



OFFICE OF THE PRIME MINISTER'S SCIENCE ADVISORY COMMITTEE

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Sir Peter Gluckman, Chief Science Advisor

Thank you for the opportunity to speak.

Before turning to the meat of what I want to say let me just make a few preliminaries.

First, government has put science and innovation forward as one of the 6 planks of its economic strategy. It has not done so on a mere whim. Indeed we stand out as the only small advanced nation which has been slow to do so. Indeed it is clear with the benefit of the retrospectroscope that we should have recognised the need to do this some thirty years ago. The result is that while other comparator countries have been steadily increasing both their public and private sector spend on R&D and on innovation for the past twenty years we have been rather static. It is only in the past two years that we have really seen government acknowledge that research is an investment not a cost and that the whole science and innovation ecosystem needs to be addressed systematically.

The consequence is that we now only spend 0.5% of GDP on public sector non-defence R&D and all our comparator countries are spending at least 0.8% and heading towards 1% public spend. I actually think even this number is an over estimate of our true public sector spend because within that we spend disproportionately on filling the gap that the private sector in other jurisdictions would normally spend on their biggest economic sector – namely the primary sector where small business dominates in the form of farmers and in New Zealand the Crown picks up on much of their R&D needs.

In our comparator countries we have seen a steady growth of private sector investment in R&D so it now averages 1.5 to 2% and continues to increase – we sit somewhere around 25% to 30% of that number.

Those small countries that have invested highly in becoming smart nations have withstood the global financial downturn remarkably well - look at Israel, look at Singapore for just two examples.

In the last two budgets we have seen the start, and the Prime Minister has signalled that there is more to come, of a process by which we gradually adjust our settings to improve the potential for economic growth off the back of being smarter as a nation. The CRI reforms, the restructuring of the Ministry and Foundation to become a Ministry of Science and Innovation, my appointment, the various new schemes for business R&D support announced in this year's budget are all part of that process and there is no need for me to rehearse these.

Firstly I will address the challenge we face is of how to grow and where to grow the public investment off our historically low base. There are several components to the answer and so I will give several answers. Then is a second set of questions which more directly challenge business and in the last part of my remarks I will address those.

So to start with how do we expand the public and also the private investment in science? I worry that a polarised and naive mindset has set in – one either invests in science or one invests in business -led innovation. There is a tendency of each to accuse the other of not understanding, of having different cultures, different drivers etc. This is of course true – they do but this does not stop a high level of interaction which can be mutually synergistic. I have seen business leaders state that there is no need for investment in public sector R&D, just support business and they will do what they want to do. And I have seen some terribly naive attempts at commercialisation out of the public sector rather than transferring the knowledge to the private sector.

Parenthetically I think we have a very naive understanding in New Zealand of the role of open innovation and this has hurt our development – it is a matter I will return to at some time in the future.

I have just returned from meetings with senior science policy analysts in the UK, Singapore, the OECD and Australia. The discussions at the OECD were particularly helpful. The key question I have been addressing with them is where should the public purse be invested to assist innovation. Without hesitation each has responded that the evidence is clear that a healthy public science system is essential for an innovation-based economy. Indeed research from the UK and Norway suggests that the best return on the government's dollar is untargeted investment in bright minds, provided that the climate for effective technology transfer is present. Some small countries such as Singapore and Sweden and Switzerland have been able to prioritise within the public sector without losing momentum and we have to some extent already done that with the CRIs and the CoREs.

Secondly, it is pretty clear from economic analysis that the one component of the R&D system with real spillover effects to other aspects of the economy is public sector spend – there is little evidence that government investment in business R &D has significant spillover effects.

Thirdly, longitudinal data from a number of comparator countries suggests that as the public sector spend increases so does the private sector spend, although there may be a threshold effect at about 0.7% GDP where the private sector spend starts to increase faster than the public sector spend. This may be because there has to be sufficient ideas flow from universities and public research institutes for the private sector to build the infrastructure of funds, specialists etc to exploit the knowledge generated and for established business to look beyond itself for new ideas to grow.

These are reasons why the private sector should be more vocal about seeing an adequate public investment in R&D at our universities, polytechnics and CRIs.

One issue that is real is that we have a distributed and rather parochial approach to science. If we look around the world where science has driven economic growth, clusters are important. The COREs are a start on achieving virtual clusters in New Zealand and we need to see far more of that activity. This means putting incentives in place that overcome traditional institutional parochialism but doing so is critical – look at Australia – NSW is clearly the focus on engineering and physical sciences, Queensland and Victoria the focus of biomedical sciences, and so on.

I would like to see a greater focus on knowledge transfer – that is ensuring what knowledge is held within universities and CRIs is made available to the private sector. This is the kind of knowledge that does not have commercialisable IP component to it. One way to really do that would be to see staff rotating between the public and private sector but current academic traditions inhibit that. We need to find a way to incentivise that.

On the more traditional technology transfer front a lot is happening as a result of the last budget and I will not comment further on that except to say that the changed mindset especially in universities is exciting and offers real potential.

One interesting lesson comes out of Australia where there we have seen two large virtual institute models develop – the Cooperative Research Centres and the ARC Centres of Excellence – the latter are more like our CoREs, the former were essentially forced marriages between industry and academia. The recent review of these programmes suggests that forced marriages are not nearly as successful as those where academia is incentivised properly to seek business partners. The Centres of Excellence have found excellent private sector partners including multinationals, and we are seeing the same thing happen here with our CoREs.

There is much to learn from these new models of public sector research where the trend is to bigger longer term but contestable funding with a strategic focus. Many nations, especially smaller ones, are moving in this direction. Provided that is balanced with a healthy contestable system for talent recruitment and development and a modern research infrastructure, a healthy science ecosystem is possible.

Now let me turn to the second set of questions and challenges. What are the challenges the New Zealand business sector must address to become more innovative and productive off the back of a greater investment in a science and innovation system by the Crown?

Obviously it must invest more but if it is to invest more it needs to look at itself and ask whether it has the right governance and management skill set to do so. New Zealand business governance and management is very narrowly based in terms of skill set and this is true both in big business, in SMEs and in the start-up phase. Our public sector boards do not normally have scientists, engineers or academics upon them – this would be the norm offshore. I doubt that many companies without that skill set at the top table will use knowledge optimally.

Spinout companies are a particular challenge – too often the boards consist of the champion and investor representatives with no independent expertise in the area of the technology. If one looks at our biopharma sector this is readily apparent and a number of failures can be put down to this skill gap.

We tend to spin companies out too early and in an under-funded form – this is a result of an underfunded public system and various incentives in play. Such spin-outs are doomed too often to fail, especially if they are single product companies. The CRI reforms in part were to remove some of the inappropriate incentives to early corporatisation. But I would like to challenge the business community as well as the academic community. Perhaps we spin out too many companies. Should we not encourage clustering and consolidation? Everyone is likely to win if a spinout company involves multiple founders and multiple products, and thus management can choose to invest in successful lines rather than continuing to over invest in an unproductive idea which otherwise is the inevitable incentive. I think this is true both in the bio and the manufacturing spaces.

And if we are to be innovative as a country we need innovative thinking about the business model. Our challenge is not to create \$5 million companies - it is to create \$500 million exports. How can we do that? We live in a world of parallel discovery – what is created here is also invented in parallel elsewhere, places where there are deeper pockets, greater ability to go to scale, greater access to market etc. We need to become part of that world – rather than trying to take a widget to the world, we should enter early pre-commercial and early commercial alliances with other players who have that advantage – I would rather we had 30% of a billion dollar business than 100% of a \$10 million business which will be squeezed out by the bigger player.

Finally what will we really sell – increasingly we will sell added value, added value that comes from clever minds. We will sell food not as a commodity but because it has real added value because we demonstrate it has a 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 earthquake engineering skills or the skills of our environmental scientists. This is our future – to do so will require shifting our comfort zone.

It will require business and academia, business and scientists, to come together to start looking not at each other's half of the glass but agreeing to co-own and co-develop a hopefully overflowing glass of opportunity. It will take time, we start from a rather leaky and poorly filled glass but the leaks are being plugged and hopefully the levels are starting to rise.

Thank you.