

## Appendix 4. The Role of Science, Research and Technology in Lifting Australian Productivity

### Introduction

Building the industries of the future through enhanced productivity will require increased investment in research and development, a commitment to innovation, better links between business and research, focused international collaboration, and the effective training and use of an innovation-capable workforce.

The report by the Australian Council of Learned Academies (ACOLA), SAF04 *The Role of Science, Research and Technology in Lifting Australian Productivity* (<http://acola.org.au/wp/project-4/>) identifies opportunities for applying knowledge and skills in science and research across a range of industries and sectors to enhance innovation, creativity and productivity, and recommends business practices that will drive Australia's prosperity. The report draws on the authors' expertise in government, business, science, technology, economics and communication.

The report finds that innovation – including research, science and technology – is the key to increasing productivity in the economy, by lowering the cost of production, improving the quality of goods and services or by introducing new products to the market.

### Manufacturing in Australia

Manufacturing is important to Australia's economy. In 2014–15 it accounted for around 6 per cent of GDP (\$104 billion), 11 per cent of employment, 25 per cent of business research and development and 34 per cent of merchandise exports.

However, the sector faces many challenges. In recent decades, manufacturing's contribution to GDP has fallen, while the contribution of the services sector has increased. The success of Australia's future manufacturing industries will depend on technological innovation, a shift to advanced manufacturing, integration with services, international connectedness and enhanced participation in global value chains.

Small and medium-sized enterprises are major employers and an important source of new products and services. Such enterprises account for nearly half of Australia's private sector employment. Improvements in productivity will largely depend on the collective performance of many individual firms.

Australian firms need to increase their research and development to position themselves in new, high-technology, niche industries. They should become better linked with global value chains, which provide the ability to share knowledge, processes and skills, and can initiate longer term collaborations.

The sector offers good opportunities for those with STEM qualifications and a mix of technical and commercial know-how and problem-solving skills. Further advances in technology will require highly skilled workers in all parts of the development-to-market process, particularly within high-value-added manufacturing.

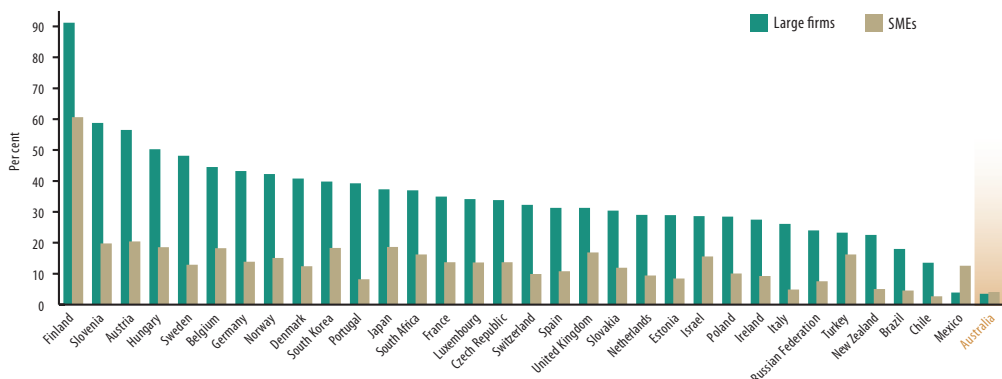
Businesses find continual change to government assistance programs confusing. More stability is needed and unnecessary changes should be avoided. Difficulties in raising capital continue to be a major barrier to business growth. New measures are needed to assist start-ups, such as crowd funding, tax concessions for investors in start-up companies, and reform of the tax treatment of employee share options.

## The benefits of collaboration

Collaboration with researchers can provide businesses, particularly small and medium-sized enterprises, with opportunities to boost productivity. Australian businesses collaborate less than their international counterparts. Small and medium-sized enterprises are even less likely to collaborate than larger firms. Increasingly we are a net importer of technology and know-how and rely on foreign direct investment for technology more than most other OECD countries.

There are systemic barriers to increasing collaboration. We can learn from successful measures used in other countries to promote collaboration. There are some examples of well-established policies and programs that are effective in helping to build and sustain business.

International collaboration could help to address declining productivity and trade performance in key sectors, such as the food industry. Australia's small and medium-sized enterprises find it difficult to participate in global supply chains, but there are considerable benefits when they do so.



Australian firms have low levels of international collaboration. Firms engaged in international collaboration by firm size, 2008–10, as a percentage of product and/or process innovative firms in each size category. (Source: OECD, based on Eurostat (CIS-2010) and national data sources, June 2013)

## An innovative workforce

Skilled labour is one of the key contributors to productivity gains through innovation. Requirements for an innovative workforce include skills in reading, writing and numeracy, information and communications technology, management and leadership; and academic, analytic and social skills.

Effective workplace training is important in building an innovative, capable workforce, as well as having a positive correlation with business performance. It also has an important role to play in meeting the demand for skills and addressing skills shortages.

Innovation needs to be valued and supported at every level with a risk-tolerant culture that allows diversity, flexibility and inclusivity. Businesses need to ensure that opportunities and incentives are provided for all staff to contribute ideas and that processes are in place through which ideas can be translated to outcomes.

Encouraging the take-up of good management behaviour could be the single most cost-effective way for governments to improve the performance of their economies. There is a need to improve management education and equip science and engineering graduates for innovation and leadership.

## Productivity and economic growth

Over recent decades, productivity growth has played a major role in the growth of the Australian economy. This was particularly the case during the mid-1990s, generally attributed to microeconomic reform and the uptake of information and communications technology.

Recently there has been concern in Australia and other developed economies about the apparent slowdown in innovation and productivity growth. Australia has suffered a reduction in labour productivity in all sectors except construction.

Public sector research and development expenditure by Australian government research agencies, the Australian Research Council and the universities has wide benefits and is an important source of gains in productivity. Moreover, private sector research, innovation and other intangibles benefit the community as well as business.

Australia's gross expenditure on research and development has been growing in recent years. Our research intensity (gross expenditure on research and development as a share of GDP) has also increased and is starting to approach the OECD average.

Increasing the levels of research and development in the medium term to at least the OECD average should be a policy objective.

## Conclusion

Enhancing creativity and innovation to lift productivity in Australia will require:

1. adopting technological innovation to develop high-value products and services for a global market;
2. improving collaboration between businesses, and between business and publicly funded research;
3. increasing international collaboration; and
4. ensuring an innovative workforce that combines technical and non-technical disciplines, and enables good business management.

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