



OFFICE OF THE PRIME MINISTER'S SCIENCE ADVISORY COMMITTEE

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There is now a more intense focus on the role of science in New Zealand's development than there has been for two decades. There is a shift in thinking and in particular a growing realisation in government that science expenditure must be seen as an investment in our country's future rather than viewed as a cost. But, like any investment, there needs to be clarity over its purpose.

Science has pervasive role in our society; be it in developing our economy, protecting our environment and responding to the challenges ahead, of climate change or understanding our society and developing our quality of life. On comparators such as OECD ratings we have declined – our relative productivity is poor, we are ranked surprisingly low on scales of innovation, we have one of the highest rates of teenage pregnancy and suicide and high rates of incarceration.

The world is changing at an exponential rate, knowledge and technology is a major part of that change and whether New Zealand remains of relevance to the rest of the world or not will depend on transformational strategies than in turn will depend much on how we develop and use knowledge. Science is the only way we have of developing new knowledge. A knowledge-based society will be more ambitious, more prepared to face the challenges ahead, more able and willing to address issues of social development and environmental protection, and certainly more productive.

Studies by the OECD show a remarkably linear relationship between a nation's investment in RS&T and productivity: nations that invest more in RS&T are the most productive. While in the past it has been argued that this relationship reflects the fact that more productive countries can afford to undertake more RS&T, the international consensus is that there is a causal relationship in the other direction, namely that investment in RS&T drives innovation and productivity.

That is why despite tough economic times many nations including the UK, USA, Denmark, France, Germany, Australia, Japan, Korea, Singapore and China have in the last 12 months announced marked increases in their public investment in research, science and technology and in the tertiary education sector in which so much public research is undertaken.

So what are the possible causes of this? We need to consider why we have such a low investment both from the public and private sectors. We need a frank and urgent national discussion on addressing this problem. As I have pointed out, the investment gap is now costing enormously.

Have we been seduced by the national myths such as number 8 fencing wire, punching above our weight? We think we are innovative when the report of the OECD and the recent report from the New Zealand Institute show that we are not. We live on a past glory that probably was never there. Could it be that we are a very young country which has not yet learnt to value intellectualism but Singapore gives lie to that as an excuse. We are not very good at celebrating risk takers because risk takers mean failure and we fail to understand that success often comes from repeated attempts.

Because our current spending pattern was established in the post war period of protectionism and farming for Britain at a time when commodity was king, we have built up an almost untouchable pattern of high social spending when finding that extra fraction for investment where the Crown should invest in R&D has not been achieved. Strategic investment is hard when electoral cycles are short.

Why is it that our private sector spend on RS&T is so low? There are common answers with those I have just given but there are additional factors. In part I think it stems from the chronically low public sector investment disincentivizing the private sector from seeing RS&T as exploitable because there has been insufficient ideas flow. I suspect in some sectors, public research sector has been too focused on late stage application rather than knowledge generation and this has displaced private sector involvement. In part we have to acknowledge that our mix of firms is such that we do not have the large firms in the defence and pharmaceutical sectors that drive so much RS&T elsewhere?

But then there are ways around that; if our real strength is in the export of ideas, then our businesses need to work better with the public sector to form liaisons and international partnerships to take ideas to scale, to find capital . What do I mean by the export of ideas – we are not going to be rich by exporting large volume commodities, except perhaps oil and iron, but because we add value. The food industry will not survive by simply exporting commodities –all said and done we only export enough to feed 20 million people; indeed it has only survived to date because of science and technology making us so efficient.

That is selling ideas. We are in the age of parallel discovery – just making the best does not sell – the market goes to those who can take it to scale and to big markets. We are not very good at doing that from New Zealand. That is why we need cleverer partnerships with those with money and market access. Given the quality of science and engineering education in New Zealand, we clearly have a large unexploited potential for knowledge based industry growth but clearly there is an issue of the availability of investment capital and the commitment of the New Zealand shareholder to more speculative investments or those with a longer term return. Perhaps some of the impending changes in the tax system might assist the necessary shift in mindset.

But how should a small country distant from markets and global populations undertake research? We must have a broadly based capacity and capability for a well trained technologically literate society must be able to rapidly adopt new technologies. Yet a country of only 4 million people cannot hope to be excellent or innovative in every domain of human endeavour. The economic imperative means we must be aggressive in generating exploitable knowledge but equally we need to invest in knowledge to develop our society, protect our health and our environment. Any system must be responsive and flexible and acknowledge the essential role of basic research and serendipitous research findings.

But we have to be realistic to where are the likely research domains that will transform New Zealand for we need a transformational rather than an incremental strategy. Food is but one example – how can we return more to the farmer, how do we deal with the challenge of pastoral emissions, what will the consumer want in 20 years time? Can we transform our service sector to export more services, how can

we extract value from our mineral-rich and water-rich land yet protect the environment, could we find a manufacturing niche based on our undoubted expertise in design?

Incentives operating on our public research providers lead them to focus on institutional health rather than seeking synergies through inter-institutional activity. That is why the Government has embarked on a program of change starting with the CRIs. There is a need to develop a more “New Zealand Inc” approach and give priority to exploiting the latent synergies that exist across institutions. This is a fundamental shift in thinking beyond pure competitive models that have driven our research system for the past 20 years. It is not generally appreciated that our system is much more competitive and less strategic than that of other countries and that a highly competitive but poorly funded system of research is likely to be highly conservative.

Cutting edge research is based on two core capabilities; infrastructural and human. Sadly too many of our best scientists and technologists have judged the climate for research and innovation based careers in New Zealand as non-competitive and we have much work to do to reverse this trend. There is much to do here as the global competition for scientific talent continues to get more aggressive. We have a run-down infrastructure and increasingly there are areas where major infrastructure is needed. We have deficient capacity in many areas, are we truly equipped for the informatics age? We do not have a clear approach to publically funded infrastructure and what principles it should operate under. How should it link to the private sector, can we achieve better national and in some cases international coordination? Work is underway to address these questions.

New Zealand cannot thrive with just one Fonterra; we need to see greater productivity extending beyond our shores in several domains. Seeing where that productivity growth will be is complex, for we face the peculiar challenges of distance, size, and lack of internal markets. We have to become clever about using our resources – our well educated people, our ability to grow grass and ruminants, clean water, our minerals, our closeness to Australia, our strengthening umbilical cord to Asia. We have to work out where our capacity to export will really grow – will the food industry in 20 years be focused more on food for health, what can we do with our mineral resources, how should we respond to global warming, how can we export services better, what will be the role of advanced ICT? We need to become clearer about that science we can do well on our own and that where taking it to scale will require partnerships from an early stage. Will we do better trying to grow a hi-tech industry on our own or, in an age of parallel discovery, will we do better by partnering from the discovery stage?

The mix of skills at the board table is a concern: few scientists, academics or technologists are appointed to Boards, be it of public or private companies. The type of analytical and lateral thinking that they bring can be of immense value and their appreciation of the innovation process can be of great value. The few scientists and academics on boards in New Zealand tend to be found only in companies directly related to their technical expertise whereas in many other economies such individuals make important contributions well outside their narrow disciplinary expertise. In particular they can play a major role in bridging the cultural divide. University and CRI researchers live to different rules and incentives to those in the private sector, time horizons are different, the linearity of objectives is much less for the academic. Relative to other countries we have little churn between the public and private sector and we need to find ways to enhance that churn. As a result, companies tend to come to researchers late to solve a particular problem rather than an early dialogue about where science is going and how it might transform their firm.

How can we improve the export of knowledge out of CRIs and universities to business? Part of that must be through open innovation. But a real issue is the lack of expertise in technology transfer – this is a

particular skill and we have few practitioners of it in New Zealand. A complex area of policy formation is the issue of the role of the State in promoting private sector R&D directly. The issues go beyond affordability and include issues of principle – for example should it be a broad entitlement through tools such as tax breaks – or is a more expansive discretionary grant-based approach needed? Climate change represents a particular challenge. New Zealand is the only Annex 1 country with the major part of its emissions being pastoral. We and the developing world have to address this challenge and New Zealand is taking the lead in the development of a global alliance address this issue. It is disappointing how little media coverage the critically important events of last week got. We should not underestimate the importance of this scientific challenge.

There is currently much reflection on how to advance New Zealand both economically and in the broader social domain. Already the Government has identified science as an important element in our next phase of development. Indeed science will be key to transformation of our economic base while protecting our primary sectors. A number of initiatives are underway; the Crown's own research activities in the Crown Research Institutes have been reviewed, draft strategic priorities for the public science system have been announced, there is active consideration of how to improve the transfer of knowledge from the public to private sector and of the framework necessary to improve public sector investment in research.

Support of initiatives such as the global research alliance on greenhouse gases in agriculture and the Square kilometre array proposal (in partnership with Australia, indicate the potential that New Zealand science has to play in protecting and developing New Zealand's position in the world. Government is stepping up to the plate – it is important that the private sector recognises the essential role that knowledge formation will play in its own development – it too must invest.

Thank you.