



OFFICE OF THE PRIME MINISTER'S SCIENCE ADVISORY COMMITTEE

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Sir Peter Gluckman's speech at OECD Symposium and workshops 2010 'Inside Innovation'

'Reflections on New Zealand and Innovation'

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Historically, New Zealand has had a very low public and private investment in R&D relative to our comparator countries. I suspect the reasons for this are largely cultural. New Zealand was a frontier society, which until Britain joined the Common Market, did not think much beyond commodity exports. Perhaps with some historical justification it convinced itself with stories about number 8 fencing wire and home-grown problem solving; namely that innovation can come from frontier inventiveness rather than from sustained investment in knowledge, R&D and innovation broadly defined.

However, once Britain was no longer our customer and the protectionism of the 1970s was removed, New Zealand has struggled to lift its game despite strong commitments to orthodoxy in economic policy. That, together with our egalitarian ethos, makes us as a society somewhat reluctant to make active choices. As an egalitarian and frontier society with its innate anti-intellectualism we have had a limited appreciation of the importance of knowledge for the modern small state. Things are changing: for example a decade ago expenditure on R&D was seen as a cost, now it is seen as an investment.

This country has been inhibited by lack of intellectual discourse – we have had few real public intellectuals – and yet the complexity of the issues we face requires depth of interrogation and comment. A more intensive investment in science will drive that discourse. There is no shortage of issues, and these include climate change, water quality, the impacts of an electronically connected world, dealing with regenerative medicine, and so forth. These are all issues that the public is confused about or where the science is complex and the public and policy makers could be better informed.

We have not performed well in the productivity or GDP stakes over the last 30 years, and we have seen, over that time, other countries increase their R&D investment from about our level to about 0.8-1% of GDP and have seen private sector investment rise even more. I only use comparisons to countries like Denmark, Israel, and Singapore, all small countries – many of which have problems of effective isolation and all of which have made major investments in R&D and seen their productivity and GDP rise accordingly. The problem is that this is only an association, and we still have those who doubt the evidence that investment in R&D is a key part of the innovation cycle as it is only correlative. One might say the same about any fiscal intervention such as tax cuts as the logic is the same in both cases. These critics demand causative evidence, which is clearly not possible given the complexities, confounders and time-lags involved.

But there has been a considerable mind shift in the last few years – we have seen government introduce a number of initiatives aimed at resolving several structural issues in the science system, improving technology transfer and incentivising the private sector. Already an uplift in private sector interest and involvement is appearing.

In my view the argument for a knowledge and innovation based strategy is obvious: New Zealand is geographically isolated with few natural resources that can be readily exploited beyond food, water, tourism and services and a minimal indigenous market. The manufacturing sector is small but significant and can only grow through knowledge based innovation and development. Our best assets are a highly educated population, a strong rule of law and integrity and our growing connection to Asia. It is within the weightless economy that we can really lift our performance. There are obvious sectors to exploit such as medical technology, agritech, nutraceuticals, clean tech, design, digital media and some areas of advanced electronics. But the need is to have sufficient idea flow from the public sector to warrant local and offshore private sector investment. It is no different to ensuring enough water in a hydroelectric scheme.

But we also need to be innovative in our business models – for example we should be developing public-private partnerships to encourage multinationals in areas such as food and ICT to undertake research in New Zealand around which local activity can cluster. We need to develop multilevel partnerships in R&D with the Asian tigers so that we can marry our ideas-generating capacity with their depth of market access, capital and managerial expertise.

In my view New Zealanders have not generally done well in managing and governing knowledge-based industries and we need to increase the entrepreneurial skill base in this area (and I would refer to the recent New Zealand Institute report), we have shallow capital markets, we still try to develop a widget then sell it to the world rather than develop alliances at the discovery stage and go jointly to the market, which would get round many of the deficits of the former model.

It is for these reasons that when I met with Andy recently in Paris I put several questions to him. What is the OECD analysis of the relative benefit of public investment in R&D versus incentives to business? Is there a critical level of R&D investment which must be reached by the State before private investment starts to flow, in other words what is sufficient investment in public institutions to ensure enough ideas generation to convince the private sector to get in behind? My suspicion is that this occurs at a public investment by the State of around 0.7% of GDP. Given that our investment is only at 0.5%, what would OECD see as the priorities at the next stage – targeted investment or not? What percentage of the public spend should be on discovery research? We have generally moved away from this over past decades and this must have a long-term downside – it is like diverting water upstream from the hydroelectric station.

The Government has made science and innovation one of its 6 pillars of economic growth and productivity. But science is also an essential defensive tool: we have seen the critical value of remarkable earthquake engineering, all New Zealand based, in saving lives in Christchurch; we know the critical value of bioprotection research, and so forth.

We have no deficit in our capacity to generate knowledge but rather in our lack of a sufficient volume flow to build the knowledge-based and added value-based industries and the support structures that flow from them. In 20 years what will New Zealand be selling to the world that can sustain real growth, that will earn \$100s of millions and not just a few million – we cannot get rich off the latter. The answer must be that we will increasingly be selling added weightless value, the added value that comes from clever minds. We will sell food not as a commodity but because it has real added value, because we will have developed foods that have undoubted health benefit; we will sell electronics and manufactured goods, not because they are cleverer than someone else's version but because we add value through clever design; we will sell services because of the added value of our engineering skills or the skills of our environmental scientists.

Underlying all of this is another key issue – we are 4 million people distant from markets and population centres. A reflection of our isolation is the intense and harmful parochialism between our major centres and we operate R&D over 7 major cities and sites. This seems too many for a small country – there is little clustering of public, technology transfer and private sector innovation activity, expertise is diffuse, if present, and the one advantage we should have in small country of promoting multidisciplinary innovation is thus lost. I am increasingly of the view that this failure to physically cluster is hurting us, and again I am interested as to whether the OECD has done work on the effectiveness of clustering knowledge industries and academic institutions. In Singapore it is easy because there is but one big city, but we note that clustering in Finland, Holland, Denmark and Israel has been highly effective. We also need to get beyond institutional parochialism and integrate the tertiary, science and business sectors -- more clustering can help in this regard. We need to change things so academics rotate to business and to the government sector.

And this leads to a related issue: the nature and importance of contestable funding. Our funding system is a derivative of the US and UK systems of the 1970s. We fund lots of small individualistic grants through the Marsden and HRC. The Foundation has tended to focus more on impact and the business case rather than science and excellence thus diminishing knowledge led innovation. Our system as a whole has been very competitive, which has inhibited inter-academic and inter-institutional collaboration; it is too capricious for research career development and may not be appropriate for a small country. There has been some increase in tools aimed at aggregation and collaboration, such as the Centres of Research Excellence and the Foundation's platforms.

There is now to be a review of the contestable funding system. The question really is should we be looking for substantive change to a more strategic funding system -- preserving the right level of contestation for new entrants yet encouraging more integration into multidisciplinary and even international teams? What is the right level of contest? Is it sensible for a small country to run a very competitive contestable system scaled down from that of much bigger countries? When so much discovery has application outside its original field, how important is impact assessment? How should we prioritise because the simple fact is that 4 million people cannot do everything to the cutting edge and bad research is a waste of money?

My role is new. Like science advisors elsewhere, I have recognised a key issue around what is the role of evidence and science in government's policy formation. Again this is a question I put to Andy two months ago. How can we evaluate the extent to which better and more robust scientific advice advances policy formation across all domains of government? There is some evidence that independent scientific advice to ministries does improve policy formation, but it is largely anecdotal. It is a matter that I know the OECD Committee on Science and Technology is turning its attention to. A related matter I am focused on is the quality of, and access to, government contracted research, particularly in the social sciences, I am currently preparing a report on this matter.

The matter of size has other implications, because New Zealand has to work hard to be relevant to the world. We need that relevance for diplomatic purposes and for flow-on benefits to trade. Science offers that potential to assist in addressing this issue, and the Government has realised this. The Prime Minister has established a senior-level international science and innovation coordination committee to enable a much greater focus on the link between science and diplomacy. There are several dimensions.

First, diplomacy plays its role in science. Diplomacy has allowed New Zealand science to get access to EU funds, and bilateral initiatives have been developed with Germany, China and

Singapore, to name but a few. The science community has benefited. At the extreme, diplomacy and science come together in very large science projects such as hopefully the Square Kilometre Array radio telescope.

Secondly, science assists diplomacy– look at how many international agreements now have science within them. Science is relatively politically neutral and opens doors – it is perhaps the modern equivalent of ping-pong diplomacy. And that science leads to trust and innovation and that innovation leads to economic opportunities through trade and investment.

Thirdly, science operates within diplomacy – the most obvious examples are in arms control verification but science is playing an enormous role in the diplomacy of climate change – not just in creating measurement approaches and identifying the problem but in helping the community towards solutions. New Zealand can be truly proud of its role in leading the work on the Global Research Alliance to reduce agricultural emissions – one that meets several diplomatic objectives. And it is science that is the glue that holds the real and virtual ungoverned spaces together for the global community – it is science that essentially governs the Antarctic, the internet, space and the ocean deeps.

The quality of our future as human beings on our rapidly degrading planet will depend on how well we develop new knowledge and use science and technology. Every challenge we face is in part based on science and technology and has its solution embedded in science and technology. A modern society must be scientifically literate and informed. Democracy requires this. While we should not expect every citizen to understand the complexities of quantum physics – who does? – we would hope that our community is literate with what the scientific method is, how science approaches complex issues, and how it addresses probability and uncertainty. This is not possible without a critical mass of scientists and science within the society, but that is not sufficient – we need to ensure scientific literacy in our schools and I am have just forwarded a report on this to the Prime Minister.

All this is made more acute by the rise of the internet. No longer can information be easily divided into that which is likely to be reliable and that which is not. In the past, that was perhaps the role of the specialist journalist, but now anyone can put so-called information on the net. Much of that information is misleading or plain wrong and improved scientific literacy is needed so our citizens can make best use of the new world of information overload. This is a real challenge and I wish I had time to go into it in some depth.

Science brings with it a spirit of adventure, of enquiry, of innovation, of looking ahead. It can be infective and we want it to be infective for these are the very attributes that this country needs to have if it is to succeed. We need the ambition that science brings.

To do so will require shifting our comfort zone. Increasingly our emergent knowledge economy will not stand alone, it will be partnered with those of other nations, nations closer to market and the capacity to go to scale. New Zealand can become a smart nation and a smart society. That is our challenge.

Thank you.

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