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Speech Notes

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Extending the innovation frontier

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Economic transformation is one of the government's three priorities for the next decade as we look to further develop the economy into one that is high value, high wage, innovative and export-led.

An economy can "transform" in three ways:

- Doing more of what we do now.
- Doing what we do now in different (hopefully more efficient) ways;
- Doing different things.

The last two involve "innovation": applying the knowledge and learning necessary for new products and processes.

In the past, we have tended to associate "innovation" with "science". It is no accident that the current Growth and Innovation Advisory Board grew out of the Science and Innovation Advisory Council.

If we persist with the view that innovation flows out of science, the implication is that if the government wants to stimulate innovation it bulks up the system at the front end: either funding science directly or supporting the R&D that takes place in private firms and industry associations.

Today I want to open up the debate on innovation so that ultimately there is a clearer view and common agreement about what it means and implies.

The contemporary literature from the field of innovation studies does not deny the role of science in innovation, but sees it as but one component that on its own is not a sufficient driver of change.

New thinking sees innovation as

- pervasive (it impacts across all industries, not just the high tech ones);
- collaborative (for example through industry associations, collaborative agreements and public-private research interactions) and that collaboration persists over long period;
- cumulative, with knowledge building on previous learnings;

- uncertain (it is not known what will come out of any initiative) and risky (insofar as there is great variability in results) which imparts a bias against private investment in innovative activity unless the government shares or spreads some of the cost.

New thinking also sees innovation as

- working best where there are industry clusters, but clustering needs to be vertical (the outputs of some firms being the inputs of others) and not just horizontal (firms doing the same thing);
- involving a close science-technology interaction, but the collaboration is typically around problem-solving;

Above all, innovation is systemic, and happens when the institutional and organisational frameworks, regulatory systems, infrastructure and processes for diffusion of technology are mutually supportive.

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If we start thinking about innovation in these terms, it becomes a process that deepens the economic base as well as broadening it.

A big concern in recent decades has been that New Zealand seldom retains the benefits of its innovation. We innovate, but the innovation is bought out, relocated and developed offshore. We become the perpetual incubators for the rest of the world.

If innovation is seen as a collaborative and cumulative system, it develops and renews itself in New Zealand. Gallaghers and Fisher and Paykel are examples of this type of innovation.

This implies that if innovation is to be a driver of higher productivity and economic transformation, it is necessary to think about it in terms of a structure or system, that is organised, managed, adjusted and funded.

It is not something that simply happens serendipitously, is pulled naturally by the incentive systems operating in markets, or is pushed by further front end investment in R&D - although each of these may play a role in the system.

If we are to get the best from investments in innovation we not only need to aim for high returns to those investments but we also need to extend the durability of those returns.

This leads in to the issues of scale and the penetration of export markets, which have been picked up in a couple of recent reports, including those of the Food and Beverage Taskforce and the New Zealand Institute.

We have relatively few mid-sized New Zealand firms hungry for export led growth. Put another way, innovation lacks suitable carriers.

Organic growth through exporting is a very difficult and inherently slow process.

I have commented on this in a number of recent speeches, so I won't rehearse the issue, but I do want to make it clear that we cannot separate our innovation system from initiatives to support firm growth, and initiatives to better align the inwards flow of foreign investment with expanding a New Zealand-based growth process.

Before we move any further into this topic, some context is needed.

It is true that New Zealanders are highly innovative, but even the most robust flow of innovations compete in a crowded place. Historically, our core competencies have emerged in the resource-based industries in general, and in producing food and beverage products in particular.

Ray Winger from Massey University notes that supermarkets are offered between 5,000 and 6,000 new, altered or repackaged products each year.

About 10 percent of them go onto the shelves.

One percent of those chosen are still there five years later.

75 percent of foods in the supermarket did not exist ten years ago or have changed markedly in that time.

I would imagine that similar strike rates apply to other types of new products, be it developments of computer software, new communications technology applications or whatever.

Those numbers outline both the enormity of the challenge and its unrelenting nature.

It is very difficult for a small economy to take a scatter-gun approach, generating large numbers of new products in the hope that on the law of averages the odd one will hit the target.

A strong implication of this is that our innovation system needs a filter. We have to have some mechanism to sort out ideas that have a starting chance from those that are likely to be also-rans.

Generally, this means that innovations need to be much more closely connected with the needs of the end user - be that the final consumer, the supermarket, or the user of the ingredient.

That in-market intelligence and the connection of the "trader with a problem" with a New Zealand "innovator with a solution" is currently a major gap in our innovation system.

As long as that gap remains, the system has an inherent disposition to trial and error rather than customised responses.

The question is how we learn from recent experiences so that we can improve on what we do, and apply good lessons to more industries to diffuse and speed up innovation.

Case studies have special features that cannot be replicated, but case studies can offer insights.

Today I am going to use the case of the avocado oil industry to highlight the issues that the policy community needs to work through in fleshing out this aspect of the transformation agenda.

It is now widely accepted that most successful innovations grow out of established processes and technologies and into adjacent market spaces. They are seldom blue skies ventures.

In this case, one of our leading avocado oil producers – Olivado – started life aiming to produce cold pressed virgin olive oil. The partners were searching for a point of difference in a crowded market, and recognised that avocados had a high oil content as well, and could provide the raw material for a new oil product.

The problem with this fruit is that its high chlorophyll content means that it is sensitive to light and air and can become rancid rather quickly. Cold pressing technology had to be complemented by a system to stabilise the oil to protect its qualities.

Avocado oil is an attractive product because its special qualities mean that it can meet several consumer needs.

It is not a one shot wonder that can be made redundant when a fashion changes or a rival product displaces it from a market niche.

It has a high smoking point and hence is a good cooking medium. It has a distinctive flavour, and can be used with infused flavours in the gourmet cooking market. It also has very strong health and nutrition properties.

New Zealand avocados have particular locational advantages – in much the same way as Sauvignon Blanc grapes and green lipped mussels – that means that any competitive advantage is not easily competed away by foreign rivals.

Cold pressing the fruit protects and preserves the qualities of the fruit that would be diminished through traditional solvent-based oil extraction technologies.

Cold pressing techniques were developed and refined here, underscoring the capacity of our innovators to see opportunities when the rest of the world is content with the status quo.

I understand, though, that each of the two main avocado oil producers have developed slightly different cold pressing techniques, each producing oil with marginally different characteristics. They then compete to establish which is better.

The lesson here is that innovative technologies were developed to meet a market challenge, rather than the innovation producing a product that then sought out a market opportunity.

We have a natural competitive advantage, a good process and an exceptional product, and supply miniscule quantities into the world market compared to its ultimate potential.

But we still see the main competitor as the company across the harbour bridge. Our innovation system is still not taking a unified approach to standardise product and extract the maximum from any brand identification with a consistent New Zealand quality.

There is a tension that is not easy to resolve. On the one hand, sharing the secrets of the trade can erode any quality advantage that one particular processor has.

On the other, failing to diffuse best practice can result in new entrants producing a cheaper product with poorer qualities, and there is an inherent risk of reputational damage to the country, which could harm all New Zealand producers. I am not sure how we reconcile country risk and the protection of industry reputation with the protection of firm specific intellectual property and competitive advantage.

Now enter some commercial realities.

We tend to see adding value as an end in itself. There is no doubt that avocado oil is an extremely valuable product. But adding value adds cost. The fruit has to be cleaned, skinned, de-stoned and pressed: and about ten percent of the content of the fruit is extracted as oil.

When it comes to a hierarchy of values, exported fruit tops the list, followed by fruit sold on the domestic market and only then fruit that is used for oil extraction.

This industry therefore works off the supply of the residual crop. Enter another problem: weather conditions at the time of pollination and late frosts at the time of fruit ripening have a huge impact on the seasonal yield, and there can be large variations in that annual yield between the major growing regions.

If supply is volatile by season and region, and the oil industry works off the surplus, supply into the extraction plants is especially volatile. A part of the response to that is to source fruit from other countries, such as Australia and Chile. The risk here is that in the longer term, the technology may be more profitably deployed abroad, so we end up incubating for growth elsewhere.

The special features of the New Zealand growing environment mitigate that risk, but ultimately it will be a contest between the cost advantage obtained from a steady supply of fruit and the product quality disadvantage of getting it.

This tells us that good technology and a good product are not enough. They have to be grounded in the reality of the supply of raw material and the economics of getting the final product to market.

Returning to the good news, the industry has scope for sustained technological advancement in both product quality and process efficiency, so it is a dynamic and evolving one. This relates to my earlier comments about good innovation being cumulative.

There are a number of areas with potential for product and process enhancement.

- Improving extraction rates from the fruit.
- Extending the shelf life of the oil to partly compensate for seasonal volatility in yield and availability of fruit.
- Using the high vitamin E content of the fruit to extend applications in soaps, pharmaceuticals, and similar skin care products.
- Finding other nutraceutical uses for the oil.
- Finding commercially viable uses for the 90 percent of the fruit pulp that remains after the oil is extracted.
- Breeding new plant types with a higher oil content.
- Improving growing techniques to improve the yield from any given planted area.

The lesson here is that these areas of focus arise out of the industry, and they are problems seeking solutions. It is a solutions pull rather than a science push that drives the dynamics of the innovation process (and it is a continuous and interactive process, not a linear one).

If I then turn to the innovation support systems in place, I find that a mix of university, Crown Research Institute and Technology New Zealand, working in partnership with industry, has the capacity and the funds to tackle these problems, although the smaller companies do think that funding routines are complex and difficult to acccess.

At least five of the problems are currently being pursued through research projects.

However, the responses are firm specific, not industry generic. There does not appear to be a recognition of industry good activity and a sharing of the costs associated with capturing it.

If it is private money, that is the business of the owners of the firms, but since there is an element of public money involved the immediate question is whether

the public funding part of the science might generate better national returns if it was more specifically industry-driven and responsive to the avocado oil industry rather than firms in the industry.

My intention today is not to pronounce on a solution, but rather to pose a set of questions that need to be answered if we are to improve the effectiveness of our innovation efforts.

I have six questions on my list.

The first is, how do we improve connections and build relationships with potential market partners, and what is the role of government agencies and business assistance programmes in facilitating those connections?

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There is already some work going on here - I am working with New Zealand Trade and Enterprise, the Ministry of Economic Development and Treasury to try and align business assistance programmes with the market opportunities so that we set the targets for firm growth beyond the limits of the domestic market.

We also have the Beachhead programme, which provides a range of services to accelerate market entry and international business growth, by linking New Zealand companies into global connections and supporting them to establish and expand offshore operations.

My second question: Are there systems in place to avoid duplication, share the costs of industry good science and product improvement but still protect special features of the distinct offering of the different firms in an industry?

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Put another way, can we design a regime that allows competition underneath a New Zealand brand umbrella? For instance, the government has identified that there are clear opportunities for growth and innovation in the aquaculture and tourism sectors.

How do we extend the life span of the returns to our innovation and limit any intellectual property simply being bought out and exported?

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This probably means that we need a new approach to targeting inward foreign investment so we move from mutual convenience being the driver (you have capital, we have resources) to mutual advantage (you have a market needing a product, we can develop that product but need your market).

Another question: Have we got the systems in place to connect industries and firms with the government funding agencies and research capacity in the universities and CRIs, and do our funding and incentive systems leverage the advantages that all of the parties bring to a project?

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For example, within the review of business assistance we have identified opportunities to ensure NZTE business assistance measures and Foundation for Research Science and Technology portfolios target the same sectors and complement each other in leveraging growth.

Extending the lifespan of returns of innovations and putting in place systems to connect industries and firms with funding agencies and research will also be addressed at an upcoming summit on capitalising on research, that will comprise chief executives and senior executives from a cross-section of New Zealand businesses, senior executives from New Zealand's research sector, government officials and ministers.

Next question: Are firms and science agencies thinking and planning far enough ahead in terms of where current innovation is creating opportunities for subsequent initiatives to build on? Another good example of this is the recent launch of the New Zealand aquaculture strategy, which is likely to influence decisions and the direction of the industry for years to come.

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Finally, we must ask whether our institutional and organisational frameworks, regulatory systems, infrastructure and processes for diffusion of technology are mutually supportive, or are they disconnected?

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I welcome responses and feedback to all these questions and, of course, any suggestions to add to the list of issues we need to address.

Earlier in this presentation I said that a good innovation system recognised that the process was risky and uncertain, but it worked best when it had a problem-solving focus, good institutional supports, was collaborative, built on past learning, and pervaded all parts of the economy, not just the high tech end.

Clearly, that sort of system is not a top down one, it is not an exclusive responsibility of governments, and it involves a lot more than science.

Critically, the system we develop needs to grow out of and respond to our special Kiwi circumstances. There is no single universal formula that can simply be downloaded from the internet and applied everywhere.

Successful innovation-driven economic transformations – such as those of Ireland, Singapore, South Korea and Taiwan – have the common features that I have listed, but each was moulded to fit the special features of firm structure and national competitive advantage that resided with the different economies.

We need to tell stories, share experiences, learn from them and constantly question whether we have got the allocation of money right and the instruments through which to channel it. I look forward to your responses on each of those issues.

Thank you.