MANUFACTURING AUSTRALIA

Review of Australia's R&D System

Manufacturing Australia submission

Executive Summary

Manufacturing Australia (MA) welcomes the opportunity to contribute to the Review of Australia's Research and Development System. MA advocate for policies that strengthen manufacturing competitiveness and drive innovation and investment across the manufacturing sector and broader Australian economy. An effective research, development and commercialisation ecosystem is fundamental to achieving this goal.

This submission outlines how Australia's R&D system can better support manufacturing innovation, increase industry-research collaboration, and enhance Australia's sovereign manufacturing capabilities in key strategic areas. Our recommendations focus on creating a more responsive, industry-aligned R&D ecosystem that delivers commercial outcomes while addressing national priorities.

We propose targeted reforms to R&D tax incentives, enhanced funding for industry-led research, stronger research commercialisation pathways, and strategic investment in manufacturing innovation precincts. These reforms are intended to help Australia to better compete in the global race to attract and retain manufacturing capital investment and capture value from innovation-intensive activities in both established and emerging manufacturing firms.

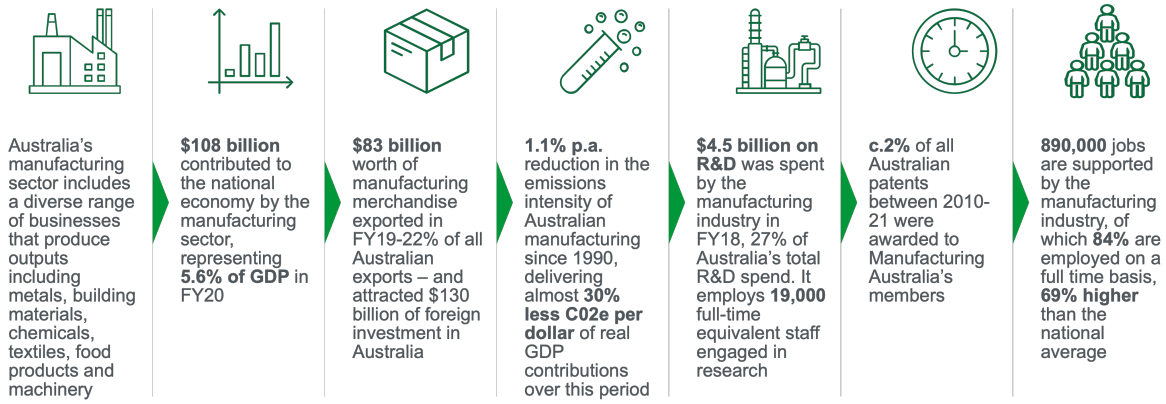
About Manufacturing Australia

Manufacturing Australia is a CEO-led coalition of Australia's largest manufacturers who work with all sides of government, business and community to help the manufacturing sector realise its full potential.

MA member companies include some of Australia's largest manufacturers across a range of sectors: Alcoa, Bluescope, Brickworks, Capral Aluminium, Cement Australia, CSR, DuluxGroup, Dyno Nobel, Orora, Rheem, Sims and Tomago Aluminium.

Manufacturing Australia member companies directly employ more than 50,000 people across Australia and operate around 500 plants and smaller facilities nationwide. MA members have more than 25,000 downstream suppliers in Australia in addition to a growing global footprint with direct operations in more than 30 countries and exports to more than 50.

The exhibit below summarises the broad benefits afforded to the Australian economy from domestic manufacturing capabilities.



Source: *Low Emissions Manufacturing: Australia's Opportunities.* Manufacturing Australia/L.E.K Consulting. March 2022. https://www.lek.com/insights/sr/low-emissions-manufacturing-australias-opportunities

A track record of R&D success

MA member companies are amongst Australia's largest R&D investors. Collectively, they have invested around $3 billion in R&D over the past decade, which includes more than 50 partnerships with Australian universities and research institutes. Notably, MA members have a strong track record for commercialisation and application of R&D projects in their Australian plants, both to improve the performance of existing plants and to support the business case for new manufacturing investment.

The outcomes of this research are typically seen in incremental, continuous improvement to products, services and processes across the manufacturing value chain, helping to maintain and build international competitiveness, leading to job creation, economic opportunity and benefits to Australian communities.

Some current examples include:

- Dyno-Nobel operates one of the largest commercial plant nutrition R&D programs in Australia, with more than 30 replicated research trials per annum. Its technologies are helping its customers drive efficiencies and improve environmental impact. For example, developing technology to improve nutrient use efficiency to improve farm yields and support sustainable farming practices.
- BlueScope operates one of Australia's largest in-house manufacturing R&D centres at its Port Kembla steelworks, with more than 30 PhD scientists working on future innovations, such as next generation alloy coating processes for greater corrosion resistance and improved performance.
- Cement Australia is trialling more efficient ways to operate its cement kilns, including using alternative fuels to replace coal as a fuel source.
- Orora has developed a transport simulator testing environment allowing many industry sectors to assess packaging performance in diverse transportation conditions to ensure products are delivered in pristine condition.
- DuluxGroup employs approximately 150 scientists in four locations across Australia and further facilities in New Zealand, and around 25% hold PhD degrees. Its Dulux Paint & Coatings Innovation Centre at Clayton in Victoria is world-class and focuses on primary research, particularly in polymer science, into leading edge concepts for longer-term development. This is often in collaboration with Australian universities. For example, it is developing the fundamental technology that will underpin the next generation of coatings with exceptional durability.
- Rheem Australia's Rydalmere plant houses Paloma Rheem Global's R&D centre of excellence for renewable energy water heaters. In recent years Rheem Australia has developed the world's first smart electric water heater, capable of scavenging excess rooftop PV, reducing costs for householders and aiding grid stability.
- Brickworks undertakes research and trials of alternative biofuels and substitutes to reduce its reliance on natural gas, as well as the development of new, innovative building products and more fuel efficient and sustainable kilns. Alternative biofuels account for a growing percentage the Group's energy requirements, with fuel sources including landfill gas and sawdust.
- Capral Aluminium partners with Australian robotics and automation experts to integrate advanced robotics and laser measurement into aluminium profile manufacturing. These programs have made it one of the leading technical subtractive machinists of aluminium in the world. One project, undertaken in partnership with a NSW robotics company, has enabled Capral to develop the world's first fully automated robotic packing line for aluminium extrusions. These projects enable Capral to not only improve the competitiveness of its existing operations, but also to undertake manufacturing that was previously the preserve of imports.
- CSR's dedicated innovation team focuses on advancing building science and building performance across residential and commercial construction sectors, from daylight & glazing, moisture management & mould control, ventilation strategies, comfort for occupants and energy efficiency.

In addition, MA companies provide industry placements, mentorships, sponsorships, guest lectures and academic prizes to university students, as well as being a major employer of STEM graduates to ensure we build the next generation of science talent in this country.

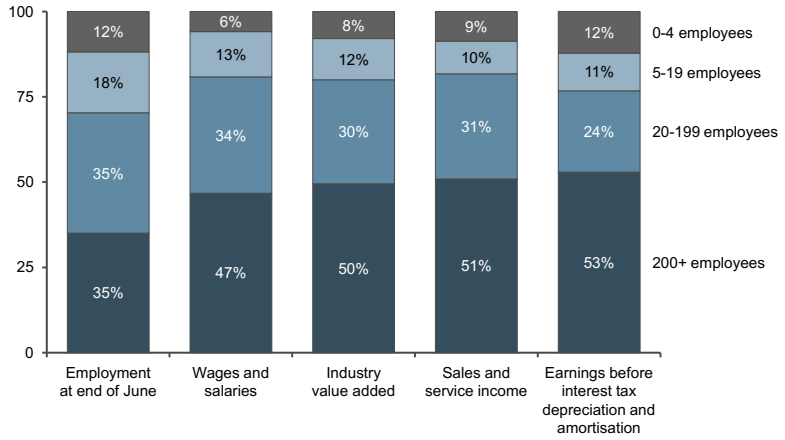
Australian Manufacturing Snapshot

Understanding the composition of Australian manufacturing, how manufacturing typically grows and what enables or inhibits that growth is fundamental to considering how Australia's R&D system could better support manufacturing investment. This section seeks to summarise those characteristics.

Australia's manufacturing sector is highly diverse, with outputs spanning the fundamental building blocks of modern society – including, metals, building materials, chemicals, food products and machinery – to highly specialised and advanced products – such as solar cells, biomedical sensors and precision cutting tools.

Australian manufacturers are a spectrum of small, owner-operated businesses through to very large private or publicly listed manufacturing companies (including many of Manufacturing Australia's members). Australia's smaller manufacturing businesses are often highly specialised or important suppliers to the broader sector, creating an "ecosystem" effect through the value chain. Larger Australian manufacturing businesses, although few in number, account for more than a third of employment in the sector and often half of other important statistics like industry value added or earnings.

Figure 1. Manufacturing industry composition, by business size (FY20) *Percent*



Source: Australian Bureau of Statistics, 81550DO001: Australian Industry 2019-20

Growth is best achieved by improving Australia's overall attractiveness for investment

Governments can enable growth and modernisation in Australian manufacturing through economy-wide efforts to improve Australia's attractiveness for capital investment. Key enablers include:

- **Globally competitive input costs**, including tax, infrastructure, construction, transport, energy and labour costs. Australia does not need to be lowest cost in any particular input, but broad competitiveness across the board with other advanced economies is necessary for greenfield and brownfield manufacturing growth.
- **R&D and innovation incentives** that are stable and predictable, that reward both process and product-based R&D, that encourage R&D throughout the manufacturing ecosystem (small to large) and which are broadly competitive with competing jurisdictions.
- **Tax incentives that encourage capital investment**. Accelerated depreciation policies provide a material incentive to bring forward investment in manufacturing plant and equipment.
- **Efficient and harmonised regulation** on a national basis. Inconsistent or duplicitous regulation is a material impediment to manufacturing firms growing from localised to national capabilities and further to export. Broad based deregulation and harmonisation agendas across States and Territories are important to enabling manufacturing growth.
- **Support for rules-based free trade** in our region and globally, which includes maintaining bi-partisan support and appropriate resourcing for a rigorous and effective anti-dumping system.

The exhibit below summarises manufacturing investment drivers and what levers can support these.

Manufacturing investment is driven by a multitude of interrelated variables. A comprehensive approach is required to increase investment levels

Business-to-business *and* business to academia collaboration is needed

Collaboration models can support growth by manufacturers of all sizes. For larger firms, bespoke schemes could encourage partnership with global majors in specific "verticals", or "matchmaking" with smaller firms with compelling capabilities in applications like artificial intelligence, automation & supply chain optimisation.

Incentives should encourage partnership across value chains to realise greenfield investments in new plants or to mature & scale breakthrough technologies that provide broad societal benefits.

Incentivising collaboration with both academic and industry partners is key to achieving scale. Incentivising academic collaboration alone is less likely to lead to scale projects in manufacturing industries where Australia is likely to be a "technology taker" rather than a "first mover". In those instances, broadening the global awareness and engagement by Australian manufacturing firms is preferable, and helps to build understanding of global best practice that can be introduced in Australian supply chains.

Technology adoption should support core business and create value for customers

Technology adoption in manufacturing is generally driven by consumer demand and competitive pressure. It focuses on two key areas of product and service improvement (creating products and services that better meet customer needs or expectations) or process improvement (improving the safety, efficiency and productivity of the manufacturing process). In those two contexts, incremental investment in digital and technology enhancement should occur without the need for governments to de-risk or underpin investments.

However, governments can help enable continued adoption of technology in three key ways:

1. Awareness building: improving understanding and awareness across the value chain of technologies available domestically and globally, with the intention of stimulating business-to-business collaboration, as above.
2. Regulatory streamlining: removing inconsistency between States around technical standards and requirements, which create disincentives to scaling rollout of new technologies.
3. De-risking investment in "breakthrough" technologies or technologies that address "externalities". An obvious example is the development and scaling of low emissions manufacturing technologies. This role for governments is logical where the business case for investment in such technologies is challenged, but it is manifestly in the national interest to scale such technologies.

Manufacturers need to compete on value *and* cost, not one or the other

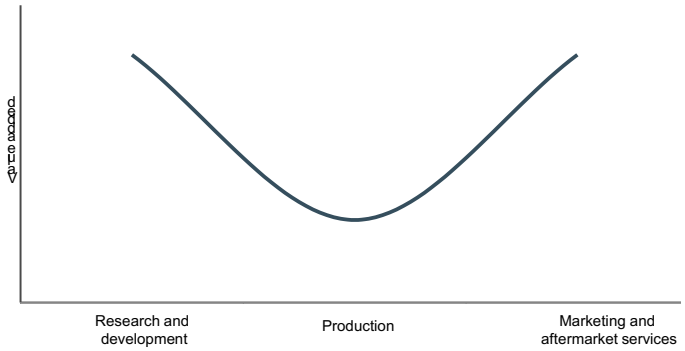
A strong manufacturing sector provides the enabling foundation for further value-add from investing in and developing important skills throughout the value chain, from R&D through to marketing and aftermarket services.

Importantly, these should not be seen as mutually exclusive, but interdependent. Research has shown that investments in R&D activities and marketing in isolation can result in lower value creation across the entire value chain, often referred to as the "smile curve". This concept partly explains why many developed economies have experienced offshoring of low value and basic manufacturing activities to economies with low labour costs.[1]

However, R&D and marketing investment does not typically occur sustainably in isolation of production. A broadly competitive operating cost environment, as outlined above, is an essential enabler of manufacturing investment, which can then underpin further value creation by manufacturing firms across the value chain.

Companies maximise value and can earn superior returns where they can develop interdependencies across the value chain – in particular, the ability to identify customer needs, develop innovative solutions, then deliver products and services that meet customer needs using flexible and responsive manufacturing capabilities.

Figure 2. The 'Smile Curve'



Source: Department of Industry, Science, Energy and Resources – Industry Insights, Globalising Australia; Baldwin R, Ito T, and Sato H (2014) Portrait of Factory Asia: Production network in Asia and its implication for growth – the 'smile curve', Institute of Developing Economies Japan External Trade Organization

Key Challenges in Australia's R&D System

Our consultation with members and broader industry stakeholders has identified several key challenges within Australia's current R&D system:

1. **Declining R&D investment**: Australia's R&D expenditure as a percentage of GDP has fallen from 2.25% in 2008 to approximately 1.8% today, well below the OECD average of 2.7%.
2. **Research-industry disconnect**: Despite world-class research capabilities, Australia ranks poorly on industry-research collaboration metrics, limiting commercialisation of innovations.
3. **Complex and uncertain policy environment**: Frequent changes to R&D tax incentives and support programs have created uncertainty and undermined long-term R&D planning.
4. **Skills shortages**: Critical shortages in STEM skills, particularly in manufacturing-relevant disciplines such as materials science, robotics, and industrial engineering.
5. **Scale and fragmentation issues**: Limited scale of Australia's manufacturing sector and geographical dispersion of research capabilities hamper critical mass formation.
6. **Commercialisation barriers**: Weak commercialisation pathways from research to market-ready products and services.
7. **Targeting of grants:** Most grants schemes are targeted towards manufacturing that doesn't exist in Australia, and the gap is too wide for this to be useful. Very few grants are available that will help to realistically advance existing manufacturing capabilities.

Recommendations

1. Target the R&D Tax Incentive towards manufacturing capabilities (RDTI)

The RDTI remains the cornerstone of Australia's R&D support system but requires targeted reforms:

- **Increase stability and certainty**: Commit to a 10-year freeze on structural changes to the RDTI to provide certainty for long-term R&D investment planning.
- **Enhanced rates for priority sectors**: Introduce premium RDTI rates (up to 50% refundable tax offset) for R&D activities in designated priority manufacturing sectors aligned with the National Manufacturing Priorities.
- **Avoid R&D intensity measures**: Remove or reject any "R&D intensity" thresholds that disadvantage large manufacturers with substantial revenue bases. Such measures disproportionately penalize capital-intensive industries and fail to recognise the strategic importance of manufacturing R&D regardless of company size or revenue.
- **Streamlined compliance**: Reduce compliance costs through simplified documentation requirements and pre-approval pathways for certain categories of R&D.

2. Enhance Industry-Research Collaboration

- **Manufacturing Innovation Precincts**: Establish national Manufacturing Innovation Precincts with co-located industry, university, and CSIRO facilities focused on key manufacturing priorities.
- **CRC funding**: Increase Cooperative Research Centre funding with a specific allocation for manufacturing-focused CRCs.
- **Industry Secondment Program**: Fund a national program enabling research staff to work within manufacturing businesses and industry professionals to spend time in research institutions.
- **SME Innovation Vouchers**: Implement a national voucher scheme providing manufacturing SMEs with incentives for engaging with research institutions on specific challenges.
- **Industrial PhDs**: Develop an Industrial PhD program where candidates undertake research projects co-designed by industry and universities with guaranteed industry placement.

3. Strengthen Commercialisation Pathways

- **Commercialisation Fund**: Establish a Manufacturing Commercialisation Fund to bridge the "valley of death" between research and commercial application.
- **IP production tax credits**: Given the increasing global competition for innovation investment, a production tax credit that offers a concessional tax rate on profits derived from eligible IP would be a powerful incentive to businesses that retain, commercialise, scale up and manufacture locally.
- **Scale-up infrastructure**: Develop national technology scale-up infrastructure including pilot plants and demonstration facilities accessible to manufacturers.
- **Government procurement**: Implement innovation-focused procurement policies requiring Commonwealth agencies procure innovative Australian-made products.
- **IP framework reform**: Reform intellectual property frameworks to better support collaborative innovation and protect Australian innovations in global markets.

4. Address Skills and Capability Gaps

- **Manufacturing Skills Taskforce**: Maintain a dedicated Manufacturing Skills Taskforce to identify critical skills gaps and develop targeted training programs.
- **STEM education investment**: Increase investment in manufacturing-relevant STEM education at secondary and tertiary levels.
- **Mid-career retraining**: Fund mid-career retraining programs focused on digital manufacturing skills.
- **Technical specialist visas**: Create a streamlined visa pathway for technical specialists in areas of identified manufacturing skills shortages.
- **Manufacturing Technology Access Centres**: Establish regional Manufacturing Technology Access Centres where SMEs can access advanced equipment and technical expertise.

5. Strategic R&D Investment

- **Tax exempt grant funding:** Grant funding for manufacturing R&D should be treated as non-assessable, non-exempt income.
- **National Manufacturing R&D Roadmap**: Develop a comprehensive, long-term National Manufacturing R&D Roadmap identifying key technology priorities.
- **Challenge-based funding**: Implement challenge-based R&D funding programs addressing specific national manufacturing challenges.
- **International partnerships**: Form strategic international research partnerships in key manufacturing technology areas.
- **Public research institution reform**: Reform funding models for CSIRO and other public research institutions to increase focus on industry-relevant research.
- **Long-term funding cycles**: Move to 5-year funding cycles for major research programs to enable more ambitious research agendas.
- **Target grants schemes towards existing capabilities**: Take a “bottom up” approach that seeks to stretch and extend existing manufacturing capabilities further along the value chain, rather than picking “widgets” or technologies without regard for their applicability to existing capabilities.

INTERNATIONAL BEST PRACTICES

Our recommendations draw on successful international models including:

- **Germany's Fraunhofer Institutes**: Industry-focused research organisations with strong commercialisation focus
- **UK Catapult Centres**: Technology and innovation centres bridging research and industry
- **Singapore's Agency for Science, Technology and Research (A*STAR)**: Integrated research ecosystem with strong industry alignment
- **South Korea's R&D tax credit system**: Generous incentives targeted at strategic industry sectors
- **Israel's innovation voucher program**: Connecting SMEs with research capabilities

Conclusion

Australia stands at a critical juncture in the evolution of its manufacturing sector. Global supply chain vulnerabilities exposed during recent crises have highlighted the importance of sovereign manufacturing capabilities. Simultaneously, technological advances including Industry 4.0, advanced materials, and sustainable manufacturing present significant opportunities.

A reformed R&D system that better supports manufacturing innovation, in both established and emerging firms, is essential to capitalise on these opportunities. The recommendations in this submission envision a more responsive, industry-aligned R&D ecosystem that can drive the next wave of Australian manufacturing innovation and help to underping the next generation of manufacturing investment and employment.

Manufacturing Australia is committed to working collaboratively with government, research institutions, and other stakeholders to implement these reforms and strengthen Australia's position as an innovative manufacturing nation.

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