

Implications for New Zealand universities: commentary on *Catalysing Economic Growth: Boosting Innovation Expertise in the Private Sector* - a paper by the Institution of Professional Engineers of New Zealand (IPENZ)

Overview

The paper produced by IPENZ discusses New Zealand's economic situation and low place (25th) in the OECD league tables. It recommends policies designed to improve labour productivity in order to improve economic performance. It states that there are two issues which need to be addressed in New Zealand:

- The need to boost the expertise in the private sector to develop, adapt and adopt new technologies (innovation expertise)
- The need to make the New Zealand economy more "sticky" to high technology companies (ie, make changes to the economy so that high technology companies remain in New Zealand).

The paper contains two main proposals to address these issues:

- The Government should create an Innovation Expertise Fund (IEF) which would be applied in two shares – one for universities and the other for CRIs. Funding would be diverted from the Performance-Based Research Fund into the university part of the fund, and each university department could choose the extent to which its research activity is assessed under the Innovation Expertise Fund and the PBRF. The IEF would measure research activity against the following criteria: economic impact of the research, amount of private sector investment attracted by the department, and number of level 8 or above graduates who have moved directly to New Zealand private sector employment. The IEF would only be made available to the university department when they are matched with new private sector co-investment.

The CRI part of the fund would be based on turning IRL into an innovation development agency, using part of its core funding. Other CRIs could become involved at a later stage, also contributing part of their core funding.

A competitive test would be used from time to time to allocate part of the IEF between universities and CRIs to ensure that funds went to the better-performing parts of the sector.

- The Government should provide direct co-funding for the early years of employment of workers in new R&D positions in industry. The paper suggests that 50% of the salary (up to a maximum of \$50,000) for the first year, and 25% (maximum subsidy \$25,000) for the second year be provided. It suggests that a pool of \$30m per annum could fund 500 new R&D workers per year.

Comment

- The paper highlights a number of very important issues for New Zealand, including the need to drive economic development by lifting labour productivity.

It provides some good information about the contribution that engineering could make to economic development through the growth of high technology sectors. The issues raised are serious ones and the paper is a useful addition to the debate, although the universities do not agree with all of the approaches suggested.

Potential implications for New Zealand universities

- To put the IPENZ paper into context it is important to understand the origins of the PBRF. The PBRF is funded from Vote: Education, not Vote: RS&T; adopting the proposals in the IPENZ paper would in effect be a transfer of funding from the education system to the RS&T system. When the PBRF was created its funding was based on funds previously allocated to Universities as research degree top-ups into the new fund. While new money has been added through the Budget process, over two-thirds of the PBRF is based on the earlier top-ups. These funds were not intended as a source of funding for research, but to enable tertiary institutions to provide research-based teaching, enabling the universities to produce the researchers and trained professionals upon which groups such as IPENZ depend.
- One-quarter of the PBRF is allocated on the basis of Research Degree Completions – basically the number of Masters and PhD graduates produced each year. The ability to supervise and teach these people and to retain them in New Zealand after graduation would be seriously limited if the proposals in the report were implemented. These graduates are the researchers and professionals that occupational groups such as engineers, doctors and those in industry need to keep the economy ticking over. Any reduction in overall PBRF funding would put in jeopardy the maintenance of the production of these graduates.
- The paper suggests that some PBRF revenue be reallocated to the Innovation Expertise Fund, and that part of this fund could potentially be accessed by the CRIs, and that the funding would not be available to research institutions unless they had co-funding from industry. If the proposals were implemented, it could lead to an overall reduction in PBRF funding to universities, with some of this funding potentially shifting to CRIs and some being unable to be spent due to the need to obtain co-funding from industry. With recent changes to the CRIs and the establishment of core funding for CRIs, research funding has already been diverted away from universities and towards CRIs. Research across the university sector in New Zealand is already facing significant funding challenges.
- If funding is shifted away from the PBRF, it is likely that the activities currently funded by the PBRF (eg, research based teaching) will suffer. Diverting funding away from these activities will actually pose a significant risk to the aim of growing New Zealand's economy through the development of highly qualified graduates for technology based industries.
- The proposal to create an IEF and allow departments to choose the extent to which they are assessed under it or the PBRF would create a messy and impractical system. The Government has stated its desire to simplify, rather than complicate, the RS&T environment in New Zealand. The PBRF already carries a significant administrative burden, and adding another layer of performance assessment will only increase bureaucracy and reduce efficiency. In addition, it would be extremely difficult for universities to manage with each department choosing the extent to which its research is assessed under each system. Likewise, it would be difficult if not impossible to measure the relative performance of institutions. For example if the Engineering Department at the University of Auckland decided to take part in the IEF while that at the University

of Canterbury opted for the status quo, meaningful comparisons could not be made.

- The purposes of the PBRF, are to:
 - increase the average quality of research
 - ensure that research continues to support degree and postgraduate teaching
 - ensure that funding is available for postgraduate students and new researchers
 - improve the quality of public information on research outputs
 - prevent undue concentration of funding that would undermine research support for all degrees or prevent access to the system by new researchers
 - underpin the existing research strengths in the tertiary education sector.

These priorities are different from those of the IEF and for the IEF to be implemented as outlined would involve a major realignment of the PBRF's goals.

Wider Issues

- Before the policy proposals put forward in the paper can be considered, more work will need to be carried out to show that the policies will be successful, what the alternatives are and why these approaches are preferred.
- As outlined, the IEF would not have a focus on increasing the quality of New Zealand's research, one of the main aims of the PBRF. If New Zealand is to make significant productivity gains, it is very important that we continue to fund research of the highest quality. For the universities to help industry it is also important that we continue to grow the amount of research-based teaching, a goal that would be difficult to achieve if PBRF funding was reduced.
- Businesses are unlikely to support high quality research unless it meets their immediate and short to medium term needs. The proposals do not contain any incentives for businesses to engage with universities or to co-fund research. Businesses can already access public R&D capabilities through schemes such as the Technology Transfer Vouchers so it is unclear why the proposals in the paper would be taken up by businesses. Four of the universities are involved in a trial of the scheme and the others are keen to play their part.
- The paper ignores the fact that the universities are already highly engaged with business. For example, in the middle of 2010 the universities commenced a programme of national events to showcase the research research capabilities present in the universities and to strengthen the existing ties.
- The paper identifies \$30m as being needed to co-fund the salaries of R&D staff across New Zealand businesses, but it is unclear where this would come from. It is also unclear from the paper what would be the likely take-up rates of this type of policy intervention or the number of companies which would like to employ R&D staff but cannot afford to do so.
- Before any changes are made to the PBRF or other funding mechanisms, a number of wider issues need to be considered.

- The 'brain drain' and policies that would encourage graduates and entrepreneurs to remain in New Zealand, rather than go overseas.
- The small size of most New Zealand companies, and the difficulties that most small companies have in investing in R&D. Ninety per cent of enterprises in New Zealand employ fewer than five people, and growing these companies to a size where they warrant dedicated R&D staff will take more than a simple subsidy for R&D salaries.
- The issue of the ability of the economy to absorb science, innovation and technology and process these into valued products and services at a profit can be improved. Research suggests that the development of science and technology is going on in universities and institutes across the globe, but that the economies with the best ability to use and absorb the ideas to generate products and services are experiencing economic growth (ie, there is a net flow of innovation, science and ideas from some regions to others). In New Zealand, this may require development of the right sized businesses which are able to market and export high technology products and services. This type of development is likely to require a comprehensive growth strategy, greater amounts of expansion capital, development of talent and expertise in directing, developing, managing and marketing internationalising businesses, and the development of greater entrepreneurship.
- Allowing businesses to determine (via co-investment decisions) which R&D activity gets funded at universities may assist economic development in the short term by funding research that is likely to be used by the market in the short to medium term. However in the long term this will divert funding away from basic research platforms, which are also needed if New Zealand pursues a high technology economic development strategy. While businesses are unlikely to co-fund basic research, it is important to fund and support research across all stages, from basic to applied. The proposals in the paper appear to be based on a linear model of technology development, yet successfully commercialised technology has seldom followed a linear development model. In some cases, basic research has led to technological advances that are able to be commercialised, and in most cases the path to market is messy. Regardless, it is important that funding is not diverted away from basic research.

The way forward

Economic development needs not just graduates but the right type of graduates. Universities are already playing their part in this area. Before new university qualifications are approved the universities must consult with industrial, professional and other groups on whether the proposed qualification meets their needs. Once a qualification has produced its first set of graduates there is a review process to check that the qualification meets the needs of the wider community. Through such processes the universities help to ensure that they are responding to the needs of the market.

The IPENZ paper believes that more can and should be done to bolster innovation, a sentiment with which we agree. A number of mechanisms have been developed over the years, such as the Technology for Industry Fellowships, the TechNZ undergraduate and postgraduate internships. These arrangements provided graduates with an opportunity to gain experience, while providing businesses with much needed expertise at an affordable price. As well as providing companies with fresh eyes to come up with new solutions they also enabled prospective employers and employees to test each other out, a kind of technological speed dating. While some of these measures have been

discarded, any debate on helping industry deploy graduates should look at these measures alongside any new proposals.

The discussion document identifies a set of issues that are relevant and important to the economic development of New Zealand and the universities clearly have a role to play in addressing some of them. One issue highlighted is the need to offer undergraduate and graduate students experience of either working in qualifying 'technology companies' or investigating technical problems of relevance to such industries if our innovation system is to be accelerated. Ideally such interactions will provide a positive experience for the student, the industry and the university. This vehicle has been tried elsewhere and has proved to be a success. For example, in 2003 the Knowledge Transfer Partnerships were introduced in the United Kingdom. This scheme involves companies, a knowledge transfer base (such as a university or a research organisation equivalent to one of our Crown Research Institutes), and a recently qualified graduate. The scheme allows for companies to obtain knowledge and technology from universities and for a graduate to enhance his or her business and technical skills. The company entering into the partnership arrangement contributes between 40% and 67% of the project costs with the government contributing the rest. The scheme is considered to be a success and at any one time there are approximately 1,000 programmes in place.

We believe that a new initiative, based on dedicated new funding, to promote work-integrated learning and knowledge transfer would also work in New Zealand.

The universities believe that it is important to produce the graduates the country wants and needs, whether this is in the arts or the sciences, and that industry is provided with the appropriate resources to enable it to contribute to the country's development. The issues raised in the paper are important and need serious consideration. However, we do not believe that the solution is to use the PBRF to solve these problems; we do not see the best way forward being the removal of funding from the PBRF, in effect penalising it for being successful in what it set out to achieve. The universities would be willing to work with IPENZ and other bodies to further define the issues and debate the solutions.

Universities New Zealand Research Committee
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