9.6%).

4 Attitudes to robots and AI

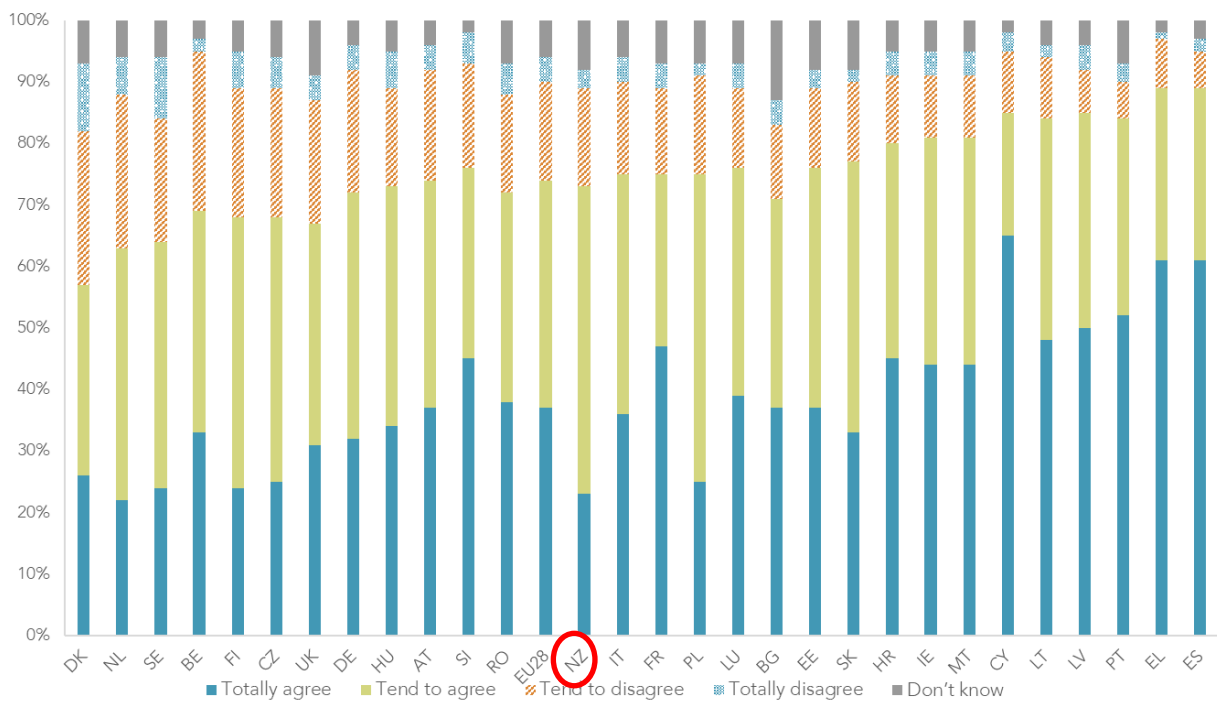
New Zealanders' attitudes to robots and AI are somewhat mixed. The following five questions have New Zealand in the middle (4.1), at the least accepting end (4.2 & 4.4), and at the most accepting end (4.3 & 4.5).

The graphs in this section sort countries reporting the most positive attitudes to robots and AI on the left, to those with the most negative on the right.

- For questions expressing a positive attitude, countries are in descending order of the total of "totally agree" and "somewhat agree" responses. "Don't know" responses are considered to indicate disagreement for sorting purposes.
- For questions expressing a negative attitude to robots and AI, countries are in descending order of the total of "totally disagree" and "somewhat disagree" responses. "Don't know" responses are considered to indicate agreement for sorting purposes.

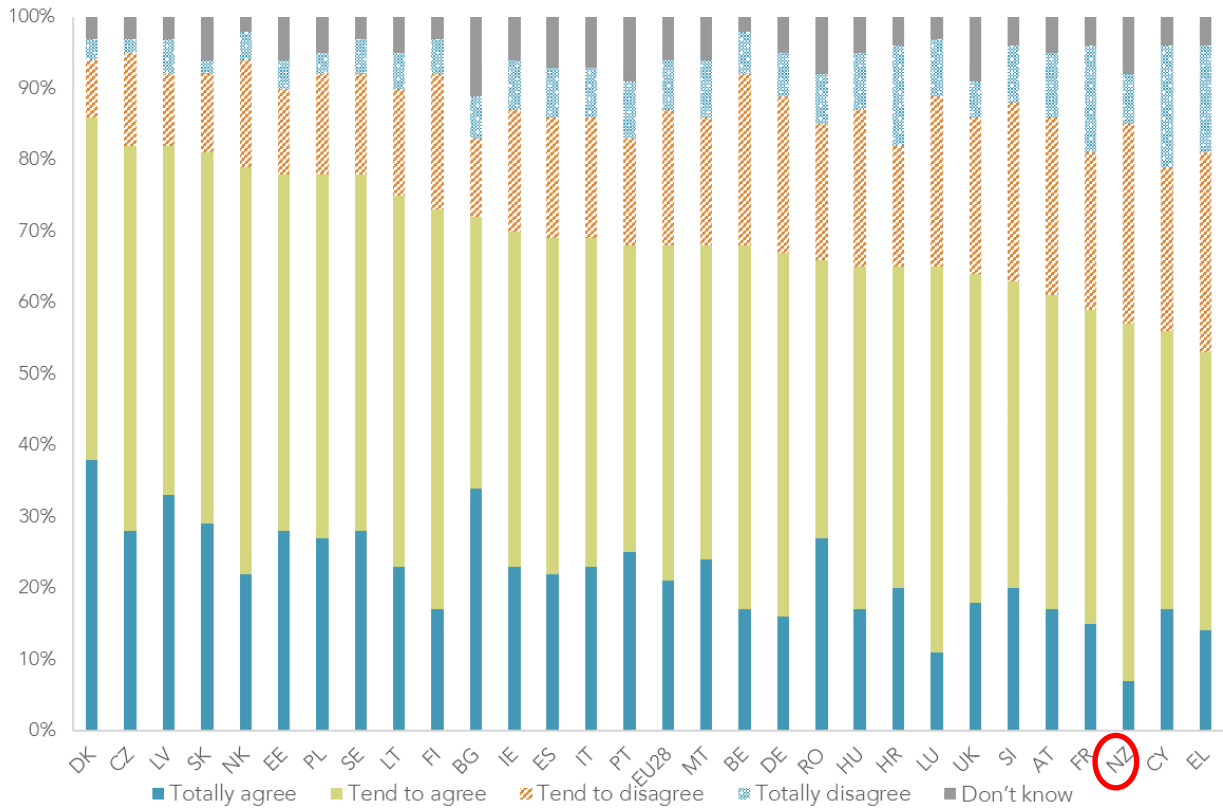
4.1 More jobs will disappear than new jobs will be created

Seventy-three percent of New Zealanders agreed with this statement. New Zealand sits in the middle of EU countries.



4.2 Robots and AI are a good thing for society, because they help people do their jobs or carry out daily tasks at home

Fifty-seven percent of New Zealanders agreed with this statement. They are much less likely to agree to this statement than the EU average.



4.3 Robots and AI are technologies that require careful management

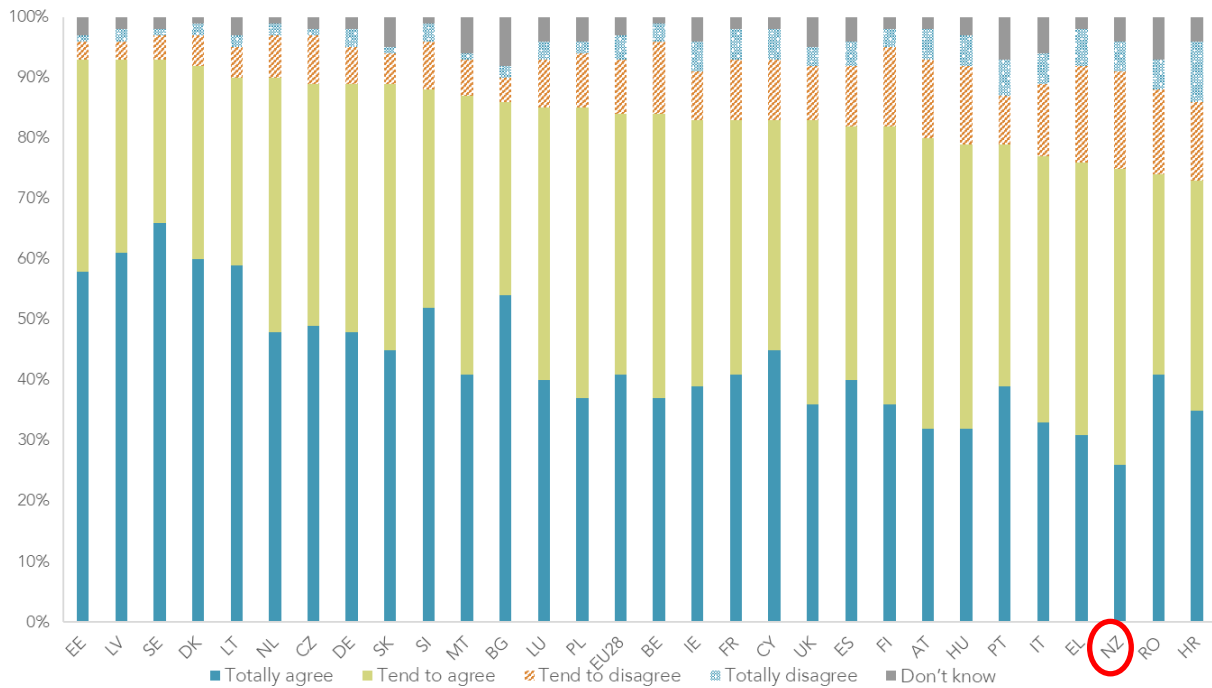
This graph includes the United States. The extra datapoint was taken from a June 2018 survey, as reported by Zhang and Dafoe (2019).

Eighty-eight percent of New Zealanders agreed with this statement. However, more disagreed than in most other countries, including the US.



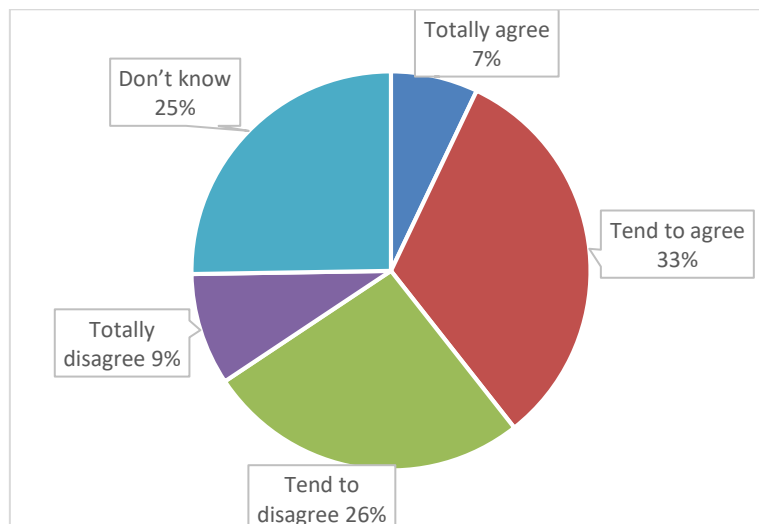
4.4 Robots are necessary as they can do jobs that are too hard or too dangerous for people

Seventy-five percent of New Zealanders agreed with this statement. They are much less likely to agree to this statement than the EU average.



4.5 New Zealand is keeping up with the best in the world when it comes to the digital transformation of industry

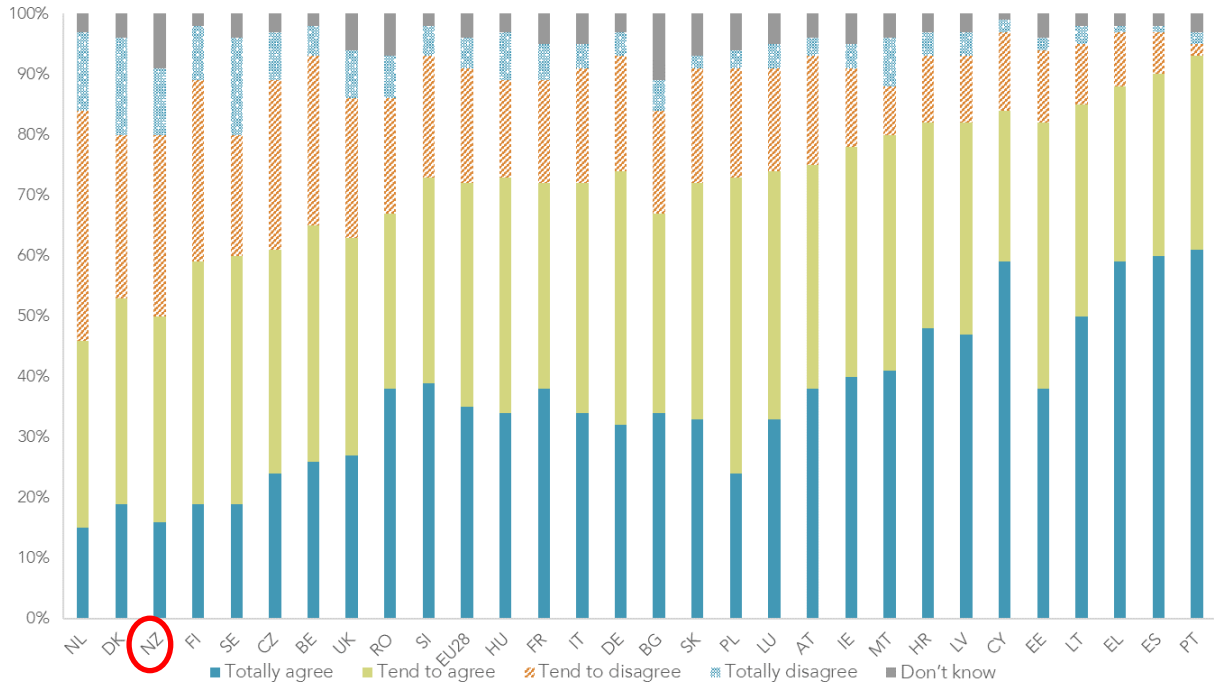
As this question has no direct equivalent in European Commission (2017), this report includes New Zealand responses only.



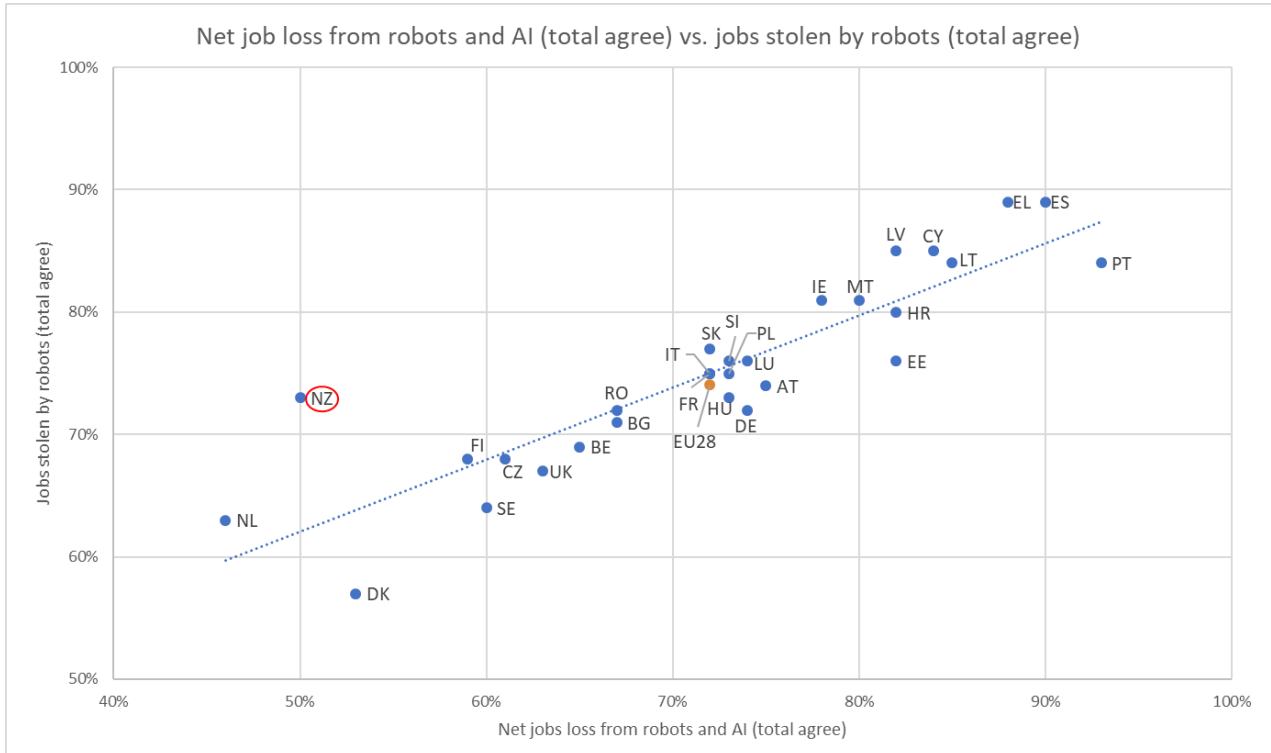
Just 40% of New Zealanders believe that New Zealand is keeping up with the best in the world. This is consistent with the findings of the Commission’s 2019 research project in collaboration with the Australian Productivity Commission. That project found that “the majority of [Australasian] firms – with a few notable exceptions – are not at the forefront of digital innovation and production” (APC & NZPC, 2019, p. 7).

4.6 Robots and AI steal people's jobs

Fifty percent of New Zealanders agreed with this statement. However, more disagreed than in almost all other countries.



The following graph explores consistency between two related attitudinal questions. A linear relationship is clear, though New Zealand sits further from linear trend line than any other country.



5 New Zealand responses by age and income

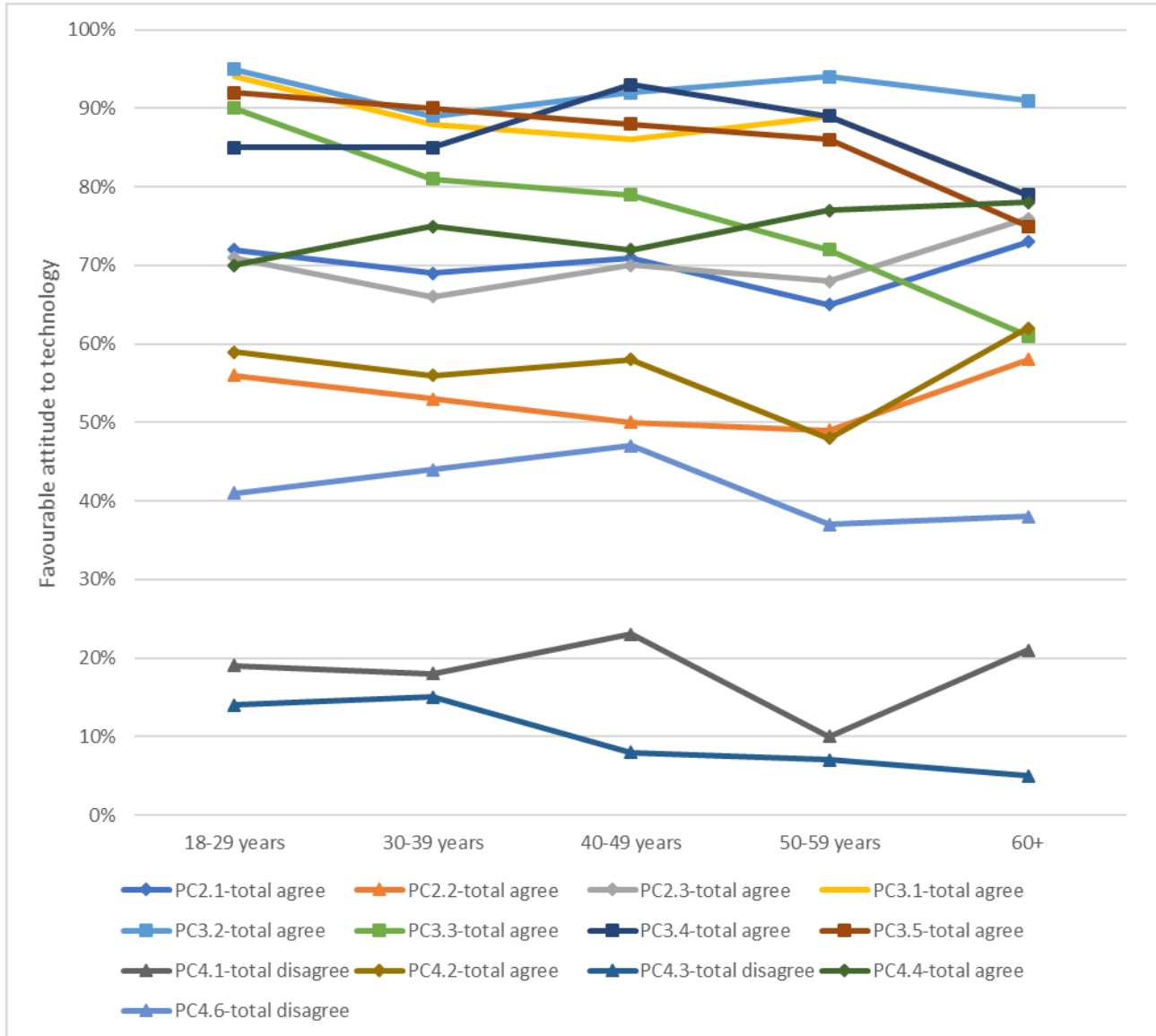
The following table supplies a useful summary of the questions for the graphs presented in this section.

No.	Questions
PC2.1	What impact do the most recent digital technologies currently have on – the economy?
PC2.2	What impact do the most recent digital technologies currently have on – the society?
PC2.3	What impact do the most recent digital technologies currently have on – your quality of life?
PC3.1	Are you sufficiently skilled in the use of digital technologies – in your daily life?
PC3.2	Are you sufficiently skilled in the use of digital technologies – to do your job?
PC3.3	Are you sufficiently skilled in the use of digital technologies – to do a future job if you were to find a job or to change jobs within the next 12 months?
PC3.4	Are you sufficiently skilled in the use of digital technologies – to use online public services such as filing a tax declaration or applying for a visa online?
PC3.5	Are you sufficiently skilled in the use of digital technologies – to benefit from digital and online learning opportunities?
PC4.1	Due to the use of robots and artificial intelligence, more jobs will disappear than new jobs will be created
PC4.2	Robots and artificial intelligence are a good thing for society, because they help people do their jobs or carry out daily tasks at home
PC4.3	Robots and artificial intelligence are technologies that require careful management
PC4.4	Robots are necessary as they can do jobs that are too hard or too dangerous for people
PC4.6	Robots and artificial intelligence steal peoples' jobs

5.1 Favourable attitudes to technology by age

The following graph shows the age breakdown for New Zealand respondents to the survey questions. Youngest age respondents are on the left, oldest on the right.

There is no obvious overall pattern. Some lines trend upwards, others trend downwards. Some have a hill in the middle ages, others a dip.



By contrast, European Commission (2017) reported strong age effects for the oldest (55+) group. The following table summarises the age-related results.⁴

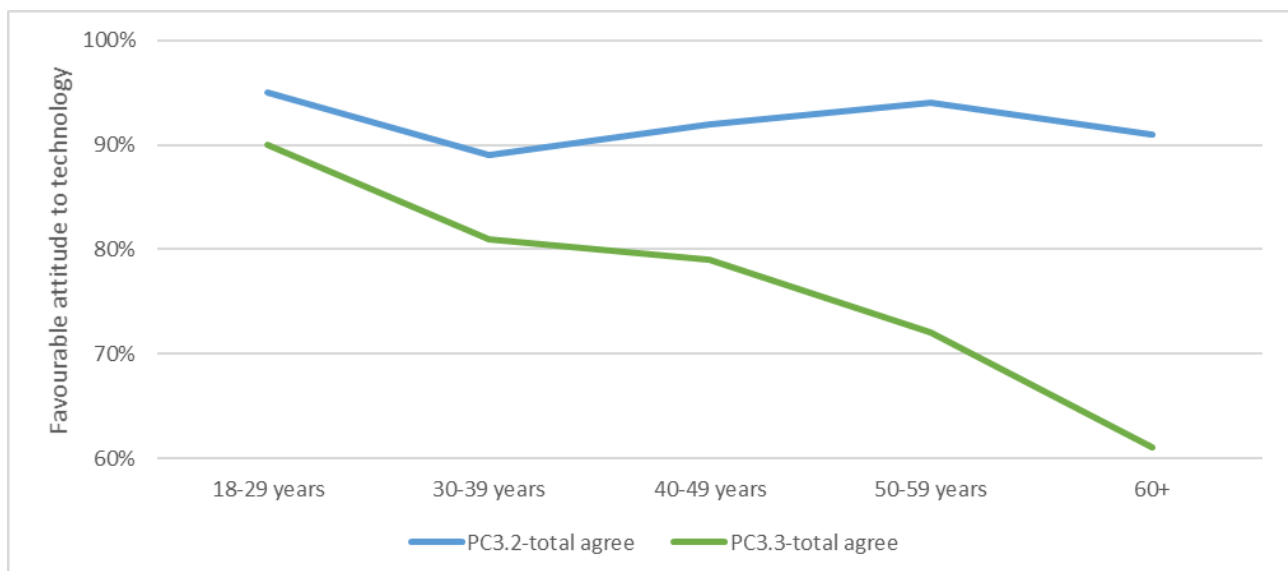
Question	EC survey responses by age
PC2.1	"66% of those aged 55+ say the impact on the economy is positive, compared to 79%–81% of the younger age groups" (p. 10).
PC2.2	56% of those aged 55+ say the impact on society is positive, compared to 68%–70% of the younger age groups.
PC2.3	53% of those aged 55+ say the impact on one's quality of life is positive, compared to 74%–78% of the younger age groups.

⁴ European Commission (2017) did not include a breakdown by age for questions PC4.1, PC4.4 or PC4.6.

Question	EC survey responses by age
PC3.1	"Respondents aged 55+ are the least likely to agree: 47% compared to 81%–92% among younger respondents" (p. 22).
PC3.2	"Respondents aged 55+ are the least likely to agree: 67% do so, compared to 79%–85% of younger respondents" (p. 28).
PC3.3	"The younger the respondents, the more likely they are to agree that they are sufficiently skilled in the use of digital technologies to do a future job: 85%–72% compared with 47% of those aged 55+" (p. 35)
PC3.4	"Respondents aged 55+ are the least likely to agree: 42% do so, compared to 74%–83% of younger respondents" (p. 25).
PC3.5	"40% of [respondents aged 55+] agree they are sufficiently skilled in the use of digital technologies to benefit from online learning, compared to 72%–89% of younger age groups" (p. 32).
PC4.2	62% of those aged 55+ agree that "robots and AI are a good thing for society, because they help people do their jobs or carry out daily tasks at home", compared to 71%–74% of the younger age groups.
PC4.3	"relatively few differences ... Those aged 55+ are the least likely to agree (85% vs. 90%–91%)" that robots and AI are technologies that require careful management (p. 63).

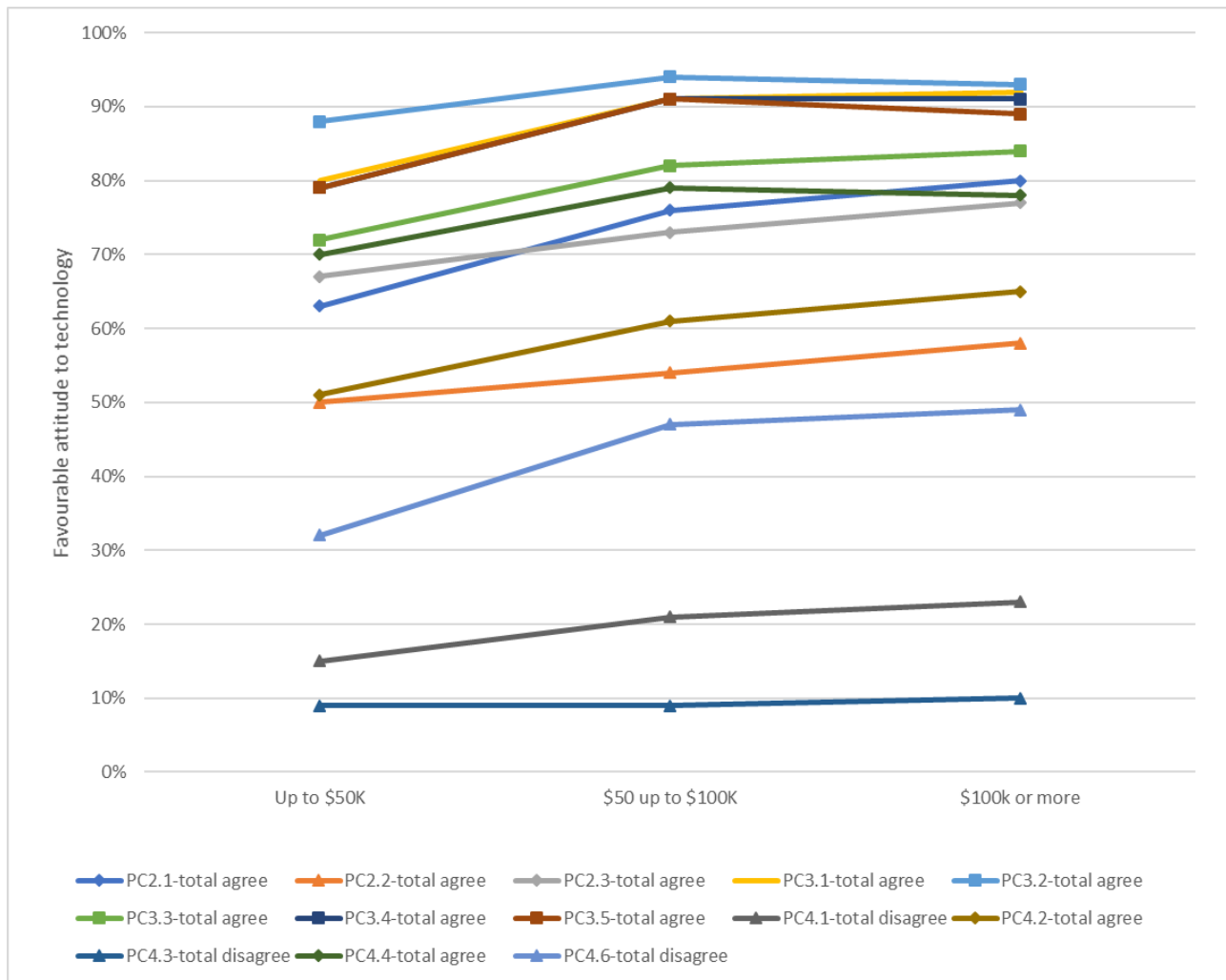
The selection effects described in section 1.2 may explain the lack of a consistent age difference in the New Zealand survey.

There is an interesting sub-story in New Zealanders' responses to questions PC3.2 & PC3.3. Confidence in one's own digital skills for one's current job does not decline significantly with age (blue line). But confidence in one's own digital skills "to do a future job if you were to find a job or to change jobs within the next 12 months" does decline significantly with age. This could indicate that older workers do not think their current digital skills are well matched with the demands of the labour market. Alternatively, they may think that younger people have much better digital skills, and older respondents expect to be competing with such people for future jobs.



5.2 Favourable attitudes to technology by income

The following graph shows the personal income bracket breakdown for New Zealand respondents to the survey questions. Lowest income respondents are on the left. Those with incomes below \$50K are less favourably inclined on almost all questions, whereas responses varied little between those with incomes between \$50K and \$100K, and those above \$100K.



Plausible explanations why respondents with low personal incomes have less favourable attitudes include that they think that:

- they are more likely to be adversely affected by robots and AI; or
- they will, if adversely affected, suffer greater consequences than those on higher incomes.

The “step-up” above \$50K personal income is most pronounced for PC4.6, that is, disagreement with the statement that “robots steal people’s jobs”. This is consistent with the former explanation, that is, that those on low incomes think they are more likely to face displacement by robots and AI.

European Commission (2017) did not break down responses by income levels. Rather, they used a self-assessment of class, and reported a breakdown of assessments of one’s own digital skills (questions PC3.1 to PC3.5) by class. Generally speaking, those identifying as “working class” had lower assessments of their own digital skills than did those who considered themselves “middle” or “upper” social class.

Appendix A Country codes

Code	Country
AT	Austria
BE	Belgium
BG	Bulgaria
CZ	Czechia (Czech Republic)
DE	Germany
DK	Denmark
EE	Estonia
IE	Ireland
EL	Greece
ES	Spain
EU28	The 28 EU countries as at 2017. (All countries in this table, excepting New Zealand and the US.)
FI	Finland
FR	France
HR	Croatia
IT	Italy
CY	Cyprus
LT	Lithuania
LU	Luxembourg
LV	Latvia
HU	Hungary
MT	Malta
NL	Netherlands
NZ	New Zealand
PL	Poland
PT	Portugal
RO	Romania
SI	Slovenia
SK	Slovakia
SE	Sweden
UK	United Kingdom
US	United States

Appendix B Questionnaire

PC1 What is your current occupation?

NON-ACTIVE

1. Responsible for ordinary shopping and looking after the home, or without any current occupation, not working
2. Student
3. Unemployed or temporarily not working
4. Retired or unable to work through illness

SELF EMPLOYED

5. Farmer
6. Professional (lawyer, medical practitioner, accountant, architect, etc)
7. Owner of a shop, craftsmen, other self-employed person
8. Business proprietors, owner (full or partner) of a company

EMPLOYED

9. Employed professional (employed doctor, lawyer, accountant, architect)
10. General management, director or top management (managing directors, director general, other director)
11. Middle management, other management (department head, junior manager, teacher, technician)
12. Employed position, working mainly at a desk
13. Employed position, not at a desk but travelling (salesmen, driver, etc.)
14. Employed position, not at a desk, but in a service job (hospital, restaurant, police, fireman, etc.)
15. Supervisor
16. Skilled manual worker
17. Other (unskilled) manual worker
18. Never did any paid work

PC2 In your view, what impact do the most recent digital technologies currently have on:

Please select one answer for each.

1. The economy
2. The society
3. Your quality of life

RESPONSE LIST

1. A very positive impact
2. A fairly positive impact
3. A fairly negative impact
4. A very negative impact
5. Don't know

PC3 To what extent do you agree or disagree with the following statements regarding your skills in the use of digital technologies: You consider yourself to be sufficiently skilled in the use of digital technologies ...

Please select one answer for each

1. ... in your daily life
2. ... to do your job [ASK IF 'CURRENTLY WORKING', Q1 CODE 5 TO 18]
3. ... to do a future job if you were to find a job or to change jobs within the next twelve months [ASK IF 'NOT RETIRED, Q1 NOT CODE 4]
4. ... to use online public services such as filing a tax declaration or applying for a visa online
5. ... to benefit from digital and online learning opportunities

RESPONSE LIST

6. Totally agree
7. Tend to agree
8. Tend to disagree
9. Totally disagree
10. Don't know

PC4 Please read the following definitions before answering the next question.

A **robot** is defined as a machine which can assist humans in everyday tasks without constant guidance or instruction, e.g. as a kind of co-worker helping on the factory floor or as a robot cleaner, or in activities which may be dangerous for humans, like search and rescue in disasters. Robots can come in many shapes or sizes and some may be of human appearance. Traditional kitchen appliances, such as a blender or a coffee maker, are not considered as robots.

Artificial Intelligence (AI) is a term used to describe systems that, to some extent, can sense, perceive, think and act like humans and behave rationally. Artificial Intelligence is used, for instance, in driverless cars or drones, in our homes to adjust the heating automatically, in healthcare to improve medical diagnoses and in farming to apply pesticides only where they are absolutely necessary.

Please tell me to what extent you agree or disagree with each of the following statements ...

Please select one answer for each

1. Due to the use of robots and artificial intelligence, more jobs will disappear than new jobs will be created
2. Robots and artificial intelligence are a good thing for society, because they help people do their jobs or carry out daily tasks at home
3. Robots and artificial intelligence are technologies that require careful management
4. Robots are necessary as they can do jobs that are too hard or too dangerous for people
5. New Zealand is keeping up with the best in the world when it comes to the digital transformation of industry
6. Robots and artificial intelligence steal peoples' jobs

RESPONSE LIST

1. Totally agree
2. Tend to agree
3. Tend to disagree
4. Totally disagree
5. Don't know

References

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