

7 November 2019

BusinessNZ Submission on MBIE's Draft Research Science and Innovation (RSI) Strategy

In addition to the information about BusinessNZ at the end of this submission, as part of our Major Company Group we have a Chief Technology Officers Group. This group consists of the CTO's of 20 of New Zealand's leading firms that invest the most in R&D in New Zealand.

Many thanks for the opportunity to submit. We will make some general comments and then address some of the questions in the document.

Summary – pg. 6

Vision

"By 2027, New Zealand will be a global innovation hub, a world class generator of new ideas for a productive, sustainable and inclusive future."

The proposed vision is very ambitious we wonder if it is a bit unrealistic given we are a country of not quite 5 million people from a geographically remote part of the world. We don't have big numbers of consumers on our doorstep like other small advanced economies and we are not logistically 'on the way' to anywhere. We don't have big military or pharmaceutical industries, which are usually big drivers of RSI spending internationally.

Maybe we could aim for something a bit more nuanced and tangible to strive for. For example, if we amended it to "New Zealand will be a globally **competitive** innovation hub, etc.

The word competitive denotes value for money and equally good ideas. The feedback we get from some of our biggest businesses that are investing the most in R&D and innovation is that they get better quality of research internationally for a better price than they can get from the innovation system in New Zealand. It would be a good goal to turn that around.

The Strategy focusses on the "frontier" – "solving problems no-one else has solved or is likely to investigate; capitalising on new ideas where nobody else has been successful so far; and making the most of opportunities that are unique to us."

While we realise this is a Government RSI strategy and not a business strategy – most businesses would be a bit alarmed at that kind of language. There is a saying that you can be at the 'leading edge' or the 'bleeding edge' and the latter is quite financially risky and could have poor outcomes for the taxpayer investment.

We support the idea that New Zealand should invest in areas of RSI where we have a particular problem to solve that no-one else is likely to solve – like methane emissions, but as a more

general approach to RSI we would urge officials not to discount the value of RSI that stands on the shoulders of known discoveries and ideas, but takes them to a new and innovative level. It is incredibly hard and expensive to commercialise RSI in new frontiers and it could be more fruitful for New Zealand to take a more “balanced portfolio” approach, akin to a fund manager, knowing that you need to do some high risk research, but there should be some safe and steady investments as well.

The other reservation we have about making distinctions between “at the frontier” or “behind the frontier” is that in policy, academic and political circles more emphasis tends to go on the new tech start-ups and there is less consideration given to the important RSI role that takes place in the big companies investing in R&D that benefits the wider system.

Big corporates can play a major role as incubators of the next frontier company – such as happened with Fisher and Paykel Appliances (FPA) being the starting point for Fisher and Paykel Healthcare. Facticeon is one of the leading ‘Industry 4.0’ companies in New Zealand, and that company was a spin-out of FPA Production Machinery Ltd.

Members of the Major Companies Group that invest a lot in R&D are the canopy of the forest which nurtures the new spin-outs that can be hugely successful and very importantly they are also training the talent that goes on to start-up companies (e.g. Peter Beck started his journey at FPA), and grow the SME’s into large successful companies. A lot of the leading managers of our big high-tech companies have learnt their skills in companies in the ‘Major Companies Group’ of companies. It would be good to see a RSI Strategy that gave some thought as to how this could be acknowledged and accelerated, either through more government support for capability building and or more affordable access to the CRI’s.

In relation to NZ talent creation in the STEM subjects and subsequent career paths, New Zealand lacks a centralised co-ordinated approach to this. There is a major gap in supporting and promoting STEM subjects and subsequent career paths in primary and secondary education. This is having a significant on-going impact on diversity and inclusion in STEM careers in the workforce. Major companies have a role to play here but it needs clear ownership and governance. Who is taking the lead?

We agree that stronger connections within the system and beyond would be beneficial and that as a country with a small population – we should be better connected and better at collaboration than we currently are. We think there are some institutionalised barriers to the research and academic system connecting effectively with business, which we will cover in more detail below.

Questions asked in Discussion Paper – we will answer selected questions.

Q1. The transition to a clean, green, carbon neutral NZ. The focus for NZ should be on a solution to our methane emissions, which make up 50% of our emissions and for which there is currently no easy solution apart from de-stocking, despite around 20 years of research into this problem already. Given agricultural exports make up 70-80% of our goods exports, this is a problem we need a cost-effective solution for.

Other areas of climate change vulnerability for New Zealand are our tourism and foreign student markets – some of our top export earnings aside from agricultural exports.

International efforts are no doubt going into how to power aviation on low emission fuel, but New Zealand should take a close interest in this and add our efforts to the global efforts to solve the problem, given we have a lot of economic risk riding on it.

RSI investment into adaptation will continue to be important, as will renewable energy and battery technology to continue to decarbonise energy and transport.

More research should be going into understanding the carbon lifecycle, so that farmers have more options and information to become carbon neutral at the farm level and for this to be scientifically verifiable. They also need some innovative ways to measure, monitor and report on emissions that are cost effective.

Q4. Innovation at the frontier (creating new knowledge) or behind the frontier (building on existing knowledge).

As stated already – we need a mixture of both. Too much emphasis on the frontier seems a risky and expensive strategy for a small country. New Zealand has some areas of natural competitive advantage and it would seem obvious to put emphasis on those – which to a certain extent is what the industry strategy is attempting to do.

Where we do have areas of global leadership and excellence, we should have a strategy in place to continue to invest in that research where it is having an impact. An example is the world-renowned Dunedin Longitudinal health and development study. It seems inconceivable that such insightful and world leading research was scrambling for funding a couple of years ago. That is the opposite of taking a strategic approach.

Q10. The Key Challenge for the RSI system is stronger connections?

We agree this is a challenge when it comes to business and University or CRI interconnectedness. As stated earlier we think there are some barriers to University and Business connectedness and feedback we have had from industry suggest the following are barriers;

- PBRF. The funding model for Universities incentivises research and publication in academic journals. Academics are rewarded for publishing. Publishing can be at odds with the protection of intellectual property – which needs to be kept secret until properly protected.
- Figure 2: pg 21. Summary of Statistics on our research, science and innovation activity indicates that for all the publishing we are doing (far ahead of the other small advanced economies) the quality could be lacking. The patent citations per scholarly output is in negative territory, we are not ranking in the top 1% of highly cited researchers, or the top 10% of publications. The Business Expenditure on R&D (BERD) is more negative as a % of GDP compared to other small advanced economies, as is the Government Expenditure on R&D (GERD). For all the publications we are in, the positive impacts are negligible to negative on those measures mentioned above. Maybe there needs to be a new focus on quality over quantity.
- Other barriers to business working with academics is that their primary motivations are teaching and publishing, so working with industry cannot always be done in a timely manner.
- The bigger companies want a problem to be solved by a professor rather than a PHD student and they want it solved in a timely manner.
- A University Professor has no career advancement opportunities if they work with industry. It is not easy for academics to move between the business world and the academic world and stay on the academic career ladder. In Europe we understand it is career enhancing to have been working with industry and it is much easier to go between the two worlds. MBIE should investigate those kinds of models.

- Some businesses have given up trying to work with Universities, given these misalignments and take the view that what they want from the Universities is the pipeline of graduate talent they can employ and then build in-house R&D capability.
- With regard to the CRIs – feedback we have is that they have various capabilities, some are better than others (those with a strong sector focus are in the better camp). Challenges working with CRI's can be that they think their ideas are close to market/commercialisation, while the business knows they are a long way from the commercialisation stage.
- They (Universities and CRI's and Commercialisation Offices) want too much for their IP. Some of our members say if the value of the IP is \$1.00, the cost to commercialise it is \$100. The failure to recognise this means a lot of IP probably gets left on a shelf. There needs to be a more realistic approach to the value of the IP coming out of our RSI institutions.
- Another challenge with RSI that comes out of the Universities and/or CRI's – is that they have a great idea looking for a market/customer. In the business world the business works backwards from the customer problem/need and then looks for the solution.
- Small to medium size businesses find CRI's and Universities too expensive to engage with.

Guiding Policy

Q. 11 The definition of excellence, - "in reference to the frontier – the leading edge of what the world knows it can do."

We don't agree with that definition because as stated above, some the most lucrative research and innovation is built on the back of pre-existing knowledge. In addition, in a competitive global RSI world, there are countries and multi-nationals with much bigger budgets and deeper pockets than we have in New Zealand. If we can do leading-edge RSI then that is fantastic, but that should not be where all the emphasis is placed if we want to get a good return on our investment.

Q13 – Yes, we agree that excellence must be seen in a global context and we should be drawing from the best technology, people and ideas internationally. We also like the idea of New Zealand being a talent magnet – a place where talent wants to live and work. We think that for this to be successful – immigration settings need to support this approach.

With regard to career paths and talent attraction and retention, as discussed above it would be good to have a system where researchers and scientists are more able to move between academia and business in a career enhancing way.

Q15. We agree that the impact of research should be measured and look forward to MBIE's further work on how impact is measured.

Part 4 – Actions

On Start Up – Scale up

The ideas around helping start-ups probably need more specificity than is in the draft strategy for us to be able to comment.

One of the programmes which we have promoted to Government to take a closer look at is the power of procurement to help small companies grow. There is a scheme in the USA called Small Business Innovation Fund (SBIF) where a select group of Government agencies need to spend a small percentage of their procurement budget on innovative solutions to problems they want solved. This could be the development of new technology or a novel approach to solving a social policy problem. The Government agency funds the company to develop the solution and the company keeps the IP. This is a scheme that has been going for a number of years and has had a good success rate in growing tech companies. We attach a report on the scheme.

In terms of scaling up support – we are supportive of approaches that benefit a wide range of businesses if they want to take advantage of them, such as commercialisation facilities as has been done with the Food Bowl. In addition, we have had good feedback from industry on programmes where there has been support for projects such as the primary growth partnership working on sector wide challenges.

We do think it a mistake for government to try to focus RSI spending on particular, predefined areas. We think it would be better to leave that to individual companies or institutions that may be in a better position to make those decisions.

As already stated, we don't believe a global frontier approach is right and that it should be a mixture of frontier and building on existing knowledge to innovate.

Many thanks for the opportunity to comment and we would be happy to organise a meeting with our Chief Technology Officers Group to explore ideas further if that would be helpful.

Yours sincerely

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Background information on BusinessNZ

[BusinessNZ](#) is New Zealand's largest business advocacy body, representing:

- Regional business groups [EMA](#), [Business Central](#), [Canterbury Employers' Chamber of Commerce](#), and [Employers Otago Southland](#)
- [Major Companies Group](#) of New Zealand's largest businesses
- [Gold Group](#) of medium sized businesses
- [Affiliated Industries Group](#) of national industry associations
- [ExportNZ](#) representing New Zealand exporting enterprises
- [ManufacturingNZ](#) representing New Zealand manufacturing enterprises
- [Sustainable Business Council](#) of enterprises leading sustainable business practice
- [BusinessNZ Energy Council](#) of enterprises leading sustainable energy production and use
- [Buy NZ Made](#) representing producers, retailers and consumers of New Zealand-made goods

BusinessNZ is able to tap into the views of over 70,000 employers and businesses, ranging from the smallest to the largest and reflecting the make-up of the New Zealand economy.

In addition to advocacy and services for enterprise, BusinessNZ contributes to Government, tripartite working parties and international bodies including the International Labour Organisation ([ILO](#)), the International Organisation of Employers ([IOE](#)) and the Business and Industry Advisory Council ([BIAC](#)) to the Organisation for Economic Cooperation and Development ([OECD](#)).