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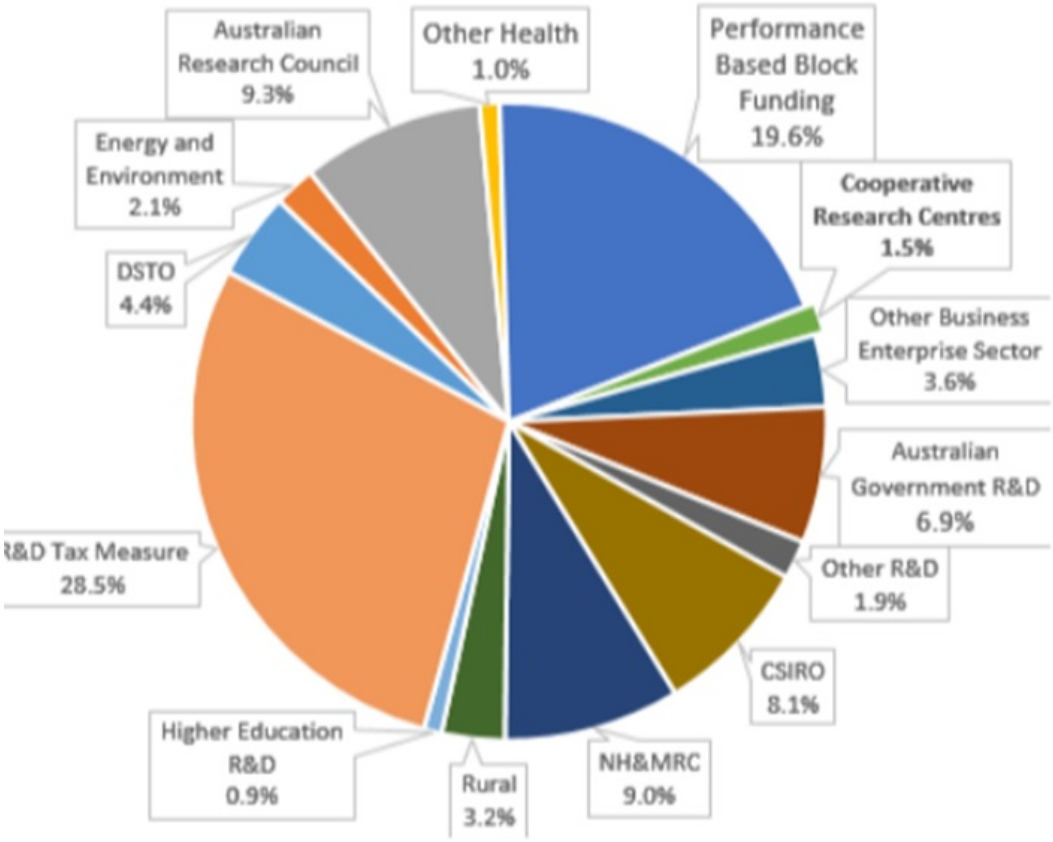
CRC Association



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Innovation in the Australian economy

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Background

Australia's economic development depends on innovation, and has always done so. While Australia is fortunate in its natural resource base, the concept of Australia as a "Lucky Country" simply living off those resources is wrong. Although indigenous Australians had lived sustainably for over 40,000 years, European settlement required innovation in order to succeed.

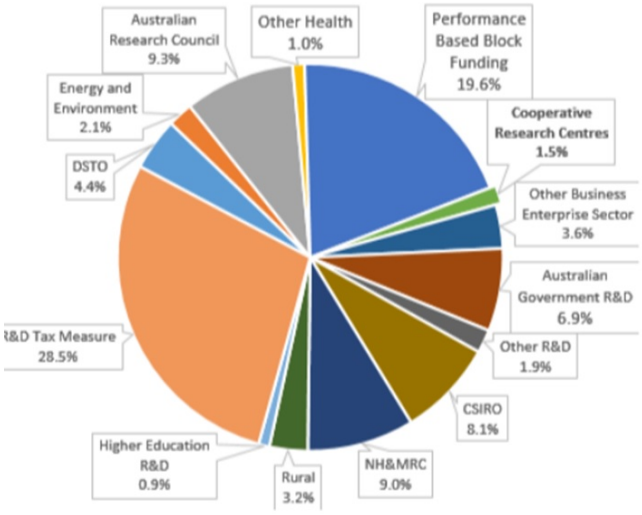
The development of agriculture and mining in Australia has relied heavily on finding innovative ways to compete on world markets. Australia is a high wage economy and innovation is the basis of maintaining the country's very high standard of living. The country has experienced 25 years of growth, even managing to avoid any recession associated with the Global Financial Crisis (GFC).

Like many Western economies, the relative contribution of manufacturing has declined as percentage of Gross Domestic Product (GDP). However manufacturing still employs more than one million Australians and has actually grown over the past quarter century. Mining constitutes four of Australia's top five exports and is critical to the country's balance of trade. But world commodity prices have dropped in recent years and Australia's number one trading partner, China, has slowed in its growth, leading to lower demand.

These factors mean that the Australian economy is an economy in transition. Innovation is seen as a major means of successfully handling that transition.

A snapshot of Australia's innovation system

The Australian Innovation system consists of a large number of programs and activities. Total expenditure on R&D has risen over the past three decades but plateaued in recent years. Australia's expenditure as a percentage of Gross Domestic Product is slightly lower than the OECD average. The Commonwealth



Government spends close to $AUD 10 billion annually; the State Governments have a variety of programs and business expenditure is in the order of twice that of government.

The major components of the Commonwealth's expenditure on R&D will be examined, along with some observations on those components.

R&D tax concessions and credits

Over one quarter of the Australian Government's innovation budget is made up of tax concessions and credits. This is a very high proportion relative to most OECD countries. New Zealand, for instance, offers no R&D tax concessions.

Essentially, companies receive a bonus tax return for spending on R&D to encourage them to innovate. For companies not yet paying tax, a tax credit is available. The credit system is relatively new and does appear to be having a very positive impact on Australia's Start-Up sector, which has begun to thrive.

The advantage of R&D tax concessions is that it benefits businesses that are taking innovation risks and are likely to be bringing new products and services to market.

The disadvantages of R&D tax concessions is that they may represent a government subsidy for companies to undertake activities that would have happened in any case – always a poor policy outcome.

Australia's R&D tax arrangements are currently under review and it seems likely the government will seek to tighten the definition of R&D. Currently, claims are largely self-assessed and we may see the government want to pre-approve projects.

Block grants

Australia's R&D efforts are unusually skewed to the University sector. The country has a very strong university sector. Seven of Australia's 40 Universities are ranked in the top 100 in the world on one ranking.

University Block Grants are provided to the universities under a variety of schemes that are designed to provide incentives for the universities or to make up, at least partially, the indirect costs of R&D undertaken through other schemes.

The Block Grant scheme is the second largest slice of the Australian government's "innovation pie" at around $1.8 billion. These grants follow on from a university's success in winning grants from other schemes, via a series of complex formulae.

The Block Grant scheme is also currently under review by the Australian government. It seems likely that more emphasis will be put on providing incentives for universities to engage with businesses, an area of poor performance for the country.

The big research councils

Australia has two large R&D councils, being the National Health and Medical Research Council (NH&MRC) and the Australian Research Council (ARC). They have annual budgets in the order of $AUD850 million and $AUD650 million respectively.

It is important to point out that the research councils are not exclusively mandated to pursue innovation. They are the principal sources of funding for basic research that is made available for curiosity-led research that may have no immediate or apparent application. As taxpayers demand greater accountability for funds, the research councils find it difficult to continue to make funding available to researchers just for the pursuit of knowledge. Nevertheless, this is consider a vital area of activity.

Generally, the two big research councils allocate funds on the basis of strong peer-review processes on a project basis. Each does fund large program-based activities as well and have some funds available for collaborative work with industry or business. Their funding is available only to university-based researchers (with some exceptions).

Demand for funds from the research councils is very high and competition for those funds is fierce. Depending on the scheme within each council, only less than one in five applications successfully gains funding, very often with a much lower level of funding than requested.

There can be no doubt of the exceptional value of research that comes out of research undertaken under the auspices of the research councils. For example the development of Gardasil, the human papilloma virus vaccine, which is responsible for the saving of hundreds of thousands of lives and sells over $AUD2 billion of product annually, relied on early and patient support from the NH&MRC. The Jameson Cell, which enables the capture and sale of coal tailings that previously were a waste product, owes its development to support from the ARC. A study has shown that this one product has delivered more than $AUD36 billion of value to Australia. If ARC projects delivered nothing else to the country, this single development would justify the taxpayer's funds that have gone into the council for its entire history.

Together, the big research councils account for about 15% of the Commonwealth spending on innovation.

CSIRO, DSTO and ANSTO

The biggest research organisation in Australia is the Commonwealth Scientific and Industrial Research Organisation, or CSIRO. Its 5,000 staff are devoted to applied research and provided with a Commonwealth budget of around $AUD700 million annually. The CSIRO works collaboratively with research councils, other government bodies and companies so that its actual research activities exceed $AUD1 billion each year.

CSIRO is an iconic Australian institution with an 85-year history. It is responsible for an extraordinary array of inventions and discoveries over that history. These include much of the technology behind WiFi, Australia's polymer banknotes that are now widely used across the world and many others. Australian agriculture has benefitted enormously from plant and animal breeding activities by CSIRO. Again, the investment by taxpayer's has been returned in plenty – CSIRO's introduction of myxoma virus in 1950 and rabbit haemorrhagic disease virus in 1995 together have provided more than $AUD70 billion of value. That is more than the country's entire investment in the CSIRO for its entire history.

The Defence Science and Technology Organisation (DSTO) is a second major Commonwealth R&D organisation. It is about half the size of the CSIRO and devoted specifically to defence initiatives. DSTO works closely with Australian industry to try to ensure a high degree of self reliance in matters of defence. French company Thales has a large presence in Australia and produces the BushMaster armoured vehicles for numerous defence forces. It recently won a $AUD1.3 billion contract to supply the lighter weight Hawkei vehicle for the Australian Army. This major contract will enable the company to have a sound base for selling to other national defence forces, leading to significant jobs and economic activity in the regional Victorian City of Bendigo.

The Australian Nuclear Science and Technology Organisation (ANSTO) operates Australian's single nuclear reactor in Sydney. It has recently assumed responsibility for the Australian Synchrotron. ANSTO is increasing its cooperation with industry.

Cooperative Research Centres and Rural Research and Development Corporations

Although only representing about 1.5% and 2.0% of the total "innovation pie", the Cooperative Research Centres (CRCs) and Rural R&D Corporations (RRDCs) are important players in the Australian system.

RRDCs are permanent industry-led bodies whereby a levy on production or sales of particular agricultural commodities are matched by the government up to 0.5% of the gross value of production for that commodity. There are 17 such bodies and the operate either as a statutory corporation or as an industry-owned company, mandated to operate in the interest of their particular industry.

CRCs are non-permanent industry-led collaborative bodies that are set-up through a competitive funding process to address major challenges. Government funding is generally matched (usually at a higher rate than the required one-to-one ratio) by the participants in the CRC. Participation in CRCs by overseas companies and governments is welcome.

The RDCs and CRCs have considerable flexibility to undertake R&D to address the issues they identify as most important to the advancement of their industry. The Boards of each are constituted so that most Directors have a strong stake in the success of their industry. The governance structure is vitally important because it provides a ‘‘market-pull’’, ensuring good targeting of the R&D effort.

The rest

A large number of smaller programs and commissioned research make up the remainder of the Australian government's R&D spending. Energy and environmental spending make up a significant portion of this spending. Programs in these areas tend to have changed more often than those mentioned above. This is due, at least in part, to differing policies and priorities of successive Australian governments.

National Research Priorities

Until 2002, Australia did not have any specified National Research Priorities. Governments allocated differing budgets or funded specific programs, but agencies generally developed their own spending priorities. In 2002 a series of research priorities were adopted, but they were generally viewed as "motherhood" in their nature. Any researcher with imagination could easily fit his or her pet project to one or more priority. The priorities did not fit into a wider Strategic Plan for Innovation either, where human capacities, equipment and infrastructure issues were considered together.

Australia's current Chief Scientist, Professor Ian Chubb, has pushed very hard during his five-year tenure for Australia to adopt a more strategic approach to innovation. As a small country, Australia can not be good in all fields of research endeavour, let alone take those ideas through to making an impact. Professor Chubb has argued that Australia must concentrate on its areas of relative strength and competitive advantage. His view is now almost universally agreed and should be implemented in the coming months and years.

Lessons for others

Each country must decide on its own approach to innovation. The Australian approach gives some guide to the directions to consider. These include:

- prioritising activities to maintain a degree of strength and competitive advantage. Trying to undertake too many things leads to weakness in all;
- scale and program-level activity is important. Researchers often like to pursue a new or improved idea before they finish what they are working on. Pursuing "perfect" must not be allowed to stop delivery of "the possible". Innovation

systems must provide scope to not only fund ideas and inspiration but to also ensure they are delivered;

- innovation is almost always achieved in teams with good leadership. The Australian experience reflects international experience that collaboration pays dividends;
- policy stability is vital. The best innovation program's worldwide are long running ones that are well understood by everyone involved. Renaming and reinventing program's should be done carefully.
- those most affected by R&D should be involved from the start. In Australia, we would no longer conduct studies that affect Indigenous Australians without their direct involvement from the start in the conception, design, conduct and conclusion of the work. But it took us 200 years to learn that lesson. Whether it is a cultural, health, environmental or business-oriented innovation program, it will be very significantly improved if those people most affected by the outcome are integrally involved as early as possible.