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Submission to Productivity Commission

# ATSE SUBMISSION ON 5 YEAR PRODUCTIVITY INQUIRY: INNOVATION FOR THE 98%

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# ATSE SUBMISSION ON 5 YEAR PRODUCTIVITY INQUIRY: INNOVATION FOR THE 98%

The Australian Academy of Technological Sciences and Engineering (ATSE) is a Learned Academy of around 900 independent, non-political experts helping Australians understand and use technology to solve complex problems. Bringing together Australia's leading thinkers in applied science, technology, and engineering, ATSE provides impartial, practical, and evidence-based advice on achieving sustainable solutions and advancing prosperity.

ATSE welcomes the opportunity to respond to the Productivity Commission's consultation on Australia's 5-year Productivity Inquiry, Interim Report 3. To support the measurement and uptake of innovation diffusion in Australian businesses, ATSE recommends:

**Recommendation 1:** Utilise more comprehensive metrics and scorecards to capture innovation activity.

**Recommendation 2**: Establish a definition for SMEs, in line with international definitions, for the purpose of international comparisons of innovation activity.

**Recommendation 3**: Invest in workplace learning incentives for businesses to develop and deliver training for priority areas such as digital skills.

**Recommendation 4**: Continue to support and fund collaborations between university researchers and industry.

**Recommendation 5:** Incentivise industry to invest in research and development, including through a collaborative premium on the R&D tax incentive and help manage the risk in the research and development process.

**What you measure, you optimise**

The interim report's measures of innovation are focused primarily on research and development activities as this reflects the focus of government innovation policy efforts in Australia and Internationally. However large amounts of innovation activity – defined by the Productivity Commission as the process of generating value by creating, adapting, or using knowledge and technology to introduce new or improved products or internal business processes – does not involve R&D.

ATSE's prior contribution to the Productivity Commission urged that the metrics used to guide public policy be revised to include intangible assets such as software. Although intangible assets are becoming an increasingly important component of investment in industrialised economies, innovation metrics do not reflect this importance. These intangible assets are not accounted for in current measurement scales, resulting in a lack of correct information for policymakers to act on.

The recently released Innovation Metrics Review, in which ATSE participated identified the following actions to enhance Australia's level of innovation measurement:

- Ongoing analysis of the innovation systems to assess existing information measures and identify new and emerging needs and information gaps to maximise the value of the large amounts of data being generated and available.
- Regular measurement of the Australian innovation systems with a scorecard: scorecards can cut through the complexity and quickly communicate the most important aspects of

innovation. An Innovation Metrics Scorecard should be reported annually to Government and regularly reviewed.

- Better data and metrics to measure innovation: coordinating with the other National Statistical Offices (NSOs) who are experiencing the same innovation measurement challenges-
- Leadership in innovation measurement- appointment of a single entity with a whole-of-government remit to provide national leadership of innovation measurement and reporting.

ATSE recommends implementing these measures to better capture the extent of innovation nationally; this would help develop policies to uplift the innovation ecosystem in the broader economy.

The report also examined conceptual frameworks to measure innovation including novel approaches in metrics and data collection that better measure innovation in Australia.

The literature review found that metrics should capture more robustly intangible inputs to innovation, such as human capital and the value of networks. Assessment of innovation inputs must go beyond funding and R&D personnel, and look to culture, knowledge flows, skills, and training. Measurement of innovation processes must look at:

- Absorptive capacity (a firm's ability to recognise the value of new information, adopt it, and apply its market-capability to commercial ends)[1],
- Management capability[2] (the approach to the management of an organisation - this is a key factor cited in the literature in determining the success of innovation in firms), and
- Collaboration (having more granular indicators of inter-firm knowledge flows, collaboration among research organisations based on publications, and indicators of relationship capital[3] and collaboration capability).

Assessments of innovation processes should be guided by EU and OECD developments in assessing eco-innovation and apply similar assessments that are appropriate for Australia. Eco-innovation is the development of products and processes that contribute to sustainable development, applying the commercial application of knowledge to elicit direct or indirect ecological improvements.

R&D should not be the sole measure of innovation output. ATSE urges looking to case studies for a more holistic view of innovation impacts and entrepreneurial innovation. ATSE suggests that the Productivity Commission uses the findings of the Innovation Metrics review to revise and modernise its indicators of innovation.

Separate measures should be used by the Commission to account for research and development. Research can be defined as when original and planned investigation, is undertaken with the prospect of gaining new scientific or technical knowledge and understanding. Development, on the other hand, is the application of research results or other information to a plan or design in order to produce improved products, processes, systems, or services before commercial production or use. Most service innovation is likely to involve the development side of R&D rather than research. Traditional indicators are becoming increasingly insufficient and misleading. Innovation in services is also more likely to be

[1] Absorptive Capacity = function (R&D Capability, Marketing Capability, Operations Capability) (Narasimhan et al., 2006)

[2] The Australian Bureau of Statistics (ABS) led a comprehensive project to survey management capability in its Business Characteristics Survey (Results at http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8172.02015-16?OpenDocument). The survey covers areas such as culture of promotions, decision making, and technological awareness. While this approach was based on a broad set of management practices, a similar approach could focus on innovation-related management practices

[3] Value inherent in a company's relationships with its customers, vendors, and other important constituencies.

non-technological, involving organisational and marketing improvements. As a result, accounting for both research and development as independent metrics would greatly improve the ability to capture the level of innovation occurring.

Most innovation metrics fail to capture the deep knowledge embedded in Indigenous Knowledge and its capacity to contribute to a sustainable future. Measurements of innovation should understand and include innovation drawn from Indigenous Knowledge.

The significance of digital technologies for innovation in services means that a firm's investment in such technologies might be a good indicator of innovation input effort. In addition to having a strong understanding of innovation, it is critical to clearly define the target group when establishing policies to enhance the 98% of businesses that do not engage in innovation, as stated in the paper. These businesses are more likely to take up disruptive general-purpose technologies[4] that have been previously developed in other industries such as mobile internet (which is estimated to have a potential impact of US$10.8 trillion on the global economy by 2025 through its applications (McKinsey Global Institute, 2013)). Adoption of general-purpose technologies and adopting disruptive digital business solutions like email, launching a business website, or connecting to two-sided digital platforms contributes to productivity improvement for SMEs without them being directly involved in R&D.

The vast majority of those 98% would fall under the definition of small and medium-sized enterprises (SMEs). The ABS defines an SME as a business employing fewer than 20 people (Australian Bureau of Statistics, 2002). This includes micro-businesses employing one to four people. The ATO defines a small business as an individual, partnership, company or trust carrying on a business and having an aggregate turnover of less than $ 10 million (Australian Taxation Office, 2020).

These definitions are different to definitions used in European countries, which generally define SMEs as having between 10 and 249 employees, with an annual turnover not exceeding 50 million euros, and/or a balance sheet total not exceeding 43 million euros. In Europe, businesses that employ fewer than ten people are defined as micro-businesses (European Commission, 2016). Because of these definitional differences, comparing SME data is nearly impossible. Standardisation of definitions would help facilitate international comparisons and assist in developing effective policies to foster innovation and dissemination.

**Recommendation 1:** Utilise more comprehensive metrics and scorecards to capture innovation activity.

**Recommendation 2**: Establish a definition for SMEs, in line with international definitions, for the purpose of international comparisons of innovation activity.

**Upskilling workers to improve innovation diffusion**

According to the Interim Report, foreign direct investment, skilled migration, and information sharing through consultants and industry associations are vectors for knowledge diffusion. These should be supplemented by improving local workforce skills and investing in infrastructure (such as high-speed internet as previously called out in ATSE's submission on Australia's productivity performance.

[4] General-purpose technologies are technologies that can affect an entire economy. These are technologies that have the potential to grow and improve productivity such as artificial intelligence (Brynjolfsson et al., 2021)

Workforce skills are important for innovation diffusion capacity, especially in small businesses where there is a larger proportion of workers than in larger companies involved in the implementation of business innovation on the 'shop floor'. SMEs that provide employees with opportunities to develop problem-solving skills and to make use of their knowledge are more likely than others to succeed in developing new products or processes (OECD, 2015).

Skills and training policy settings play a critical role in innovation at the most fundamental level by providing the foundations and skills required to develop new processes, adopt new products, and adapt to changes. Rising investment in intangible assets (i.e., software, designs, new forms of business organisation) has proved to be important for productivity growth, and such intangible assets are often a direct manifestation of human capital built on rising educational attainment and investment in skills (OECD, 2016). Providing accessible educational resources and promoting a culture of lifelong learning is key to the continuous improvement of the innovation ecosystem.

**Recommendation 3**: Invest in workplace learning incentives for businesses to develop and deliver training for priority areas such as digital skills.

**Enhancing knowledge diffusion and innovation through collaboration**

ATSE considers collaboration paramount in the diffusion of innovation and in the innovation process itself. Collaboration – including research collaborations and secondments or internships to bring new skills into a business – is vital since it allows for the spread of knowledge as well as the sharing of risk and capability.

Risk-taking is an important element of innovation and improving the risk-appetite of Australian business is a key enabler to business investment in R&D. (Australian Government, 2022). Government should work to reduce the risks and support the research and development ecosystem and incentivise the industry to collaborate with research organisations and universities. Supporting investment by business through mechanisms like tax credits and patent box's, while current policy do not go far enough in reducing risk for industry.

As argued by ATSE's 2021 submission to the University Research Commercialisation Scheme consultation, efforts focused on just one side of the collaborative coin – universities - are unlikely to boost research translation and commercialisation in the long term: universities are not always best-placed to understand the likelihood of commercial success for a particular piece of research (Australian Academy of Technology and Engineering, 2021, 2022). Government efforts to increase research collaboration and translation must include industry, particularly by creating incentives for industry to invest in R&D. This could include the introduction of a collaborative premium to the R&D tax incentive, as proposed by Universities Australia (Universities Australia, 2017).

**Recommendation 4**: Continue to support and fund collaborations between university researchers and industry.

**Recommendation 5:** Incentivise industry to invest in research and development, including through a collaborative premium on the R&D tax incentive and help manage the risk in the research and development process.

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