



Centre for the Study of Higher Education

Education, Science and the Future of Australia

A Public Seminar
Series on Policy

Research, Innovation and Knowledge Transfer

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6 August 2007

The central concern of this seminar- how *can we best foster research and innovation in Australia?* - demonstrates the significance of higher education policy for national economic development and policy. In the decades bridging the move from twentieth to twenty-first century, we have witnessed the emergence of research as an integral part of innovation to fuel economic development in public policy. This public policy shift is evident not just in leading research nations but underpins economic development agendas across the globe - and is particularly evident in the Asia-Pacific region.

The path to innovation

Innovation is seen as the key to increased value of goods and services. It

is the mechanism by which we trade the old for the new. The wealth of our future economies is to be found principally in new knowledge and ideas produced largely through the scientific or technological disciplines.

While research is not the only path to innovation, it is fundamental to much of the development of new knowledge and ideas. Whether we see innovation deriving in clear sequence from the application of fundamental research ideas or as a twisting and iterative set of developments that brings new ideas to light and to operation, research is involved from the generation of fundamental shifts in understanding through to the test and evaluation of ideas for new products or services.

And once the trade in new knowledge and innovations became important for economic development then public policy changed. Unlike economic development based on control of key physical resources, whether land and water for agriculture, or minerals, or dependent on proximity to large markets for physical trade of goods or delivery of services, knowledge is apparently more easily acquired within and across nations, particularly when communication modes are so global and ubiquitous.

The knowledge economy is not only critical to the future of nations but one in which many feel they can participate - even if some nations have a substantial start on others. The recent ALP policy paper on innovation, competitiveness and productivity states the importance of policy in this area succinctly in the phrase “industry policy is innovation policy” (ALP, 2007, 6). The current federal government policy position outlined in *Backing Australia's Future*, acknowledges research and innovation as vital to “building Australia’s competitive strength in a global knowledge-based economy” (DEST, 2003, 31).

The opportunities from the link between research and innovation, and the possible detriment and stagnation from being “left behind”, are seen as so persuasive and pervasive that national and sub-national economic policy is shaped on this understanding.

In a global knowledge economy Australia has no inherent advantage to sustain high-level performance, only a small head start on some. That head

start, Australia's current research strength, is the product of past public investment in research and ability to engage with high quality research internationally. And innovation in Australia, given our size, depends on not only on engagement with industry or capacity to begin enterprises, but being part of global industry networks.

Public policy for research and innovation has been developed from this understanding of national economic futures. In this paper I am concerned with the development of research policy in the Australian context, acknowledging this is only one part of overall innovation policy.

Mimicry is a distinguishing feature of the broad policy to be found in most countries to support research in its role as a key requisite for innovation. The outcome being sought by much policy can be seen in Silicon Valley or North Carolina's research triangle or Boston's route 128. Whatever the particular circumstances that led to these successful clusters of research universities and other agencies, entrepreneurial companies and industry development, a series of general features derived from this experience have found their way into public policy in many countries.

The first lesson derived about the links between universities or other public research agencies and industry was that the public good and private benefits of research were intermixed. It was not just that research funded by the public purse was transformed to produce private benefits for industry (and from there to contribute to the general good), but that the private benefits would be partially captured for the university and the researchers as well as industry. The second observation was that high quality research institutions could attract industry to an area and could seed new industries and companies.

Leaving aside questions about how "easy" it is to replicate the successful examples of research and innovation clusters outlined above, the policy drive to do so has the following broad features.

Underpinning public support for research. This has two broad arms, one reinforcing the public and the other the private good. The first is public funding for research infrastructure, research projects and researchers in universities,

research institutes or other public agencies; and the second a legal framework that protects the private benefit of research through creating property rights, such as in patents and related mechanisms.

Encouragement of collaboration. Policy has been focused on bringing universities and industry together in research projects or centres, encouraging matching funding initiatives, and rewarding areas where industry and research institutions are jointly engaged in research.

Support for technology or knowledge transfer. Into this category of initiative come networks and intermediaries to assist industry and business (particularly SMEs) to gain access to research; tax and other incentives to encourage research and development in industry or to encourage firms and industries to locate in areas adjacent to research institutions.

In that last area of technology or knowledge transfer much is made of the need for venture capital to assist in commercialising research. However, access to such funding is not widespread. Douglass (2007) notes a number of US states have set up venture capital funds to attract the private sector investment needed for new start-up companies. And in the last decade or so many US states have set up their own publicly funded set of research institutes, usually in collaboration with a network of universities, to tackle large-scale research issues. Again this sort of initiative is found at sub-national level in other countries, including Australia.

Australian public policy for research

The research and innovation policies that have been pursued and are proposed for Australia have all these features, although emphasis differs. This framework for research and innovation dominates public research policy and therefore has direct implications for universities, which is my particular concern in this paper.

Australian public policy for research mirrors the broad categories for government support outlined above:

1. Underpinning public support is provided through “block” grants to universities and project funding to researchers or groups of researchers.

Funding for postgraduate research students, the Research Training Scheme, is provided to universities for a specified number of places. There are two features of this research funding in Australia, first that access to this funding is available to all universities¹ and second, the allocation of block funding and RTS places is performance-based – that is it is tied to formulae that allocates against past research performance.

Research infrastructure is funded in a variety of ways, through the overall capital funding available to universities through commonwealth funding and through specific grants. The National Collaborative Research Infrastructure Strategy (NCRIS) is a comparatively recent innovation that is contributing successfully to enhancement of research infrastructure by allowing for large infrastructure projects that provide access for researchers from a range of institutions. The largest single recent investment in shared research infrastructure, however, was largely funded by state government contribution with the Victorian government's multi-million dollar contribution to the Synchrotron. Research project grants are competitive and peer-assessed.

2. Collaboration between universities and industry is encouraged through a range of schemes, principally through project-based funding (Linkage grants) as well as through the Co-operative Research Centres program. In recent years, the federal government also increased funding for CSIRO to “enable development of large-scale collaborative partnerships which reflect the National Research Priorities”. (DEST, 2004). One of the major initiatives of a number of State governments, principally Queensland, Victoria and Western Australia, has been to create funds that support collaborative research projects and initiatives.

3. Support for knowledge or technology transfer is provided through a number of federal funds, as well as state-based funds, that support commercialisation of research. Examples of this support include the Biotechnology Innovation Fund, which makes competitive grants. I do not intend to deal further with knowledge transfer and innovation policies.

I am concentrating on the research policy rather than broader innovation

¹ Actually to a designated category of Higher Education Providers outlined in relevant legislation.

policy, because of the vital role of research as the developer of new ideas, the link to international advances and contributor to a culture of innovation.

The key feature of Australia's research policy is that underpinning funding, while spread across a range of institutions, is for universities allocated on a competitive performance basis. Australia is one of a small number of countries with a highly formulae-driven competitive performance based "block" funding system for research and research training. These formulae typically magnify success in competitive grant schemes through the block funding system. It is a system premised on the importance of rewarding excellence as the mechanism to create internationally strong research outcomes.

Added to this basic premise have been some interesting "innovations" that have recognised Australia's particular circumstances when crafting policy to build research and innovation, principally ARC Linkage grants, Co-operative Research Centres (before the recent concentration on commercialisation), as well as NCRIS. In the first case government funding induces industry contribution to research to build university- industry links and facilitate knowledge transfer and innovation. In the second the cost and scale of research infrastructure needed to be internationally competitive is recognised and supported by encouraging collaboration in the use of such infrastructure. Both cases recognise the comparatively small scale of industry research in Australia and the need for public support to build internationally competitive outcomes.

Where to from here?

We know the general direction of policy needed to foster research and innovation, the increasing importance of being able to participate effectively in the "knowledge economy", and the increasing expenditure on and attention to research and innovation in countries in our region, and beyond. We know that Australia maintains a strong international reputation in some areas, but that the challenges in maintaining that performance are many. What would we expect to be the major policy concerns of government for the next few years?

Some issues would seem to be crucial.

Have we sufficient underpinning public support for research to be

internationally competitive?

There are two issues in relation to international competition, quality and scale, and the two are related particularly in relation to science and technology research and innovation.

There have been increases in public funding to research in recent years – principally to granting agencies such as ARC and NHMRC and extra funding to research infrastructure, but much of the policy energy of the past few years has been devoted to developing a new system for assessing research quality (RQF). This system is to be the new allocation mechanism for a ‘substantial’ portion of research funds. There has been much debate across the system about how this should be done, which I will not rehearse here. If such a system is to be implemented we must have a robust and credible system. However, any cursory strategic view of the international research and innovation landscape would say the allocation system in Australia is a second-order issue.

The current Australian allocation system concentrates research funding based on formulae that take into account success in winning competitive grants among a range of other indicators. Rewarding excellence in research is essential to building international research quality, it is one part of, but it is not the same as, building research capability². However the issue of building research capability is currently being subsumed in a policy debate focused on mechanisms for further concentration of a limited pool of funding.

There is no policy evidence or logic to believe that further concentration of existing research funding will assist in building Australia’s research at a rate that will enable Australia to remain internationally competitive. This is in part because much of the funds being dispersed in this way are actually a contribution to the overheads of the research being funded through the competitive grants scheme. As the funding of research overheads is insufficient, success required cross-subsidisation from other sources – and it is clear that this in itself is a limit to the extra capacity that can be generated by

² Arguably the only explicit capacity building in research is Regional Protection Funding of some \$12.4m over four years. And as the title implies this is not about capacity building but protection of regional universities.

further concentration. In other words, expansion of the competitively allocated pool of research funds does not enhance research at the rate anticipated if sufficient other funding is not available to support that research.

Simply, Australia's policy measures are focused on rewarding excellence and concentrating research funding (and research training). This is a quality enhancement focus but it is not the same as building research capacity. We need a policy system that funds to build research capability for the future, as well as through providing higher overheads for competitive funding rewards research excellence at a higher rate than is currently the case.

Fundamentally this is an argument for increased funding and rebalancing our current focus on building research quality with a focus on building research capability. In doing so Australia would recognise that quality and overall scale are important. Unlike the UK or Ireland, Australia does not have access to the scale of research investment produced through the European Union, nor the scale of investment in the United States. Investment in research training through the research training scheme (RTS) has remained essentially static since 2001, despite the fact that Australia has an ageing academic and research workforce. And the general research funding to support infrastructure and to allow universities to support the research grants they gain has not grown at the rate necessary to support that capability building.

The second part of research policy to build innovation involves collaboration. Do we have an environment that encourages closer collaboration between universities and industry in order to facilitate research and innovation links and knowledge transfer?

There is one key issue here and it is the balance between public and private good (Clark 2007) in terms of research policy drivers to collaboration.

The second set of issues relate to the way we balance public and private good to build collaboration for innovation. Linkage grants and the initial CRC scheme worked because the public good of public research funding and effort was married with potential private benefit through returns to industry and potentially to universities through commercialisation of research. The outcomes

sought from these funding schemes are not exactly the same as those from peer-driven research funding. The private partners are looking for impact or return to the end-user. The work that has been done through the ATN RQF trials on estimating impact would be a useful adjunct to evaluation of the quality and outcomes of funding allocations in this area.

If these schemes become too focused too early on private benefit through the creation of companies and the protection of intellectual property within their boundaries then they will fail in the balance that produces collaboration. We can see evidence of this in the recent developments in CRCs, which is leading to reconsideration by universities of engagement. Similarly it has been argued that innovation is stifled if universities are driven to measure success through commercialisation of their research and therefore the strong protection of intellectual property rights rather than keep a strong focus on their research.

And in the case of underpinning support for research and support for collaboration the time frame on grants needs to be longer. Building capacity and collaboration requires a longer timeframe than often seen in two to three year cycles.

Research policy needs to have a long-term focus in order to ensure Australia can build innovation to be part of a global knowledge economy. This focus is to be found in a funding commitment over a five-year period to building research capacity, through setting a target for increased research higher degree places and a strong funding base for research infrastructure across a range of universities. The reward to excellence should come attached to grants through increasing overhead funding. Support for collaboration should be more strongly focused and evaluated on end-user assessments of impact, rather than too heavily focused on capturing the private benefits of that collaboration too early in the innovation process.

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References

Australian Labor Party (ALP), April 2007 “*New Directions for innovation, competitiveness and productivity*” – New Directions paper

Clark, Paul. 2007 “*The Commercialisation of University Research and Economic Productivity*” in Journal of the Programme on Institutional Management in Higher Education, Higher Education Management and Policy, Volume 19, No. 1 OECD 2007, pp 133-143

Department of Education, Science and Training (DEST) 2003 “*Our Universities – Backing Australia’s Future*”. Commonwealth of Australia May

Douglass, John Aubrey. 2007 “*The Entrepreneurial State and Research Universities in the United States: Policy and New State-based Initiatives*” in Journal of the Programme on Institutional Management in Higher Education, Higher Education Management and Policy, Volume 19, No.1 OECD 2007, pp 95-131