The State of Australia's Manufacturing Industry Now and Beyond the Resources Boom

Australian Academy of Technology Sciences and Engineering

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Submission to the House of Representatives Standing Committee on Economics, Finance and Public Administration into

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Australian Academy of Technological Sciences and Engineering (ATSE)
ATSE is an association of 733 professional men and women of achievement in the application of science, technology and engineering to Australian life. The Academy and the three other established Learned Academies (Science, Social Sciences and Humanities) between them cover virtually all aspects of Australian professional life except the medical specialities. ATSE's mission is to promote the application of scientific and engineering knowledge to practical purposes.

Summary

ATSE's submission is focused on the following two terms of reference for the inquiry; namely:

- the state of the country's manufacturing sector…, and,
- policies for realising these opportunities

ATSE wishes to emphasise the need to gain competitive advantage for the manufacturing industry through innovation, particularly through research, quality and design, and the need to ensure our skills base is world class. Australia cannot compete in mass manufacturing but there are niches we can fill if we innovate. Accordingly, ATSE considers that there needs to be:

- a comprehensive suite of results-orientated incentives provided for the manufacturing industry to be actively engaged in the innovation process;
- strong investment in R&D capability in science, engineering and technology, in publicly funded research institutions (PFRIs);
- strong links forged between PFRIs and businesses involved in the manufacturing industry;
- support the development of 'outreach' programs, based on the establishment of "Innovation Clusters", and
- significantly increased numbers of science, engineering and technology graduates to support enhanced innovation in the manufacturing industry.

Background

Whilst all OECD countries have experienced a reduction in manufacturing as a proportion of GDP over the last few decades, evidence indicates that Australia's manufacturing sector has contracted faster than other OECD economies. Based on the Australian Bureau of Statistics (ABS) analysis of manufacturing data for 2003-04, it has been noted[1] that over the past 25 years, manufacturing has had by far the slowest growth than any other sector of the economy (45% between 1980 and 2005). Official ABS data shows that in 2004/05 manufacturing experienced what appears to be a healthy 6% jump in nominal sales. However, after taking into account price movements, the ABS notes that the sector experienced an overall 0.4% decline in sales volumes, the worst outcome in 14 years.[2]

It is well-recognised that Australian investment in R&D, one key generator of knowledge, is approximately half that of the OECD average, and that this is largely accounted for by a relatively low business investment in R&D. In addition, the structure of Australian manufacturing is dominated by low R&D intensive food and metals industries, and this consequently impacts on our national level of R&D and innovation. [3]

Yet, data suggests that industries experiencing the fastest growing areas of world trade and carrying the greatest productivity and employment benefits are concentrated in the high technology, innovative and knowledge intensive sectors. Further, it is noted that in the case of those organisations that are actively involved in innovation, there is a greater level of engagement with publicly funded research institutions (PFRIs).

Two broad determinants of national investment in R&D have been established: intrinsic factors which address the propensity to invest, and structural factors, which reflect the above argument that different industry sectors have different levels of R&D investment required to remain competitive. The ICT and pharmaceutical sectors are the highest investors in R&D (typically 10% of turnover) and they barely exist in Australia.

ATSE considers the evidence is clear on both counts in Australia. Intrinsically determined investment in R&D is progressively falling further behind that of OECD nations, and significantly behind, in absolute terms, that of emerging economies such as China and India.

Innovation

ATSE regards the support of innovation as an investment in survival as a developed country. The nation's ability to do this depends on the capability of the manufacturing industry at science, engineering and technology.

While there is a commodity boom we prosper, though at the cost of a dramatically rising deficit in our balance of trade, as we are forced to import the necessary goods from countries that do operate in the knowledge intensive sectors. When the cycle turns, our present industry structure may find us desperately uncompetitive although, as the exchange rate for the Australian dollar is basically commodity price driven, manufacturers might derive some benefit should the value fall relative to major trading partners. If the Australian manufacturing industry is to maintain its strength against increasing global competition (particularly from low wage countries such as China) in the export and import competing sector, it must develop new methods and different approaches to address the challenges it faces.[4]

The popular argument circulated by Treasury that Australia does not need an ICT industry – we extract economic advantage through effective application of ICT products in our industries is correct. However, it will mean that it is not possible to gain a competitive edge through using technology widely available to our competitors and will continue to place pressure on the current account.

- Support industry innovation

Only 35% of businesses in Australia are involved in innovation and expenditure on innovation is highly concentrated in a small number of businesses.[5] Clearly, existing organisations are a major source of innovation in Australia.

So, one major strategy to increase the level of innovation in Australia is to increase support and incentives provided to established industry to undertake innovation.

- Encourage more collaboration

Only 8% of firms had cooperative arrangements for their innovation activities[6], and of these about one-third had these arrangements with universities. A fifth of those firms in the top quintile by innovation expenditure had collaborative arrangements for innovation with the publicly funded research institutions (PFRIs), including universities. Clearly, as more firms become actively engaged in the innovation process, they will naturally engage with the PFRIs, particularly if these institutions are prepared to actively market the services they can provide.

The relatively small proportion of firms that are actively involved in innovation need to make greater use of the PFRIs. Linkage grant programs funded by various agencies in Australia are oversubscribed with quality applications. There is certainly a need to further develop policies and provide increased funding for R&D linkage projects between PFRIs and organisations undertaking innovation. It is necessary, in view of the unmet demand, to increase the quantum and/or the effectiveness of funding that is available for the various programs that support linkage with industry, such as the ARC Linkage Grant Program and the Co-operative Research Centre Program.

A very effective mechanism for the manufacturing industry to collaborate with PFRIs and to become engaged with the innovation process is via access to human capital.
One option to consider is for recent graduates and advanced undergraduates to be funded for placement in those businesses that have a history of low level of innovation, but which need to become actively involved in the innovation process. This would be enhanced by complementary funding being provided by firms and ensuring that participating universities actively support and are engaged with these new initiatives.

There is a need to develop policies and to fund programs that enable organisations to both access relevant human capital skills and collaborate with PFRIs.

- Increase the capability to use knowledge generated elsewhere

A frequently quoted statistic is that Australia generates only 2% of the world's knowledge, so must seek the remaining 98% overseas. Many countries, particularly in Europe, are making major investments to strengthen their access to international knowledge, through a variety of programs, such as enabling students to move between universities in many countries during their degree studies (the Barcelona Agreement), supporting students to study abroad for a semester or year, international exchange programs, funding for researchers to participate in international research programs, and funding for the interchange of personnel between PFRIs and industry. The same level of investment for similar programs does not exist in Australia.

There are significant opportunities to establish "Innovation Clusters" in Australia that focus on the manufacturing industry and relevant technologies. The purpose of these clusters is to link,

via innovation/technology borders, the knowledge base with appropriate firms and PFRIs. There has been only limited support for such 'outreach' programs in Australia.

ATSE believes that there is a need to provide substantially increased funding to support 'outreach' programs, based on the establishment of "Innovation Clusters".

ATSE considers that the whole area of 'intellectual property' (IP) and patenting should be addressed alongside the above in order that a more robust commercialisation plan can be produced. Spending by Australian PFRIs on R&D is at a relatively acceptable level on the OECD Scoreboard. However, this R&D is not creating sufficient IP, which, in turn, is not creating sufficient income through commercialisation.

Research Quality Framework

ATSE expresses severe reservations about the proposed introduction of the Research Quality Framework (RQF) to distribute block funding to universities. The proposed RQF Model favours Research Quality over Research Impact and this will have the effect of rewarding academics and institutions that pursue academic outcomes over engagement with industry. Accordingly, there will be fewer incentives for academic staff to be engaged with business; this will have deleterious effects on the level of innovation for the manufacturing industry.

Skills Training

ATSE retains a concern for the Australian education system and the nation's current capability to produce an adequate supply of qualified labour to meet the manpower requirements of a future technologically-based internationally competitive manufacturing sector.

The concerns are based firstly on the current state of schooling in areas such as mathematics and the physical sciences that underpin subsequent technological training, as well as professional courses in engineering and applied sciences. End of school certification in most States fails to differentiate achievements in these conceptually more demanding areas of study, leading to decreased levels of enrolment. The result is not only a decrease in the relevant capabilities of those entering technological training, but also a progressive lowering of the capability of schools to teach these disciplines, since fewer people qualified in these disciplines enter teacher training.

Secondly, decreased readiness in these prerequisite areas of study for many entering university has resulted in a lowering of standards in many areas of professional training.

ATSE recognises the complexity of the social changes that have led to this situation. However, it believes that there is currently little will in either level of government to address the inappropriateness of the embedded culture of schooling, and the attitudes that tolerate low levels of achievement in those subjects in which knowledge and skills must be accumulated through the years of schooling. While it might be possible to acquire isolated elements of knowledge in some areas of learning, this is not the case in mathematics and physical sciences, where it must be accumulated with both attitudes to quantitative work and technological inventiveness being underpinned by mastery exhibited in demanding examinations.

The manufacturing industry recognises the importance of having a 'world class' skills base on which to base any future success. In the recent Australian Industry Group report, World Class Skills for World Class Industries[7], it states that, 'Skills matter – for individuals, for employers and for nations. World class firms, which make up world class industries, are those that survive and

prosper in an increasingly open global economy. At a very broad level, and using the indicator of productivity growth, Australian firms appear to have improved their standing against those in other countries in recent years, but Australian industry is not yet in aggregate 'world class''. In addition, it was reported that firms believed that skills shortages would be a significant threat to their competitiveness over the next 3 years, with the inability to secure skilled staff being cited as a major potential barrier to success.

In the Australian Industry Group's report, Achieving Global Fitness[8], a number of issues were identified; the key issues being:

- measures to further globalise Australian industry (in particular expanding Australia's skilled migration program to assist the growth of Australia's skills base in support of domestic measures to address skills shortages);
- building world class capabilities (in particular implementation of a whole of government strategy to lift business capability by providing advisers who are able to assist business with growth strategies and link them to industry and government initiatives available to support their business plans). ATSE considers that a 'whole of nation' strategy may be more appropriate, incorporating issues such as population, immigration, education, industry, savings and investment and,
- becoming a more skilful global competitor (in particular increase the overall spending on education and training, and improved access to recognition of skills for existing employees).

ATSE has a concern with the present Government policy of using skilled migrants to address the failure to train a sufficient number of Australians. In an increasingly competitive global market for skilled workers and professionals, Australia faces the prospect of falling behind if it is incapable of training its own.

The Way Forward

It is evident that there is a strong correlation between a thriving knowledge base, excellent (and well supported) innovation and a 'booming' economy. If Australia is to 'ride out' the resources boom and become a key player in the global market, we must make greater strides down the technology/innovation path – including 'educating' the population to become more technologically knowledgeable and receptive to innovation. Australia needs to embrace the more innovative manufacturing industries instead of focusing predominantly on its basic resources. In addition, industry must be encouraged to adopt more technological innovation in order to become more productive and effective. To do this, business people need to feel comfortable with technology and the role that it has in innovation. Further, Australia must reduce its relative dependence on commodity exports and develop exports of technological goods and services. The nation's ability to do this depends on its capability in science, engineering and technology. ATSE believes that Government has a key role in:

- increasing the level of support and incentives for industry to undertake innovation;
- expanding those polices that support industry-research links, such as the Co-operative Research Centres and ARC Linkage grants;
- developing new innovation clusters that focus on particular manufacturing industry sectors and technologies and,
- providing suitable incentives and reforms to stimulate knowledge-based training.

Footnotes

1. Colebatch Tim, Economics Editor, Manufacturing stuck in lowest gear on economic road, The Age, July 7 2006, Business Section
2. Business Prospects for Australian Manufacturing in 2006, Australian Industry Group Manufacturing Forecasts
3. Marceau J, Sicklen D & Manley K, The High Road or the Low Road? Alternatives for Australia's Future, University of Western Sydney Macarthur http://www.abfoundation.com.au
4. Achieving Global Fitness, Manufacturing Futures. April 2006. Australian Industry Group
5. Trewin D and Paterson M, Patterns of Innovation in Small Businesses 2003, Australian Bureau of Statistics, Canberra, 2006
6. Ibid
7. World Class Skills for World Class Industries, Report to the Australian Industry Group May 2006
8. See reference number 4