Te Ara Paerangi – Future Pathways Submission

Submission from New Zealand Apples and Pears Incorporated

Background

New Zealand Apples and Pears Incorporated (NZAPI) represents the interests of 253 apple, pear and nashi growers, 20 postharvest groups and 69 Associate members. In 2020 the New Zealand apple and pear industry covers 10,396 hectares and produces 587,000 tonnes of apples and pears. The Integrated pest management (IPM) practices used by industry ensure that the very tough regulatory phytosanitary requirements set out by the 89 countries we export to are met and adhere to the very strict food safety and Good Agricultural Practice (GAP) requirements of European retailers. The industry continually updates this programme to ensure it remains a global leader in producing sustainable, nutritious, safe food. This commitment to low environment inputs and high productivity has seen the industry being ranked as the most competitive apple industry in the world. (Based on The World Apple Report published annually by Belrose Inc). The industry has a current export value of $917m FOB and have increased in export value by 7.5% PA since 2013. Maintaining this trajectory will see the industry reach a value of $2 billion by 2030. Research and innovation are seen as a key pillar behind the current success of New Zealand's apple and pear industry and is paramount to continued growth and maintenance of our globally leading status.

NZAPI is grateful for MBIEs willingness to be so wide reaching in their initial consultation and are thankful for the opportunity to make a submission on the Te Ara Paerangi – Future Pathways Green Paper. We would welcome any opportunity to remain part of the consultation process as it progresses forward. Additionally, we would like to voice support of Horticulture New Zealand's submission

Executive Summary

In any reform of the current system, we recommend that you:

- Ensure that research conducted in New Zealand is of relevance to and accessible by New Zealand industries.
- Actively involve industry and other end-users in the processes for prioritising the research conducted, setting the strategy underneath the priorities, and deciding how funds are allocated.
- Include 'Emerging risks and opportunities' as one of the whole-of-system priorities.
- Support long-term research programmes as well as shorter-term projects.
- Accommodate the research needs of regional communities as well as national needs.
- Articulate the overall purpose and objectives of the research system, design the system to deliver that purpose, and then fund it adequately so that it is able to deliver.
- Avoid designing an overengineered research system accompanied by burdensome and costly management processes.
- Provide for the core expertise that underpins New Zealand's primary sector research.
- Consider collaboration a core function that is provided for outside of contestable funding.
- Ensure knowledge transfer is designed into all research proposals from the outset to generate maximum impact from research spend.
- Ensure appropriate access to data collected using public funding.
- Continue to engage with industry parties such as NZAPI and other horticultural industry product groups.

1. National research priorities

The full breadth of the national research system needs to effectively deliver research across multiple horizons from 'blue-sky' investigator-led research, to 'mission-led' collaborative research, to highly focussed research questions for a specific end-user. Not all of these horizons are likely to fit under a single set of national research priorities.

Nonetheless, prioritising research of national importance at the system level would inform the design of the most appropriate frameworks for research funding structures and institutions. It would also provide transparency around funding decisions. However, to ensure that New Zealand's publicly funded research remains relevant to its end-users, the prioritisation process has to be consultative in nature with active participation from industry end-users at all stages.

There is also a need to maintain enough agility within the system to ensure that stakeholders and end-users can rapidly access research outputs that support them to meet the challenges of emerging risks and to embrace new opportunities, some of which may not fall under current areas of prioritisation.

Recommendation

'Emerging risks and opportunities' could be included as a standing item on the list of whole-of-system priorities.

Q1: What principles could be used to determine the scope and focus of national research Priorities?

End-user focus

Research priorities should be focussed on the challenges New Zealanders are facing now and those we will face in the future. Identifying and prioritising these challenges requires direct and ongoing input from the people facing them in addition to researchers and government officials.

Enhancing national and regional resilience

The national research system has an important role to play in supporting New Zealand and its regions to thrive in a changing world. For example, strong research support to the full breadth of horticultural industries would enhance the country's resilience by providing: opportunities for economic and export diversification, domestic food security, optimised sustainability and rural employment.

Stability

Many of the issues that horticulture and New Zealand are facing are long term and multifactorial in nature. To effectively meet these challenges requires a body of multidisciplinary understanding to be developed over years and decades. This is not achieved if funding is channelled into portfolios of disconnected, short-term projects. The stability to make incremental advances in knowledge and technologies also needs to be supported by a research system that is not frequently disrupted by changing research priorities or the withdrawal of funds after five years.

The maintenance of more rigid and targeted research priorities has been achieved internationally through the establishment of independent research councils. These councils prioritise research within key disciplines (e.g. Economic and Social, Medical Research and Natural environment) that have a narrow focus while maintaining collaboration by operating

under a collective body. The ability to operate independently allows research councils to set priorities outside the influence of political cycles, shielding them from constant reform.

Agility

A set of rigid priorities and an inflexible prioritisation process would obstruct the ability of the research system to assist New Zealand to meet unexpected challenges or benefit from unexpected opportunities and discoveries. As well as supporting the long-term increase of knowledge in key areas, there needs to be sufficient flexibility built-in to the prioritisation process to enable end-users to have timely access to research outcomes in novel areas.

Cross-government alignment

There are sets of national priorities in existence that could inform the development of some of the national research priorities. One example is the national security intelligence priorities[1] coordinated by DPMC, which include biosecurity, human health, environment, climate, and emerging technology.

Some government departments have also developed roadmaps that should be considered in the research prioritisation process. One example would be MPI's 'Fit for a Better World' that sets out a roadmap for the food and fibre sector to lead the way to a more sustainable economy[2].

Q2. What principles should guide a national research Priority-setting process?

Participation

Ensure that non-scientific end users are well represented and actively contributing to the priority setting process.

Inclusivity

To provide smaller-scale industries the opportunity to benefit from research that can help them grow, these end-users need to be included in discussions alongside the larger, more established and more connected industries. While these smaller end-user groups have less resource to invest in research than their larger counterparts, appropriate research-support could assist them to become more important contributors to New Zealand's regional communities and economy in the future.

Regionalisation

Across the country there are regional differences in the challenges faced and opportunities present. A prioritisation process that was heavily Wellington-based would be unlikely to serve the needs of all parts of the country.

Cost-effectiveness

Wide consultation is vital for identifying the most appropriate priorities, strategies and allocating the available funding. However, there is a need to avoid over-engineering the process itself as this would risk it becoming self-supporting, time-consuming for individuals, and expensive for the New Zealand public.

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[1] National Security Intelligence Priorities | Department of the Prime Minister and Cabinet (DPMC)
[2] Primary sector roadmap to boost export earnings | NZ Government (mpi.govt.nz)

Modern technologies could be utilised to enable participation from outside the main urban centres without incurring huge travel costs by repeatedly bringing large numbers of people to central locations. Communication materials should also be streamlined. Producing a suite of state-of-the-art communication materials about the prioritisation process itself would not materially improve the quality or impact of the actual research but could deplete the funds available for actual research.

Review

Whilst long-term stability in the science system is important, periodic review of national research priorities will also be needed. If the priorities are not reviewed from time to time to check that they are still relevant there is a risk that important research needs that fall outside of the current suite of priorities never get funded. The world is not static, and a single set of priorities is unlikely to suffice for multiple decades. There is a delicate balance to be achieved to ensure that the priorities are sense checked from time to time, whilst providing certainty and avoiding a move to short-term priority cycles.

Q3. How should the strategy for each national research Priority be set and how do we operationalise them?

Collaboratively

As well as being involved in identifying national research priorities, including end-user industry groups in the processes for setting strategies and funding decision making also helps to ensure that the research conducted is of high relevance and grounded in practical realities. There are existing collaborations that demonstrate the strength of this approach.

One good example is the Better Border Biosecurity (B3) collaboration[3]. This highly active collaboration, consisting of four CRIs and a university, has been providing quality research outputs to support government and industry in the prevention and management of plant biosecurity issues for over 17 years. The B3 collaboration is focussed on an area of national priority (biosecurity) and takes a mission-led approach with industry and government stakeholders represented at both the governance and science advisory levels. The collaboration develops 5-year strategies that are aligned with government strategies and industry roadmaps, and engages in annual cycles of project and portfolio assessment.

Other examples of research and industry collaborations include the New Zealand Agricultural Greenhouse Gas Research Centre[4], the Bioresource Processing Alliance[5], and the New Zealand Food Safety Science & Research Centre[6] that has an industry advisory group.

Recommendation

Each national research priority could be operated by a collaborative, virtual organisation that included researchers, Māori, relevant industries, other notable stakeholders, and government. The virtual 'institution' would work as a team to set the strategy under the priority and make decisions about funding projects that best align with that strategy. To provide stability, a

[3] Home - B3 | Science Solutions for Better Border Biosecurity (b3nz.org.nz)
[4] Global Research Alliance | New Zealand Agricultural Greenhouse Gas Research Centre (nzagrc.org.nz)
[5] ABOUT US | Bioresource Processing
[6] Our People | NZFSSRC

commitment to fund the collaborative organisation for the long term (i.e., 10+ years) would be required.

2. Te Tiriti, mātauranga Māori and Māori aspirations

As this is an important and complex area, we would encourage full consideration to be given to this prior to deciding how to identify research priorities and assess their relative importance.

Q6. What are your thoughts on regionally based Māori knowledge hubs?

We acknowledge that many research organisations are now actively embracing the challenge of becoming Tiriti-anchored. This process requires extensive and ongoing discussions to build the relationships and frameworks required to make this an actuality rather than an aspiration. We also acknowledge some of the resourcing issues that are accompanying this process with Māori representatives being approached simultaneously about multiple issues by multiple parties.

If regional Māori research hubs were established and funded as part of the national research system, this could provide a much-needed framework to encourage and enhance the integration of mātauranga Māori into all research.

Regional Māori hubs also make sense from a horticultural perspective as a lot of horticultural research is region-specific and enhanced connectivity with iwi in important horticultural regions would be beneficial for all.

3. Funding

The current research system is structurally fragmented. Crown Research Institutes, Regional Research Institutes, Centres of Research Excellence, the National Science Challenges and universities are all competing for national funding. One knock-on effect of this is that public money is being spent paying research staff to prepare funding bids for public funds.

Recommendation

Structure should follow function. Invest time in understanding the purpose and objectives of the research system to ensure that the reformed system is optimally designed. Then fund the system adequately so that it can serve its intended purpose.

Increased National Research and Innovation Investment

New Zealand's target investment in research of 2% of GDP falls well flat of the OECD average of 2.5%. It is argued that an uninspiring investment target will never meet the desired outcomes of an aspirational research strategy. The lack of access to required funding severely restricts the feasibility of transformative research and development, especially within industry. Improving private sector confidence in research outcomes is key to meeting aspirational R&D investment targets. Meeting such a goal would be greatly accelerated by a pathway that raises public funding options for 'horizon 2' research that focusses on discovery, piloting and proof of concept. Currently private investor buy in is hampered by the overwhelming cost associated with this type of research as well as the lack of certainty of outcome. Increased public investment into research of this nature would help to overcome the valley of death where discovery research is not commercialised due to lack of funding for high cost/high risk of failure

concepts. Injection of funding into this area would greatly assist the discovery and implementation of truly transformational research.

Q7. How should we decide what constitutes a core function and how do we fund them?

We see core functions are those aspects of the research system that are required for it to function but that are not aligned with any single priority.

Key expertise

Maintenance of key fundamental science expertise in the country is an example of a core function that is being lost in the primary industry sectors as current experts retire and no-one else holds such detailed New Zealand-relevant knowledge. While individually these key knowledge holders might not align with any single research priority, their scientific and industry knowledge underpins multiple areas of research. Creating publicly funded positions for some of these key roles that may not be tied to any single organisation would recognise the value of the knowledge held by these individuals and help to create a career pathway, enabling better succession.

An approach where core funding supports roles within virtual centres or research councils aligned to long term national priorities would enable career development and succession planning into roles of national and long-term relevance providing generalist, but relevant careers with key expertise.

Basing careers and core funding around virtual centres or research councils means that CRI's and universities wouldn't have to compete for capability and we can maintain expertise across the system instead of individual institutes competing for skill and capability potentially doubling up on expertise or reducing capacity to respond to national priorities where there is not the skill base resource or funding to address priorities as individual organisations.

A balance needs to be found where core funding for scientists with key expertise should be maintained for both generalist and specialist positions. We need to ensure that we can maintain specialist positions that also align to end users so that we have the knowledge required to quickly respond to emerging risks and the deep understanding required to create transformational change.

Funding cannot solely be aligned to current priorities or contestable funding as a turn key approach to accessing scientists as this will not develop or maintain relevant key expertise or deep level understanding. Examples for horticulture would be the provision of key roles within CRIs such as Plant and Food Research that support bioprotection and biosecurity expertise for horticulture.

Collaboration provision

Bringing the right people together to develop the right research questions often incurs costs. The provision of core funding to cover collaboration costs would enable the research funding to be spent on the research rather than the collaborations themselves.

Improved Funding Transparency

Improving transparency around where CRIs are collecting and using commercially gained funding may help identify the cause of the mismatch between CRI and end user priorities. Overtly commercialised priorities aimed at benefiting the CRIs at the cost of end users is not

sustainable or productive. Long term CRI research (Horizon 3) needs to be more closely aligned to end user priorities. There needs to be more public funded research aligned to end user priorities in Horizon 2 to allow value, good investment/co-funding by private sector for Horizon 1.

Q8. Do you think a base grant funding model will improve stability and resilience for research organisations, and how should we go about designing and implementing such a funding model?

Base grants would provide certainty, stability, and end-user confidence. If a base grant also resulted in lower research overhead costs being passed on to industry funders and end-users, then research would become more affordable for smaller-scale customers. Currently smaller horticultural sectors are less able to fund and therefore benefit from research than more established sectors.

Discussing overseas models with people who participate in and use them and identifying what aspects of those might be suitable for New Zealand would be useful when designing the funding model. In Australia, for instance, private industries are often active decision makers determining how and where research money is spent. Plant Health Australia[7], for example, is a government-industry not-for-profit company where all members have input into and provide funding for a range of large scale, nationally coordinated projects that could not be funded or pursued by organisations acting independently.

Another Australian model to look at is Hort Innovation[8], which is a grower-owned, not-for-profit research and development corporation dedicated to horticultural research. The company is jointly funded by growers and the Australian Government. This model means that each sector has dedicated funds to spend on research that is important to them, without having to compete with one another for a pooled fund.

4. Institutions

Q9. How do we design collaborative, adaptive and agile research institutions that will serve current and future needs?

Avoid duplication

Current overlaps in the science conducted in different CRIs decreases the efficiency of the system and makes it confusing for an end-user to know who to connect with or whether the person/team they've connected with is the most appropriate one.

Virtual, cross-organisation collaborations would help to avoid duplication by bringing these different teams together under one multidisciplinary umbrella.

Ensure Integration across the system

The CRIs have historically been critical to the success of the NZ horticulture sector, but we recognise that there are other entities in the science system. Optimal utilisation of the overall research system could be enhanced by a system that also encouraged the building of enduring partnerships between the universities and industries.

[7] Home - Plant Health Australia
[8] Hort Innovation | The company (horticulture.com.au)

Recommendation

Creating business manager roles for a sector that are not affiliated with an individual research organisation and that understand industry needs would ensure that industry end-users are connected to the right organisation for the research that is required.

Q13. How do we better support knowledge exchange and impact generation?

What should be the role of research institutions in transferring knowledge into operational environments and technologies?

Inadequate knowledge transfer undermines the role of research in society. The expected impact and how knowledge and outcomes arising from the research will be shared and implemented is something that should be considered at the concept stage. Details should be agreed between relevant parties prior to funding being awarded.

5. Research workforce

It is important that workforce considerations are not just tied to the national research priority areas. Some core and essential expertise is becoming scarcer in New Zealand (e.g., taxonomists, soil scientists, and agricultural chemical scientists) as key experts retire and there is an absence of succession planning at the system level.

Maintaining nationally relevant expertise in these more fundamental areas of science is not helped by a research system that bases the evaluation of science excellence on numbers of publications and then appropriates funding based on this. However, these experts in fundamental sciences as applied in the New Zealand context perform key functions in the country's scientific knowledge base, and the maintenance of this expertise in the country should be supported. In addition, the provision of scholarships associated with these positions could help to keep graduates in New Zealand.

Such a heavy emphasis on the proxy measures of research productivity (H index, number of publications) can reduce the capability of researchers for roles outside of academia. The pressure to publish can encourage development of research skills that are well suited for projects requiring quick turnaround but shift the focus away from applied consultative research. The current over emphasis on proxy measures reduces the incentive to carry out robust applied science draining the future workforce of this skill set and way of thinking. Practical application and end user outcomes from research should be more of a leading driver for why research is carried out.

Improved alignment between the challenges faced by end users and the priorities set by an improved New Zealand research strategy could help shape a research workforce with the skills needed to address these challenges. Increased visibility and the creation of more attractive opportunities outside the traditional post-doctoral research pathway could serve to retain these key skills. These positions do not necessarily need to sit under a single priority however some skills (soil scientists) may naturally align with specific end users.

Recommendation

Ensure the maintenance of a core of fundamental expertise within New Zealand by establishing funded positions for core scientific roles that are not tied to individual institutions.

6. Research infrastructure

Q17. How do we support sustainable, efficient and enabling investment in research infrastructure?

Open data

Data collected using public funds should be accessible for other publicly funded research without a huge price tag. One example that several contributors to this submission provided was the significant cost of weather data sourced from NIWA. Data such as these would be of value to multiple national research priorities, but the current costs cannot be covered by many research grants.

Enhancing data sharing requires substantial investment in data infrastructure development, maintenance, and support as well as the development of robust data governance processes and systems that are shared across the research system. The cost of this should not fall on individual institutions and companies.

In some cases, arguably unjustified IP can slow or stall the progression of future projects as key knowledge or data may be locked behind pay walls. Inability to access the resources gained from previous publicly or industry funded work can lead to unnecessary duplication and over expenditure of research funding. NZAPI believes systems should be put in place to protect end users against the over commercialisation of outputs for CRI gain that are a result from public or industry funding.

Encourage resource sharing

Overhead costs are high in the current system, which limits the funds for actual research projects. Designing a research system that has a greater degree of sharing of fundamental resources (such as cloud platforms and specialised laboratories) between institutions could help to bring some of these overhead costs down.

Conclusion

A fit-for-purpose national research system is vital to the ongoing success of the horticulture sector and the wider primary industries. We encourage MBIE to keep end users in mind as you develop the white paper, and to align the research system reforms with other government priorities and strategies. NZAPI is very willing to be involved in any further discussions on this subject – we believe it is of critical national and regional importance.