

Engineering Leadership Forum

Comments on the Productivity Commissions issues paper on technology change and the future of work

5 June 2019

1. Introduction

This is a commentary by the Engineering Leadership Forum (ELF) on the Productivity Commission's issues paper on technology change and the future of work.

The ELF comprises the Chief Executive Officers of New Zealand's professional engineering associations including - Engineering NZ, the Association of Consulting Engineers New Zealand, Water New Zealand, Civil Contractors New Zealand, the New Zealand Division of the Institute of Public Works Engineering Australasia, the Electricity Engineers' Association, Concrete NZ, and the Institute of IT Professionals NZ. These organisations represent over 50,000 professional engineers.

2. General comments

Technology change can reduce the competitiveness of firms but it can also provide opportunities for innovation and the development of new products and services. Firms need employees with the skills to understand and work with changing technology, and they also need the support, in a New Zealand context, from the engineering and technology - based faculties in our universities to monitor and understand technology changes. We agree therefore with the Commission's focus in Chapter 5 and 6 on skills and training for our workforce and the effectiveness of the innovation system. In the two sections following we summarise our views on these two aspects. We would be pleased to discuss our comments in more detail with the Commission.

3. Education

The member organisations of the ELF are all involved in vocational education training. In 2018 ELF undertook a review of vocational education amongst its member organisations. The three main conclusions were:

- a) Some members of the engineering industry believe they are distant participants in the design and monitoring of qualifications delivered by Polytechnics, Institutes of Technology and the Universities.
- b) Micro credentials and the degree apprenticeship schemes offer a way for industry to take greater ownership of the vocational education process and to allow qualifications to be quickly updated to meet to industry needs and changing technology. These schemes would also allow specialised accreditation by reputable professional engineering organisations (so as to by-pass the NZQA/TEC).
- c) There is an increased demand for an increase in both engineering/technical and general skills qualifications but especially at levels 6, 7, and 8. In some sectors immigration strategies are being used, but this is accepted as non- sustainable long – term. Increasingly industry is also looking for generalist skills associated with asset management, management of contract risk and liability, insurance management, procurement, project management, general management including basic finance and accounting, and employee relations.

ELF believes the current vocational education system doesn't generally deliver the needs or quality outcomes sought by an engineering industry - who seek to train across many levels and different specialist areas and sometimes with mixed objectives. The vocational education system needs to be more flexible to accommodate these types of development processes. For example, the idea that learners progress linearly through the Framework by achieving qualifications in a step by step process is outdated and needs to be replaced with more user-friendly qualification structures.

Further, financial incentives and the need to achieve economies of scale have created a number of perverse incentives in the vocational education system. These encourage high volume, low cost programmes and the building of existing capability rather than growing capability to reflect strategic skill needs, changing technologies and social priorities. This has led to variable engagement and even disinterest in smaller and potentially more critical skill programmes which are particularly important in some specialist engineering fields. Changes in the way the current system is structured and financed are necessary to improve vocational education in New Zealand.

Thus the ELF supports the current review of the Government's role in and support of vocational education. In a recent submission to government we concluded:

- a) Reform of some elements of the overall system is essential.
- b) Significantly increased industry and employer involvement will improve the current education outcomes for the engineering and technology sectors.
- c) Industry, employer and professional groups must own and run the proposed Industry Standards Boards (ISBs).
- d) The ISBs must be created early in the process to provide clarity and to bring all parties together to start focusing on the reform process.
- e) Government must provide both seed funding and ongoing operational funding for the ISBs.
- f) A transition programme is required to implement the new vocational education system.

An additional aspect is that without adequate numeracy and basic STEM education the transition from primary to secondary schooling and into the vocation and education training system can be fraught, and the prospects for future work opportunities significantly limited. Regionally located schools, especially primary schools, appear to suffer most from a lack of STEM education capability. The Tomorrow's Schools Taskforce has suggested the establishment of regional hubs to take greater management responsibility leaving schools to focus on education. ELF has proposed that a group of experienced STEM teachers could be placed within each of the hubs, and that they would be tasked with monitoring STEM education processes and outcomes and provide schools support where and when it was needed.

4. The innovation system

Chapter 6 discusses the low level of innovation and capability within New Zealand firms and what could be done to improve the situation. An innovative firms sector will not only deal with challenges from new technologies more effectively, it may be able to exploit the situation to develop new products and services for export.

The Commissions 2018 issues paper on the low-emissions economy argued that the weaknesses in our science and innovation system was a significant factor as to why NZ has low rates of business R&D investment and labour productivity. The ELF agreed with this analysis and made additional commentary, which we repeat here in summary:

- NZ's science and innovation system is based on untargeted science investments, selected by scientists for scientists. Consequently, we produce world class scientists across numerous fields of endeavour but we lack institutions that deliver technology solutions for businesses.
- The disconnect between our manufacturing and technology-based businesses and the Universities and Crown Research Institutes that has evolved was discussed in detail in 2011 in the 'Powering Innovation' report. Knowledge and capability in technologies relevant to the development of business and technology change remain scattered in small pockets across the fifteen Universities and CRIs without coherence, focus or collaboration.
- The PBRF system actively supports this by requiring university research to focus on internationally relevant science and not on problems facing NZ firms.
- NZ can progressively develop a larger and more sophisticated and growing technology-based export sector and a diversified hi-tech economy that is adaptive to technology change by tapping into our world class science system as proposed by Sir Paul Callaghan eight years ago, and by the Government focusing more resources on the needs of the manufacturing and technology-based business sectors.
- Real and sustainable innovation on a scale that is relevant can only be led by existing firms and can be accelerated by creating innovation hubs at a sector level such as is undertaken by the Auckland University based Product Accelerator.
- Numerous studies including the authoritative Treasury 2025 Taskforce have argued that R&D tax breaks are a very inefficient way of improving innovation, innovative investments, nor creating innovative environments – for example encouraging firms to collaborate in innovation.
- Governments play a critical leadership role in creating innovative economies, organising research and technology transfer to firms, and proactively leading transformational developments (such as the transition to a low carbon economy).

(References in support of these comments are attached.)

Finally, we note that with the restructuring of standards NZ, and its relocation into MBIE, standard development has reduced, and standards are not being updated, with many becoming increasingly out of date and out of step with international developments. This situation, left unchecked, will have an increasingly negative impact on innovation and investment. We would be pleased to brief the Commission in detail on this issue.

5. Answers to selected questions

Q17 How well do the current outcomes from the education and skills system position New Zealand to respond to changing technology and different future scenarios?

Poorly, as discussed above.

Q22 What factors underpin New Zealand's apparently poor matching of skills with jobs? To what extent are mismatches a problem?

The current VET system is inflexible and slow to adapt to changes in firms needs.

Q24 How well does New Zealand's education and training system reflect the changing skill needs of industry? Is the education and training system able to effectively respond to changing technology and different future scenarios?

As discussed above, the proposed changes to the VET system are necessary to properly involve the firms and employers and to create programmes that are more relevant.

Q25 What programmes exist to support people to retrain, upskill or adapt to changing technology, and how effective are they?

This is an area that needs to be addressed in the VET reform process to ensure shorter and focused education and training programmes are available that encourage transitions for mature workers across industries.

Q27 How might the incentives for firms to invest in staff training change under each of the Commission's future scenarios? Under which scenarios would there be a case for greater government investment in firm-based training?

By definition technology change and VET schemes that relate are on the margin of existing programmes and as discussed, the way the system is currently funded and incentivised, these courses are often not being offered – the system is locked into a status quo state. The government needs to proactively fund the cutting edge technology-based programmes that will be needed.

Q28 What changes are needed to provide prospective students, including adults and those already part-way through a career, with the skills needed to make informed decisions about education and careers?

Refer the prior two answers.

Q 29 Which barriers to competition and investment should be priorities for reform in a government innovation strategy?

The principle objective of the innovation system needs to be the creation of innovative environments where existing firms can access new technologies from the universities and discuss potential collaborations with other firms.

Q 30 Are there particular regulations or areas of regulation that will need to be updated to maximise the benefits from technological change? Do these areas differ, depending on the future scenario?

Standards development, as discussed.

Q 31 What changes, including to government funding for R&D, might be needed to improve the returns to firms from innovation?

As noted, the problem is not a funding one, as firms will always innovate when opportunities present themselves. What is lacking is an environment where new innovation opportunities can be created by firms in collaborative discussions, and supported by science and technology advice such as occurs with the Product Accelerator programme hosted by Auckland University.

Q32 What steps should be taken to promote technology transfer and build absorptive capacity in New Zealand firms?

The critical technologies underpinning manufacturing and ICT development all sit within the NZ university system (not in the CRIs or Callaghan). The PBRF acts as a major disincentive for university researchers to work with NZ firms.

References on innovation

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