



Members of the Economics References Committee for inquiry:

Re: The challenges to Australian industries and jobs posed by increasing global competition in innovation, science, engineering, research and education.

We are grateful for the opportunity to present our submission to this inquiry. Our company is based in regional Victoria, considered by some as operating in the 'old' industry sector. We employ some 160 people and export product to many parts of the globe, with major commitment to research and development aiding our endeavours.

Our company is committed to remaining in Australia and is sustaining that commitment with relatively large investments in capital, infrastructure and human efficiency improvement projects. The owners believe that it is possible to maintain a manufacturing footprint in Australia with resolute productivity and R&D investments buttressed by an aggressive global sales development strategy.

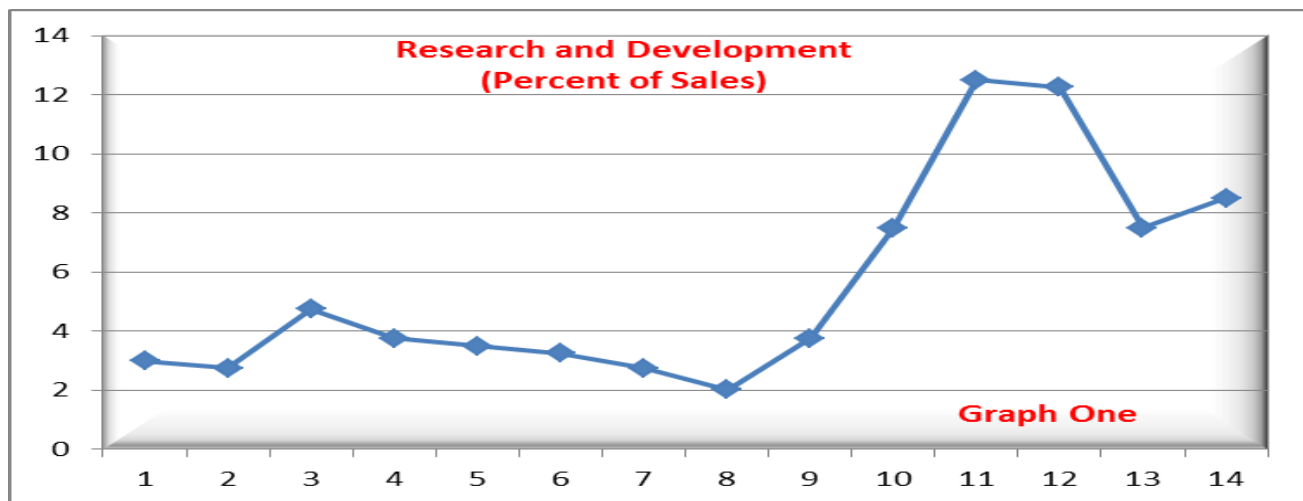
We base our submission on our company's experience whilst also bearing in mind the constant noise around one often suggested inhibitor to the growth of Australian manufacturing – market size.

The market available to Australian manufacturing is frequently asserted as restricted, we hold a contrary view to those that take this position as the underpinning to their strategic development. Rather we see opportunity here in Australia, near and far markets. It is a reasonable contention that countries such as Sweden, Finland and Canada, having much the same population mass and cost structures, benefit from near markets, Europe, in the case of Sweden and Finland and the USA in the case of

Canada. It should then be equally reasonable to hold the same view for Australia market opportunity, that is, our near neighbours, such as Indonesia which has a burgeoning middle class estimated to be anywhere between 70 to 146 million, or India with an estimated middle class approaching 600 million in 2030. These markets can and should be cultivated by Australian manufacturing, and it is an imperative that a broad based coherent position be embraced by Government and Industry to this end, which should be of the highest priority.

It should also be noted that Advanced Manufacturing techniques, such as 3D Printing/Additive Manufacturing, offer new paradigms that are now being amplified. A model that may very likely reduce the underpinnings of mass manufacturing's viability, its need for volume. We are witness to a new cohort of manufacturing enterprises emerging where operational processes in manufacture are the core of this revolution. Therefore it is critical that Australian legislature, industry and community begin to cooperate now to ensure that we can participate meaningfully here, near and far.

It has been postulated that the key to innovation is investment. Since the origins of the Industrial Revolution, innovation and investment have been crucial to national and global economic development. The introduction of broad based innovations has been shown to depend on its genesis, investment in Research and Development. For our company this commitment is demonstrated in Graph 1. This need for R&D is essentially recognised by Government and Industry, but all too often sacrificed for short term purpose. Often it is problematic, as small companies lack solvency, and large companies are locked into old capital stock, and governments are fiscally or philosophically constrained.



In June 2011, Obama launched the Advanced Manufacturing Partnership, a national effort to unite industries, universities and the government to invest in the emerging technologies that would create high-quality manufacturing jobs and bolster global competitiveness. He also announced an initiative to invest \$500 million to help develop these advanced manufacturing technologies and jobs. To support investment in U.S. manufacturers' competitiveness and accelerate innovation in manufacturing, the President committed to a further \$1 billion investment to launch a network of 15 manufacturing innovation institutes across the country. Leveraging the strengths of universities and community colleges, and government to co-invest in the development of world-leading manufacturing technologies and capabilities that manufacturing can apply in production.

Barack Obama submitted that cutting the deficit by gutting investments in innovation and education was like lightening an overloaded airplane by removing its engine. Suggesting that it may make you feel like you're flying high at first, but it won't take long before you feel the impact. It is essential for Australia not to remove its engine, far better to invest more and lead with the world's best equipment, most skilled labour force, and efficient processes. This is not an area where money should be saved or corners cut. Investing in research and development in new products, process improvement and staff training, is essential, but we need to continue to develop and improve our skill sets and knowledge, as competing countries are constantly further developing their staff and systems.

Innovation, not just in the concept that sees innovation in product and marketing only, also lives in four related, however separate, segments of a healthy business:

- Operational Innovation, which is about process improvement,
- Product and Service Innovation, which is about improving the customer experience,
- Strategic Innovation, which is detecting new trends and directions in markets, business models, the value proposition, and
- Management innovation which is in changing the way we do things.

In each of the elements our company has paid equal attention enabling it to add value in the existing supply chain, as well as service new markets. In this our educational institutions ought to be focused and provide the innovation developments necessary for Australian industry.

As a consequence for our company there has been a clear improvement in the collective and individual skill levels. In 2007 there were few tertiary educated employees in the company, this has shifted dramatically (see table 1), including vast improvements in the general production staff. This was, and continues to be motivated by the drive to innovate in all segments of our company, and government training funding.

Table One	Doctorates		Masters		Bachelors		Certificate		Unqualified	
	2007	2014	2007	2014	2007	2014	2007	2014	2007	2014
Executive Management	0	2	0	1	1	1	0	0	0	0
Senior Management	0	0	1	2	0	2	0	0	0	0
Supervisors	0	0	0	1	0	2	0	3	0	0
Administration	0	0	0	1	1	1	0	1	0	0
Process Control	0	0	0	3	0	2	1	1	0	0
Product Development	0	0	0	4	0	2	1	1	0	0
Sales executives	0	0	0	1	0	1	1	1	0	0
General staff	0	0	0	0	0	1	8	60	140	60
	0	2	1	13	2	12	11	67	140	60

To attract and retain qualified staff a great deal of effort was put to improving the work safety, environment, up-skilling staff and technical relevance of equipment, process and product. The company's commitment to innovate was driven in part by local government (The City of Greater Bendigo) assistance, particular their Economic Development Unit, as well as Federal and State Government funding support. But equally important has been the growing connection to Tertiary institutes that have and continue to facilitate product and process improvements.

The relationship between industry and tertiary institutes is one fraught with challenge and continued recalibration. Governments of various persuasions have sought to build bridges between industry and tertiary institutes whilst trying to improve structures of these organisations. Whilst no one should argue that maximum efficiency is as critical for government organisations as it is for private organisations the cost to industry in this persistent need for change is lost momentum and opportunity. For a clear example we need only look at the CSIRO, an organisation that should be enabled to drive innovation,

in cooperation with Tertiary organisations and Industry. Instead we find an organisation that is being reduced and diminished in its wider relevance in innovation.

The on and off requirement for Universities, to underpin themselves in research, bestows a challenge with long lasting effects to Australia. Research is the basis of new knowledge, the ability for some organisations to stand aside from that, will at best increase the pressure on those institutions that remain committed to research.

In a number of countries part of any degree is the need to ensure that students integrate that education with actual time in companies. This has four effects:-

- 1 ... Ensures the student understands the relevance of their learnings,
- 2 ... Ensures transfers of knowledge from business to universities,
- 3 ... Ensures transfers of knowledge from universities to business, and
- 4 ... Underpins the relevance of the university in the innovation criterion required by industry.

Higher educational institutes should be driven in their function to impart knowledge and modernisation, continually striving to dynamically pursue innovation and transformation. That is to pre-empt the future, challenge the now and introduce new ideas. Such an innovation system cannot work unless there is cooperation between education, industry, markets and legislators that can focus the minds and structures of these organisations to provide that service.

The government must play its part, as the facilitator and enabler for world-class research, increasing the number of skilled researchers by increasing the number of students completing higher research degrees, increasing productivity by stimulating businesses investment in R&D, ensuring collaboration between industry and researcher and drive Public sector innovation. Also to ensure the value of Tertiary education is not seen in the number of students processed; this should be far from the reality. Rather tertiary education, in concert with industry, and commitment to research, in both its own right and in

cooperation with industry, must be the foundation for imagination, educational development and research necessary for innovation and the quality of the students processed.

Manufacturing is accepted generally in the community as of strategic importance for Australia. The manufacturing sector, however, currently faces an intense and growing competitive pressure in global markets. There are manufacturing segments in Australia collapsing, whilst others are choosing other jurisdictions in which to relocate their manufacturing effort. In the midst of this commentators are suggesting the path forward is for Australian manufacturing to seek effect in high-end/tech opportunities. Other developed economies, such as the U.S., Japan, Korea, but also China and Taiwan, are already there and increasingly gaining share in the high-tech manufacturing value chain. Whilst we must look to develop new opportunity, we must not ignore what we have. We must believe, as is the case in other jurisdictions such as Germany and The Netherlands that even old technology can be restructured to survive.

In order to address these challenges, some in Australia manufacturing businesses are undergoing a revolution, away from traditional production systems to systems that adopt an advanced manufacturing approach. This advanced manufacturing applies high-tech production systems and services, processes, plants and equipment, including automation, robotics and measurement systems. It depends on the use and coordination of information, automation, computation, software, sensing, and networking, and/or making use of cutting edge materials and emerging capabilities enabled by the physical and biological sciences.

This implies new ways to manufacture current products, and also the manufacture of new products emerging from new advanced technologies. Advanced Manufacturing however must not be thought of as addressing only emerging technologies; rather, it is composed of efficient, productive, highly integrated, tightly controlled processes of new and 'old' products and services. The goal of advanced manufacturing is to respond quickly to customer demand by using high-precision information technology. This is well reflected in our company, a foundry engaged in an industry that is said to be one of the oldest manufacturing processes. Our company is adopting many of the advanced

manufacturing techniques. However this requires a great deal of funding that continues to add a great deal of short term pressure to the organisation.

Advanced manufacturing must be assimilated into the Australian manufacturing DNA so that they can:

- Compete globally
- Be energy efficient,
- Be better equipped and
- Manufacture more products with less material, energy and waste.

To enable this, technology and education must merge in the manufacturing sector, creating a young highly-skilled manufacturing workforce endowed with state of the art advanced manufacturing skills.

By 2025, a new global consuming class will emerge, and the majority of consumption will take place in developing economies. This will drive new market opportunities that Australian manufactures must be ready and able to exploit. In established markets, demand is fragmenting as customers ask for vast variation and extra types of after-sales service. A rich pipeline of innovations in materials and processes, from nano-materials to 3-D printing to advance robotic, assures fresh demand and drives further productivity gains across manufacturing industries and geographies. This would likely only happen if Governments acts as facilitators by encouraging and funding R&D, focused education and buttressing factory renewal cost.

Higher technical skills are needed, and this diverse nature of Advanced Manufacturing will create many new opportunities. Many related career opportunities are created in law, medicine, computing and the arts. This must be recognised and supported by Government engagement to ensure teaching institutes reflect this developing opportunity. The introduction of 3D printing is shifting the production of objects from the factory to the home. It enables consumers to free themselves from traditional suppliers and gives them the choice to follow their own acquisition strategy. In this challenge every successful organisation has to make the transition from a world defined primarily by repetition to one primarily defined by change.

Manufacturers in Australia can succeed by being innovative problem-solvers whose highly-skilled employees and skilful managers are linked into global supply chains. Manufacturers can build in-house expertise to provide internationally competitive products and services that excel because they meet needs better than the offerings of competitors. Governments' role as facilitators should not be to pick the winners, or indeed drive the process, that should be left to cooperation between educational institutes and industry, rather Governments' role is to be the expediter. The role for government, institutes and industry ought to be to set rules that reflect market opportunity, are fair and lead to substantial benefit to the community.

President Barack Obama has made advanced manufacturing, which incorporates the integration of information technology, human innovation, energy efficiency and waste reduction, a cornerstone in his initiative for boosting U.S. manufacturing and jobs growth, this is coupled with the realisation that research, teaching and industry must work together. The value of innovation is not just having ideas. It's turning ideas into action. The picture that comes to mind to many times in Australia is that those that have the ideas are left standing alone on an empty field devoid of support or clear direction, which ultimately drives these ideas to migrate to another field [jurisdiction] to find the support necessary to leverage the idea.

Our company continues on the path to develop a globally relevant manufacturing organisation in regional Victoria, Bendigo, exporting to all parts of the world. Never the less it will require more effort and support if it is to be realised. From Government support to access funding to continue to advance its manufacturing technique and product development, from educational institute the well-coached employees we need to be innovative in all aspect of our business, and for the community their support that Australian business, like its sporting teams, have a place and a right to be competitive in a global environment.

Yours faithfully

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**Chief Executive Officer**

**Keech Australia**