



**Sir Peter Gluckman's introductory remarks to the session on science and prosperity**

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We are a small nation and one geographically somewhat remote. We have tendency to be self satisfied – selling food and tourism has been relatively easy but sadly exports as a percentage of our economy are falling. As a nation we have tended to be relatively satisfied with ourselves and not as ambitious as we need to be to thrive. One of Sir Paul Callaghan's legacies is to remind us of this – we need to be better at look at ourselves and we need to be better at having the ambition to achieve what we could. We have become to incrementalist.

It is not realistic to imagine we can achieve as a small nation the kind of growth we need and want by looking inward. We only have to look to the global financial conditions to see how vulnerable the small nation state has become in an irreversibly globalized economy. Our citizens generally want more prosperity – how do we create an economy that does that? This is the topic of this first session. How can science help us to get there?

When one looks around the world the most successful advanced countries in the past decade in economic terms have been small countries. Countries like Denmark, Singapore, Korea, Israel and Finland have all managed to withstand the economic storm better than most – and they have done so on the basis of becoming knowledge intensive economies. Several consistent themes emerge.

It is clear that smallness does drive a culture of doing more with less (although there is a limit to that concept) and that while we might not often think we do it well, technology transfer tends to be more efficient in small countries. Smallness forces small countries (and companies) to focus on thinking globally – they fail if they do not. Smallness should also promote inter-disciplinarity – for that its where much innovative thinking occurs in science – something we have not emphasized enough in our funding systems. On the other hand we have failed as yet to attract multinational companies to see value in using New Zealand as a knowledge base – yet we should be able to do so. Should we be partnering more with the other small countries – all said and done teams are made by marrying different skills and some such as Singapore have capacities and capabilities we do not have.

One of my more interesting conversations recently was with one of the authors of "Start-up nation" – the book that documents and explains Israel's rapid emergence as the hot house of start-up activity. We discussed how countries look at themselves. As he said so pithily "Finland has start-up envy, Israel has Nokia- envy". His point was that every country must have its own path to innovation and must build on what they are excellent at – yet nations are good at taking for granted what they are good at rather than using that to build on and create excellence. I suspect we all can feel resonance with that statement.

In a technological age, multi-factor productivity growth can occur through imitation (that is by knowledge absorption) or by frontier innovation. But as countries get closer to the global

knowledge frontiers the latter has the greater impact on growth. While knowledge transfer and absorption promotes growth in low GDP countries, in high-income countries it is no longer enough to have high absorptive capacity but to be competitive must also have high frontier innovation and that is true even for a country like New Zealand which cannot do everything. Hence the importance of our university sector

Several clear messages have emerged from the other advanced small nations. Firstly the linear model of the relationship between investment in an individual research project and economic impact is now rejected in favour of a much more holistic approach. It is generally accepted that assessing the return on R&D is a complicated process with a long lag-time that make such linear models meaningless even though they are still favored in some treasury departments. While it is difficult to measure the direct effects of public R&D spend on economic growth there is a consensus about its importance and ability to generate growth. Annual returns are likely to be in the order of 20-40%. There is also growing evidence that public investment does not displace private investment but fosters it.

While many countries have tried to look at the issue of impact and the broader issues of social and policy return as well as direct economic return, the reality of is that quantitative assessments are difficult and artificial. That does not mean that just because we cannot measure it well we should ignore it – to quote Einstein “not everything we can measure is important and not every that is important can be measured”. In assessing the return on research one needs to look at its cultural, environmental, social and policy returns as well as those of direct economic impact.

A further point is that while the science and innovation ecosystems intersect they are not the same. Not all innovation comes from science and not all science is driven by a need to innovate. But without a commitment to and a culture of scholarship and enquiry, innovation of the type that will lead to economic grow that a scale we need is not imaginable. While relevance and impact will be core to research prioritization, there is a need to sustain a high corpus of research for ideas generation – that indeed is the primary role of Universities in a science and innovation ecosystem - businesses have the role of filtering those ideas to products.

Earlier today I expanded on the typology of science and scholarship. In this session we focus on its role in promoting direct economic growth. This leads to two key questions. Firstly what is it that we are doing well now that we could do more of and second what is it we are not doing much of but where we have a clear competitive advantage. Remember we will not get rich from our small internal market – only by increasing sales to the ever increasingly inter-dependent world.

The answers are not easy because whatever we do there are tradeoffs – risks that have to be evaluated and managed. As we face an ever increasing number of new technologies we need to have more mature conversations better informed by science rather than being simply reactive.

And what are we not doing well now where we have a competitive advantage. Sir Paul would have argued that given the quality of our STEM education we have advantages in high value manufacturing in areas such as medical technologies. But our ecosystem for innovation is not well developed although much change is happening – what do we have to do to develop the capital markets, the partnerships to go to scale. How do we deal with the manifest gaps in managerial and entrepreneurial leadership. How do we learn to value risk takers even when they fail?

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