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Inquiry into Australia's Future in Research and Innovation
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Curtin University Submission to the Joint Select Committee on Trade and Investment growth

Background

The Joint Select Committee on Trade and Investment Growth was established to inquire into and report on measures to further boost Australia's trade and investment performance, including, but not limited to, barriers to trade, reduction of red tape and structural challenges and opportunities for the Australian community.

As part of its remit, the Committee will investigate how the research and innovation sector can better assist in overcoming Australia's geographic, economic and labour challenges, with a focus on commercialisation including, how technology imports and exports could be further facilitated.

Innovation can be defined as doing something new that has utility to business and society and is valued.

Recommendations

1. More flexible schemes with increased support are required to encourage research collaboration and student mobility. This is essential to stabilise the drift of South East Asian students to the United States. Australia must be competitive in the market place;
2. Support for long term international collaborations between industry and international Universities;
3. Expansion of the new Colombo Plan;
4. Policy alignment across agencies at the Australian Government level;
5. Review of regulatory and tax arrangements impacting Trade and Investment;
6. Preferential treatment of University to Business research within the current R&D tax incentive process would enable greater engagement at no extra cost to the Australian Government;
7. Support for Knowledge and Innovation within the University sector through direct funding to facilitate collaboration and knowledge transfer activities with industry;
8. Support for cultural reform in both University and Business sectors to enable the engagement process. This ranges from entrepreneurship training for both undergraduate and postgraduate students as well as academic staff and business;
9. Support for Accelerator-type programs;
10. Support for the development of co-working spaces, demonstration and experimental laboratory facilities that are open to students, researchers, industry operators and technology service providers. This facilitates and showcases state-of-the-art research and technology demonstration projects, and delivers targeted research solutions to industry problems;

11. Support for innovation in non-STEM areas as well as STEM areas;
12. Whole value chain support (exploration to manufactured product sales) for industry sectors that are identified with comparative advantages in Australia eg critical minerals; and
13. Greater support for prototyping, commercial proof of concept, pilot trialing and business concept development for new products developed in Universities (either in partnership with industry or not). Packaging a technology into a form attractive to industry and investors is essential. The costs of this type of support in Universities often prohibits Universities from working down the value chain.

Barriers to trade and red tape – An education perspective

The education “trade” is one of the top 4 export industries (\$18 billion) in Australia in 2014-15. Both direct and indirect revenue of \$140 billion (tourism, housing, retail, airline) is derived from education and training of international students. In the last 10 years we have seen major changes in the policy settings on international education that has diminished opportunities and in many cases enabled offshore competitor educational institutions to gain greater market share from Australia (United Kingdom, Canada and United States in particular). In the last three years there has been a recovery of the market but more needs to be done. The areas of opportunity include:

- Supporting the linkage between research collaborations internationally and postgraduate study opportunities. Greater funding and more flexible schemes are required to encourage research collaboration and student mobility. This is essential to stabilise the drift of South East Asian students to the United States. Australia must be competitive in the market place.
- Linking university and business partnerships to international universities and their business partnerships – see Curtin Examples 1 & 2 – SBEnrc and Joint Research Centre for Energy examples.
- Visa processes are becoming more difficult (long time delays and costly)
- The Colombo Plan is an excellent scheme and could be expanded to include academic exchange as well as post graduate students – this could be tied to institutions with international business linkages tied to the collaborating institution.
- A greater focus on United States and Canadian collaborations will reap benefits alongside the Asian markets. This is particularly important in accessing the venture capital markets required in the future.
- Policies across Australian and State agencies are not always aligned to achieve effective policy settings.
- Negotiating with international funders to allow institutional flow of scholarship funding, instead of flowing the scholarship to the individual scholarship holder.

Curtin Example 1 –Sustainable Built Environment National Research Centre (SBEnrc)

The SBEnrc is an industry-led research consortium comprising the construction industry, government road and public housing and building authorities, and private sector consultant companies in addition to three university research providers. SBEnrc arose from the former CRC Construction Innovation and has been in existence for 6 years post the CRC, with a further research agreement extending out a further 6 years subject to performance. In the period post the CRC, SBEnrc has attracted (\$10 million) of core participant funding to invest in nationally derived (by the industry partners) industry research programs.

The Governing Board has an independent Chair and a CEO that is part employed in the University and by SBEnc.

The key success factors of this model can be summarised as:

1. Industry driven with research providers supplying the research
2. The research team being national and having a diverse range of skills
3. An annual engagement program with industry partners to determine annual priorities (i.e. it is flexible and responsive to industry needs)
4. Industry Chairs the research evaluation and progress committee, which also has significant industry leaders overseeing the specific research projects' direction and progress
5. Key international funders and partnerships
6. Ease of doing business for industry
7. *Light touch* governance and administrative model
8. Provides a forum for public good research in the sector and runs national industry dissemination workshops to promote research outcomes in participating companies
9. Allows smaller SME partners to co-invest into research programs of interest without being a core member.

Curtin Example 2 – Australia-China Joint Research Centre for Energy

Curtin is the Australian leading partner of the Australia-China Joint Research Centre for Energy. The Joint Research Centre involves Australian and Chinese universities and, more importantly, industry partners. The research in the Joint Research Centre includes both fossil fuels and renewables. The activities have included joint research, staff/student exchange and joint technology development. The involvement of Australian and Chinese industry partners has ensured that the research and development activities are designed to deliver long-term practical benefits to both countries in achieving cheap and reliable energy supply with reduced CO₂ emissions. The Joint Research Centre will continue to play an important role in deploying Australia's world-leading low-emission energy technologies in Australia as well as in China and other parts of the world.

Structural Reform

The establishment of Innovation and Science Australia (ISA) is a great start, however further structural change could include a series of high-level Industry Councils (based on existing export commodities and future export opportunities). These could be linked to the Industry Growth Centres.

Taxation reform for Research and Development (R&D) conducted by business is essential. The new ISA has a crucial part in informing that reform. Preferential treatment of University/Business research within the current tax incentive process would enable greater engagement at no extra cost to the Australian Government. It would help provide a sustainable base for University research in the longer term and reduce barriers for international investment groups to make direct investment into Australian based technology opportunities.

This involves a review of regulatory and tax arrangements. Favourable tax arrangements, such as those in place in Israel and the UK, are models worthy of consideration. In Israel, non-residents are exempt from tax on gains derived from the sale of shares allocated to them by an Israeli-resident company in consideration

for their capital investment, as long as the Israeli company was classified as an "R&D intensive company". See also the Seed Enterprise Investment Scheme (SEIS) in the UK that provides a 50 per cent tax deduction on investments made in early-stage start-ups.

The United Kingdom has supported Knowledge and Innovation within the University sector through direct funding to facilitate such collaborations and knowledge transfer activities. Clustering models, such as CAPAPULT programs, have also been established to develop and retain key industry sectors in the UK. Capital funding has been provided to support such initiatives.

The recent changes to the Industry Training and Research Hubs, CRC and ARC Linkage programs is to be applauded in addressing the speed to access funding when partnering with Business.

Support for cultural reform in both sectors to enable the engagement process is required. This ranges from entrepreneurship training for both undergraduate and postgraduate students as well as academic staff.

Various commercialisation accelerator programs are proving to be valuable – See Curtin Example 3.

Curtin Example 3 - Curtin Accelerate

Curtin Accelerate is a 10 week structured mentoring program that delivers content to teams seeking to develop new technology based business concepts. The program is open to students, staff and alumni of Curtin who have any innovative business idea. Selection into the program is extremely competitive.

The program connects participants with industry contacts, provides one-to-one and group mentoring sessions, and helps bring ideas and businesses closer to commercialisation.

What is offered by Curtin Accelerate?

- \$5,000 equity-free grant
- Access to co-working space and facilities
- Access to networks including commercialisation experts, investors and potential partners
- Business start-up workshops designed and delivered by Matthew Macfarlane – Investment Director at Yuuwa Capital
- 10 weeks personalised mentoring.

The new Innovation agenda

Globally the next major revolution will occur in the fields of technology addressing major global and personal issues for consumers. The "Sustainability" revolution is taking place because of technological change enabling new sustainable approaches to issues around population, economics, business, environmental management and cultural change. The Universities' role is to develop the fundamental technologies with industry, train future generations and help bring new knowledge to the market.

This new agenda also requires new approaches to researchers working with whole systems and supply chains. This moves the agenda from the individual private benefit model to more activity at a public benefit level. No area is contributing more in this way than data analytics or Big Data (See Curtin Example 4).

Curtin Example 4 – Innovation in Big data – CISCO IoE Innovation Centre (CIIC)

In 2015, Cisco in partnership with Curtin University and Woodside Energy Limited, established the Cisco Internet of Everything Innovation Centre at Curtin University.

With over 80 researchers and links to advanced facilities and a global industry network, the Centre will bring together start-ups, industry experts, developers and researchers in an open environment to create ground-breaking and innovative solutions that foster growth, provide jobs and help build sustainable economies.

Cisco and the foundation partners Curtin University and Woodside Energy have committed approximately \$30 million to establish and develop the Perth Centre, and help position Western Australia as a global collaborator in research and innovation.

The Centre provides collaboration and co-working spaces, a demonstration area and experimental lab facility, and is open to students, researchers, industry operators and technology service providers. It facilitates and showcases state-of-the-art research and technology demonstration projects, and delivers targeted research solutions to industry problems in a safe to fail environment.

<http://research.curtin.edu.au/about/institutes-centres/cisco-internet-of-everything-innovation-centre/>

The new innovation system is too directed at the STEM areas and greater recognition of the role of the Creative Industries and Humanities is required in the new model. The current settings are not enabling the linkages between humanities and the innovation agenda. Designers and behavioural specialists will play more important roles in the new innovation system in the future. The settings must encourage that interdisciplinary collaboration.

The new innovation agenda will have a key place in future defence technologies and humanitarian strategies as the world moves towards a greater gap between the “haves” and “have nots” in the next 25 years. The recent positive changes between defence and universities in Australia in developing national research programs are welcomed and encouraged. In Israel a good proportion of the innovators in the private system came from a military background. This is not the case in Australia and actions to enable this would be a positive step.

Equally, the Defence Trade Controls are a potential barrier to international collaboration in the future. The good work of research providers and government have resulted in recent changes that provide a more sensible approach; however barriers to collaboration still exist for controlled goods and the impact should be continually monitored and modified as appropriate.

The suite of new technologies under development will be more confronting than ever and will require careful ethical debate and public awareness. Funding for these ethical activities have not traditionally been considered but are essential in the near future.

Both the Australian Federal and State governments have to be more open to the development of industries where Australia has a comparative advantage as a consequence of – resource availability, processing capability, supply of energy and land, and a ready supply of labour at reasonable cost, a growing market and an ability to ship to importing countries. At the moment these unique areas of comparative advantage get the same red tape treatment as other less attractive opportunities. The fear of backing a winner and then celebrating success is still alive and well in Australia, unfortunately.

The Industry Council could provide advice on the opportunities and recommend ways to fast track the opportunity.

Technology and commercialisation

Prototyping, commercial proof of concept, pilot trialling and business concept development can be required to package a technology into a form attractive to industry and investors (See Curtin Example 5).

This is a high risk end of the investment market and historical returns provide little incentive to new entrants. Programs such as Accelerating Commercialisation (and its predecessors) and the Innovation Investment Fund contributed towards filling the void of funding in this area. Continual program changes and low level of funding commitment limit the effectiveness of these programs. Increased and consistent funding for Accelerating Commercialisation is encouraged.

Curtin Example 5 - Developing commercially competitive novel technologies for the creation of new industry – Energy

Renewable energy technologies are gaining increasingly widespread acceptance worldwide. Biomass is the only renewable that can be used directly to generate base-load electricity. Biomass is also the only renewable that can be used directly to produce liquid fuels and chemicals that are currently manufactured from petroleum. With its vast area (even excluding the desert), Australia has the great potential to develop massive high quality biomass resources to fuel a new bioenergy/biofuel industry. This new industry could potentially produce a GDP at a similar magnitude to our existing agriculture in many regional parts of Australia. However, there are no mature technologies that can realise this potential for the social, economic and environmental sustainable development of Australia.

Researchers in the Fuels and Energy Technology Institute in Curtin University have developed a suite of novel bioenergy/biofuel technologies. The absence of a well-established bioenergy/biofuel industry in Australia has meant that it would be impossible to transfer these technologies to an industry partner. Recognising the great potential of these technologies, Curtin has spun-off the technologies to establish a new private company, Renergi Pty Ltd. Working with Curtin and other partners including WA farmers, Renergi has secured large amounts of financial resources, especially from the Australian Renewable Energy Agency (ARENA) and WA State Government, to further demonstrate these new technologies.

Renergi is now planning for the design and operation of the first commercial scale bioenergy/biofuel plant using these technologies originated from Curtin. In addition to contributing to the decarbonisation of our economy through bioenergy and biofuels, the commercialisation of these technologies will also make the planting of mallee and other biomass an economically feasible means of fighting dryland salinity, which is one of the worst environmental problems in regional Australia.

Renergi promises to be an Australian industry leader in bioenergy and biofuel technologies. Renergi will also export the technologies to emerging economies such as China and India and many other parts of the world.

Some Universities have recognised the gap in funding and established arrangements to make direct investments in this area. Curtin has an active proof of concept program called Kickstart that provides early stage commercial seed funding.

(<http://research.curtin.edu.au/commercialisation/information-for-researchers/kickstart-funding/>)

Appropriate incentives from Government to validate and encourage establishment of this type of program would increase activity and promote commitment from new and existing participants. The Pre Seed Accelerator model in place in New Zealand appears to be achieving success with this type of approach (<https://www.kiwinet.org.nz/files/Investment/Historic-PreSeed-Report.pdf>).

Seed funding for commercial opportunities is provided by the NZ Government and is matched by the Universities and private sources. The model encourages collaboration and knowledge sharing between institutions and investors as well as standardisation of commercialisation processes. It has the benefits of building skills and critical mass in early stage investment and commercialisation, in addition to providing direct funding support for projects. The Queensland Government has recently adapted this program for its Business Development Fund (<http://advanceqld.initiatives.qld.gov.au/funding/business-investment-attraction/business-development-fund.aspx>). A national program coordinated with the states has the potential to transform access to commercial proof of concept funding.

Follow on funding programs such as those used in the UK by the Engineering and Physical Sciences Research Council (EPSRC) and Biotechnology and Biological Sciences Research Council (BBSRC) may also be worthy of consideration (<https://www.epsrc.ac.uk/funding/calls/fof2011/>). Under these programs, additional funds can be allocated to successful projects to improve their commercial appeal and potential for impact.

Accessing the right people to guide the direction or provide an opportunity at an early stage has a big influence on success or failure of an opportunity. Australia does not have a large pool of experienced entrepreneurs who have successfully built technology based businesses. However, there are many Australians working overseas in technology sectors and some return home for personal reasons. Developing and supporting networks, such as Advance (<http://advance.org/>), to make it easier to identify those who are in the market or interested in returning could improve access. Providing focal points for local entrepreneurs to network with experienced entrepreneurs and investors from other markets is helpful. The West Tech Fest and OzAPP Awards are aimed at providing these opportunities for Western Australian entrepreneurs (<http://ozapp.com.au/>).

Skills needed in the new innovation system

The University sector is essential to developing people with the skills needed into the next 50 years. Universities are trialling more flexible models to remain relevant, leading the identification of future skills needed, providing workplace learning models, reskilling when sectors turn down (eg mining engineering), and supplying new skills when sectors emerge quickly (eg BIM – Building Information Modelling).

All of this is underpinned by great relationships with business and other sectors. Knowledge workers of the future will be different from knowledge workers of the past. They will need to be more adaptable and innovative thinkers and entrepreneurs as comfortable in a business setting as an academic research environment.

There is an unmet need for training of academic staff in how best to engage with industry. There is value in developing a workshop series to provide content of basic tools for engagement such as pitching to a commercial audience, legal frameworks, intellectual property, commercial project management and reporting. This series could be rolled out nationally through a body such as Knowledge Commercialisation Australia.

Yours sincerely

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