Interim Report

Referral of inquiry

1.1 On 18 March 2014, the Senate referred the following matter to the Senate Economics References Committee (committee) for inquiry and report by the first sitting day of July 2015:

> The challenges to Australian industries and jobs posed by increasing global competition in innovation, science, engineering, research and education, with particular reference to:
>
> (a) The need to attract new investment in innovation to secure high skill, high wage jobs and industries in Australia, as well as the role of public policy in nurturing a culture of innovation and a healthy innovation ecosystem;
>
> (b) The Australian Government's approach to innovation, especially with respect to the funding of education and research, the allocation of investment in industries, and the maintenance of capabilities across the economy;
>
> (c) The importance of translating research output into social and economic benefits for Australians, and mechanisms by which it can be promoted;
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> (d) The relationship between advanced manufacturing and a dynamic innovation culture;
>
> (e) Current policies, funding and procedures of Australia's publicly-funded research agencies, universities, and other actors in the innovation system;
>
> (f) Potential governance and funding models for Australia's research infrastructure and agencies, and policy options to diversify science and research financing;
>
> (g) The effectiveness of mechanisms within Australian universities and industry for developing research pathways, particularly in regards to early and mid-career researchers;
>
> (h) Policy actions to attract, train and retain a healthy research and innovation workforce;
>
> (i) Policy actions to ensure strategic international engagement in science, research and innovation; and
>
> (j) Policy options to create a seamless innovation pipeline, including support for emerging industries, with a view to identifying key areas of future competitive advantage.

1.2 On 24 March 2015, the Senate granted an extension to the committee to report by 10 August 2015. On 15 June 2015, the committee received a further extension to report by 15 October 2015.

Conduct of inquiry

1.3 The committee advertised the inquiry on its webpage and in *The Australian*, calling for submissions to be lodged by 31 July 2014.

1.4 To date, the committee has received 181 submissions and has held four public hearings.

1.5 The committee has agreed to table this interim report and to request an extension to present a final report no later than 25 November 2015.

Context of inquiry

1.6 The Organisation for Economic Co-operation and Development (OECD) guidelines on innovation data (the Oslo Manual) defined innovation as the 'implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations'. It added:

> This broad definition of an innovation encompasses a wide range of possible innovations…The minimum requirement for an innovation is that the product, process, marketing method or organisational method must be new (or significantly improved) to the firm. This includes products, processes and methods that firms are the first to develop and those that have been adopted from other firms or organisations.[1]

1.7 The Commonwealth Scientific and Industrial Research Organisation (CSIRO) noted that, while innovation is defined broadly as the 'process of translating an idea or invention into a good or service that creates value, and for which a customer will pay, it is not an end in itself: it is a means to an end'. CSIRO continued:

> The ends can be a broad range of economic, social and environmental benefits that drive national wellbeing, prosperity and development, including through the development of new products and services, better functioning societies or through improved public sector productivity.[2]

1.8 As a case in point, Engineers Australia highlighted that innovation in engineering encompasses an 'end-to-end process, such that it extracts value through implementation'. It noted that innovation involves:

- Creating or generating new activities, products, processes and services.
- Seeing things from a different perspective.
- Moving outside the existing paradigms.
- Improving existing processes and functions.
- Disseminating new activities or ideas.

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1 OECD and Eurostat, Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, 3rd edition, 2005, p. 46.

2 Commonwealth Scientific and Industrial Research Organisation, *Submission 36*, p. 4.

- Adopting things that have been successfully tried elsewhere.[3]

1.9 Innovation is fundamental to Australia's growth and preparedness for emerging social, economic and environmental challenges.[4] The Productivity Commission has noted that innovation and 'diffusion of new and better production methods, and the introduction of new goods and services, are the core drivers of productivity growth — getting more, and more highly valued, outputs from any level of inputs'.[5]

1.10 The OECD has stated that the 'capability to innovate and to bring innovation successfully to market will be a crucial determinant of the global competitiveness of nations over the coming decade'. It noted that innovative activity is 'the main driver of economic progress and well-being'.[6]

1.11 Similarly, Professionals Australia noted that innovation is 'a driver of both productivity and economic growth as shown by the United States where half of the economic growth in the last 50 years can be attributed to scientific innovation, despite a decline in mining productivity'.[7]

1.12 The point was made in evidence to the committee that an innovation system is crucial to driving national productivity and competiveness and to generating national wealth.[8] CSIRO highlighted that:

> With over 60 per cent of Australia's productivity growth due to innovation, it is clear that Australia's future prosperity in large part relies on the ability of our innovation system to translate research and development outputs into innovative new products and services that enable Australia to remain internationally competitive.[9]

1.13 Innovation has had a positive impact on Australia's economy 'with strong relationships demonstrated between innovation and productivity growth, firm competitiveness and trade'.[10] In 2007, the Productivity Commission found that around 65 per cent of economic growth per capita from 1964–65 to 2004–5 could be ascribed

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3 Engineers Australia, *Submission 46*, p. 4.

4 Department of Industry, *Submission 110*, p. 5; Engineers Australia, *Submission 46*, p. 10; Ernst & Young, *Submission 52*, pp 2–3; Community and Public Sector Union and the CSIRO Staff Association, *Submission 159*, p. 5.

5 Productivity Commission, *Annual Report 2007–08*, 2008, p. 1.

6 Organisation for Economic Co-operation and Development, *Innovation and Growth – Rationale for an Innovation Strategy*; cited in Ernst & Young, *Submission 52*, p. 3.

7 Professionals Australia, *Submission 117*, p. 4. See also Engineers Australia, *Submission 46*, p. 3.

8 Mr Craig Roy, Commonwealth Scientific and Industrial Research Organisation, *Committee Hansard*, 27 July 2015, p. 1.

9 Commonwealth Scientific and Industrial Research Organisation, *Submission 36*, p. 4.

10 Innovation Australia, *Submission 157*, p. 2.

to improvements in the country's use of capital and labour, made possible by innovation.[11]

1.14 Nevertheless, the point was made that a key determinant in lifting the country's productivity performance going forward will be how effectively we unleash innovation.[12] In this regard, Australia's history of research and technological advancement was highlighted, given the country's highly educated population and world-class research facilities.[13]

1.15 The Community and Public Sector Union and the CSIRO Staff Association made the point that as almost all modern activity is influenced or facilitated by scientific innovation, 'any society that devalues or rejects science and innovation, will be left behind'.[14] The Australian Academy of Technological Sciences and Engineering noted that Australian industry 'must be prepared to embrace innovation and research'.[15] The Department of Industry suggested that innovation 'requires sustained effort from both private and government sectors':

> …not only to invest in new ideas, but to build capacity to be able to execute those ideas. Where there are market failures, government is well placed to assist and facilitate improved economic outcomes.[16]

1.16 According to the Community and Public Sector Union and the CSIRO Staff Association:

> A strategic approach to diversify and build scientific capabilities for Australia's interests would maximise the impact across the whole of government, business and industry sectors.[17]

1.17 However, evidence to the committee emphasised that Australia's innovation capacity is limited by structural and cultural barriers.[18] This reality is reflected in statistics that reveal that only 1.5 per cent of Australian companies developed 'new to the world innovations' in 2011, compared to figures of 10 to 40 per cent for businesses in other OECD countries.[19] As of 2008, an estimated 98 per cent of new technologies were sourced from outside Australia.[20] At the same time, Australia remains a low

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11 Productivity Commission, *Public Support for Science and Innovation*, Research Report, 2007, p. 110.

12 Business Council of Australia, *Submission 175*, p. 3.

13 Professor Ed Byrne AC, Monash University, *Submission 1*, p. 1; Engineers Australia, *Submission 46*, p. 4.

14 Community and Public Sector Union and the CSIRO Staff Association, *Submission 159*, p. 5.

15 Australian Academy of Technological Sciences and Engineering, *Submission 96*, p. 2.

16 Department of Industry, *Submission 110*, p. 6.

17 Community and Public Sector Union and the CSIRO Staff Association, *Submission 159*, p. 41.

18 Chief Scientist for Australia, *Submission 20*, p. 1; Engineers Australia, *Submission 46*, p. 7.

19 Chief Scientist for Australia, *Submission 20*, p. 2. Professional Australia made a similar point—it noted that the figure for New Zealand is 20 per cent. *Submission 117*, p. 4.

20 Cutler & Company, *Review of the National Innovation System*, 2008.

level performer in both business and government expenditure in research and development.[21]

1.18 The inquiry has identified a number of factors which serve as barriers to the flow of ideas, mobility and funding between public and private sectors and ultimately limit or impede innovation. Some of these factors and impediments highlighted to the committee in evidence include:

- A lack of an innovation culture and appetite for risk – as innovation is largely about market experimentation, risk of failure needs to be accepted or at least tolerated.[22]
- Low levels of mobility between business and public sector research and development – only 30 per cent of researchers in Australia work in industry. This figure compares to the OECD average of 60 per cent and the United States figure of 80 per cent.[23] Conversely, only four per cent of Australia's large firms collaborated with research organisations and only a slightly higher proportion of small-to-medium sized enterprises (SMEs).[24]
- Translating Australia's highly regarded research into economic outcomes – the limited commercialisation and conversion of research for economic advantage and the need to ensure that research infrastructure addresses the industrial, social and economic problems of significance to the nation.[25]
- Lower innovative activity amongst SMEs when compared to larger firms – 74 per cent of large businesses in 2012–13 were classified as innovation active, compared to 34.7 per cent of businesses with 0–4 employees, 51 per cent of businesses with 5–19 employees and 63.4 per cent of businesses with 20–199 employees.[26]

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21 Community and Public Sector Union and the CSIRO Staff Association, *Submission 159*, p. 41.

22 Chief Scientist for Australia, *Submission 20*, p. 1; Mr Nick Wong, *Submission 3*, p. 1. Engineers Australia, *Submission 46*, p. 8. The Department of Industry noted that 70 per cent of innovation investment was directed to incremental innovation with 30 per cent directed to radical innovation. While radical innovation generally entails greater risks, the rewards to business and the economy are also generally far more significant. Department of Industry, *Submission 110*, p. 5.

23 Chief Scientist for Australia, *Submission 20*, p. 2. See also Department of Industry, *Submission 110*, p. 18.

24 Chief Scientist for Australia, *Submission 20*, p. 2 Keech Australia, *Submission 17*, p. 2. Australian Council of Trade Unions, *Submission 45*, p. 5.

25 Professor Rachel Parker, Queensland University of Technology Business School, *Committee Hansard*, 27 July 2015, p. 28; Australian Academy of Technological Sciences and Engineering, *Submission 96*, p. 2; Professor Edward Byrne AC, *Submission 1*, p. 1; Queensland University of Technology, *Submission 58*, p. 4.

26 Australian Bureau of Statistics, 'Innovation in Australian Business 2012–13, cat. No. 8158.0.

- An unconducive climate for innovators – such as a lack of support from financial markets; limited skills in business management; difficulty in accessing global supply chains and a poor intellectual property strategy.[27]
- Declining participation rates of Australian students in science subjects and of tertiary students studying science and engineering – Australian ranked 73rd of 143 countries in the *Global Innovation Index 2014* in terms of the percentage of total tertiary graduates that studied science and engineering.[28]
- Challenges in measuring the contribution of the creative industries (including traditional arts, design and architecture sector, new media and digital growth areas) and the importance of cultivating creative skills and linking designers with researchers, educators, enterprises and government.[29]

Purpose of this report

1.19 The purpose of this report is to generate further discussion and evidence regarding Australia's innovation system. As a means of encouraging further debate, the report makes public an issues paper provided to the committee by Professor Roy Green. The paper is provided at Attachment 1.

1.20 Professor Green was contracted by the committee as an expert consultant for the purposes of the inquiry. In publishing Professor Green's issues paper, the committee's intention is provide context to key and emerging issues of relevance to the inquiry, identify and explore some of the challenges and obstacles in relation to Australia's innovation system, and to generate discussion on how these challenges could be addressed. In its final report therefore, the committee will endeavour to identify and explore methods to address these challenges and to forge closer linkages and collaboration between government, industry and research bodies.

27 Chief Scientist for Australia, *Submission 20*, p. 2; Engineers Australia, *Submission 46*, p. 7.

28 Cornell University, INSEAD and WIPO, *The Global Innovation Index 2014: The Human Factor in Innovation*, Country Profile – Australia, 2014, p. 145.

29 Professor Stuart Cunningham, Australian Research Council Centre of Excellence for Creative Industries and Innovation, *Committee Hansard*, 27 July 2015, p. 35; Mr Rod Glover, *Committee Hansard*, 3 August 2015, p. 29. Australian Design Alliance, *Submission 180*, p. 2. The Global Innovation Index identified cultural and creative services exports as a weak variable, ranking the country 52nd in relation to this indicator. Cornell University, INSEAD and WIPO, *The Global Innovation Index 2014: The Human Factor in Innovation*, Country Profile – Australia, 2014, p. 22.

Recommendation

1.21 The committee recommends that the Senate extend the inquiry reporting date to 25 November 2015.

Senator Sam Dastyari
Chair

Attachment 1

Senate Inquiry into Australia's Innovation System
Issues Paper

Professor Roy Green