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Submission to Productivity Commission

ATSE submission on Australia's productivity performance

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Australian Academy of Technology & Engineering

GPO Box 4776
Kingston, 2604
ACT, Australia
T + 61 2 6185 3240
F + 61 3 9864 0930
E info@atse.org.au

ATSE SUBMISSION ON AUSTRALIA'S PRODUCTIVITY PERFORMANCE

The Australian Academy of Technology 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 how to achieve sustainable solutions and advance prosperity.

ATSE welcomes the opportunity to respond to the Productivity Commissions consultation on Australia's productivity performance. ATSE recommends a three-pronged approach to boosting productivity through targeting STEM education, research and development, and digital infrastructure. As part of this submission ATSE is making the following key recommendations:

Recommendation 1: Invest in educational programs to enable the current and future workforce to develop STEM skills.

Recommendation 2: Increase public investment in research and development, including research translation, to drive fundamental advances in knowledge.

Recommendation 3: Develop policies facilitating investment in knowledge-based capital (KBC) such as data infrastructure and Information Communication Technologies (ICT).

Understanding current productivity levels

The Productivity Commission consultation paper notes that Australia is currently experiencing 'middling' productivity levels and a decline in productivity growth. The most striking aspect of this period of low productivity growth is that it coincides with enormous technological advances. The drop in the productivity statistic alongside technological advances can be understood by the "J-curve of productivity"(Brynjolfsson, Rock and Syverson, 2021). The J-curve of productivity explains that firms move resources towards investment in intangibles, such as establishing new business processes, when new technologies are adopted. This change in resource allocation normally results in a drop in measurable productivity growth as new processes are being learnt. Later, measurable productivity rises because output soars in ways that cannot be described by measured labour and physical material inputs. There is an opportunity to make strategic investments in technology development, deployment and education in digital skills through this transitional period to enhance future productivity growth.

Acknowledging the intangible aspects of productivity

Determining productivity through the productivity growth statistic should not be the sole policy objective. As noted in Brynjolfsson, Rock and Syverson, 2021 the statistics used to calculate productivity fail to account for intangible investments such as software. It is challenging to quantify the productivity-boosting possibility that working in the digital cloud could have on the economy. The pandemic-driven shift to distance education and telemedicine could help drive economies of scale in sectors which have long proved resistant to productivity-boosting measures. Other metrics such as accounting for unpaid household labour are not counted in productivity statistics, but are essential to the operation of society. When considering policy interventions to increase productivity growth, it is critical that the Productivity Commission is cognisant of impacts on intangible or undefined investments and labour.

Investing in a technology-ready workforce

ATSE believes investing in STEM and digital skills is one of the most important drivers of future prosperity. In a technology powered and human driven future, an increase in technology knowledge and skills would better enable the workforce to produce more output from available resources.

As outlined in ATSE's pre-budget submission, interventions must urgently be deployed at all levels of learning to develop a skilled STEM workforce. ATSE recommends intervention to support widespread access to programs like ATSE's:

- World class Digi-tech program 'CS in Schools' for school students to develop digital literacy
- Innovative STEM teaching program 'STELR' which develop practical science and engineering skills and inspire students into STEM-powered career paths, and
- ATSE's flagship Industry Mentoring Network in STEM (IMNIS) program that increases industry engagement and cross-sector research and development collaborations by resourcing industry internship and mentoring programs for early-career researchers.

STEM education is vital to develop the STEM workforce, and increasingly important to support the entire Australian workforce. as Digital skills, and STEM competencies such as analytical thinking, logic-based problem solving and synthesis of complex information support companies, agencies and other employers to achieve higher productivity levels (Hajkowicz et al. 2016). To keep building and applying knowledge, policies should promote professional development for the existing workforce, to empower workers to keep up with technological progress.

Recommendation 1: Invest in educational programs to enable the current and future workforce to develop STEM skills.

Increasing productivity through research and development

Policy interventions and targeted investments to incentivise research, development, and translation are fundamental drivers of economic growth. CSIRO's working paper 'Quantifying Australia's returns to innovation' finds that for every dollar invested in research and development in Australia, there is a $3.5 return on investment and a 10 per cent average annual return.

Incentivising discovery and application of new knowledge, and removing barriers to research translation and collaboration, are essential to enhancing productivity. As highlighted by ATSE's submission to the Higher Education Research Commercialisation (HERC) Intellectual Property (IP) Framework consultation, navigating IP negotiations can be a barrier to research collaborations. Providing resources to guide small and medium enterprises and early career researchers to build partnerships and develop IP agreements would support research translation and commercialisation outcomes. Well defined intellectual property rights are vital to provide innovators with the incentive to innovate and to promote knowledge diffusion via the public disclosure of ideas. Initiatives such as the HERC IP Framework, coupled with educative resources as recommended by ATSE's submission to the Framework, are a prerequisite for increasing national productivity through research.

Recommendation 2: Increase public investment in research and development, including research translation, to drive fundamental advances in knowledge.

Investing in infrastructure that supports creating knowledge-based capital

The entire history of recorded human knowledge is now available at our fingertips, and the economy is releasing the full potential of information and communication technologies (ICT) and artificial

intelligence (AI). Knowledge capital is the intangible component that is based on skills employees share with each other to improve efficiency. One of the most significant components that helps in the sharing of knowledge and creating knowledge capital is the web.

The potential of the web to support an economy has been proven by the pandemic. Technologies such as cloud computing and videoconferencing proved their economic worth by facilitating economic activities while physical movement was constrained due to lockdowns. Current and emerging technologies are clearly able to do more than has generally been asked of them in recent years, making the case to focus on a digital-first strategy. To encourage future productivity growth, the government should leverage its position and focus on investments in digital infrastructure, such as broadband speed and network coverage.

Recommendation 3: Develop policies facilitating investment in knowledge-based capital (KBC) such as data infrastructure and Information Communication Technologies (ICT).

References

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