



## Skills and innovation – a forum discussion starter

Based on research by Dr Phil Toner for the BVET conference

### The shape and importance of innovation

*Innovation is usually defined broadly.*

Innovation is usually defined very broadly. It is typically measured as expenditure on items for the introduction of new goods and services, such as R&D, new plant and equipment (and related training), acquisition of licences and patents, and new operational processes.

It also includes expenditure on activities which are intended to improve the performance more generally such as new organisation structures or substantially changed corporate direction.

Unsurprisingly, given the breadth of this definition, official surveys find that a large proportion of firms within OECD countries are deemed to be innovative.

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Such improvements typically arise from lessons learned in the development process and from feedback from users. This feedback loop also applies to suppliers of equipment and services, and explains the high proportion of firms that identify suppliers as an important source of innovation.

Technology diffusion is also crucial, especially given the importance of new capital investment and the central role of direct production employees in the installation and maintenance of this equipment.

ABS data shows that in Australia:

- Just four industries – manufacturing, wholesale trade, finance and insurance, and property and business services – account for around 70 per cent of innovation expenditure. This is nearly three times their share of GDP.
- ‘Traditional’ industries such as manufacturing and mining are

*Just over 2 per cent of all businesses account for 56 per cent of total innovation expenditures.*

innovation and R&D-intensive, and employ a high proportion of VET-level occupations.

- While 34 per cent of Australian businesses undertake some form of innovation, most innovation expenditure is undertaken by large firms (more than 100 employees). This means that just over 2 per cent of all businesses account for 56 per cent of total innovation expenditures. In NSW, just 1000 firms account for three-quarters of total innovation expenditure.

Since only a very small proportion of all firms in Australia account for most innovation expenditure, and a high proportion are foreign owned, the nation's pool of major innovative enterprises is not only very small but also potentially fragile. For example, the automotive sector accounts for 10 per cent of total business R&D, but the industry is under increasing competitive pressure.

Technical and organisational innovation is crucial. For example, it is the principal source of productivity improvement, which in turn leads to increases in real income per person.

Innovation-intensive products and services are a rapidly rising share of world trade, which in turn is a rapidly rising share of the output of developed and developing countries. In this light, it is sobering to note that Australia continues to run ever increasing trade deficits in innovation-intensive products.

### **The role of skills in innovation**

*Most of the factors which stimulate innovation also stimulate training.*

Most of the factors which stimulate innovation also stimulate training. The fundamental purpose of vocational training is the transmission of economically useful knowledge. Industries which experience comparatively rapid changes in the knowledge base require more intensive training to transmit this knowledge.

The importance of incremental innovation and the role of learning by doing and using which are inherent in the innovation process provide an important avenue for the involvement of direct production workers in the innovation process.

*Only 8 per cent of innovating firms nominate universities as the source of their innovation ideas.*

Skilled production, trade and technician occupations can make a key contribution to the generation, design, installation, adaptation and maintenance of new technologies.

For example, 80 per cent of firms nominate 'within the business' as the sources of ideas or information for product and process

*Production employees are identified as far more important sources of innovation ideas than R&D staff.*

innovation, 65 per cent nominate 'clients or customers', and 44 per cent equipment suppliers. Only 8 per cent nominate universities.

Likewise, when managers were asked which workers within their business contributed ideas for new products and processes, they identified production employees as far more important sources of ideas of innovation than most other broad occupational groups, including R&D staff.

The involvement of direct production workers in innovation is governed by a number of interrelated factors, including:

- Differences in national VET systems, particularly the extent of higher level VET training, which provides the underlying practical and theoretical skills for product and process improvement. For instance, a high proportion of the workforce in Germany and Japan combine a good basic education with high level vocational qualifications or skills. Both countries run large trade surpluses in middle technology products.
- Work organisation arrangements within and between firms that encourage the involvement of the whole workforce in product and process improvement. Of particular importance is the role of quality systems, which have as their core objective product and process improvement.
- Pursuit by firms of competitive strategies based on product and process innovation.

*High-skill equilibriums can operate widely across industry or be restricted to 'islands of excellence'.*

The presence of these three key factors gives rise to the notion of a self-reinforcing 'high-skill equilibrium'. Across national economies, this equilibrium can operate across a large proportion of industries or in a relative few 'islands of excellence'.

### **Conclusion**

The concentration of innovation expenditure in relatively few industries and (large) firms raises the question whether VET and other forms of innovation support should be targeted at these sectors (cost-effectiveness) or focused on the sectors that lag (dissemination).

VET-trained occupations play a crucial role in industry innovation. Also, the same factors stimulate both innovation and training. But questions have been asked as to whether VET models and systems are best attuned to seizing the opportunities that this represents.