NEW ZEALAND
PRODUCTIVITY COMMISSION
Te Kōmihana Whai Hua o Aotearoa

Frontier Firms follow-on review: detailed observations

May 2023

The New Zealand Productivity Commission
Te Kōmihana Whai Hua o Aotearoa

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About this document

At the request of the Government, the Productivity Commission Te Kōmihana Whai Hua o Aotearoa has undertaken a follow-on review to its *New Zealand firms: Reaching for the frontier (Frontier Firms)* inquiry. The Commission describes the key findings and recommendations of its follow-on review in a main report *Frontier Firms follow on review* (NZPC, 2023). This document outlines detailed observations to support the findings and recommendations in the main report. The main report assesses the Government's progress in implementing the vision and recommendations of the *Frontier Firms* inquiry. Key messages and findings from the follow-on review, and our recommendations to the Government to achieve success in creating high-performing innovation ecosystems (and the frontier firms that can emerge from them) can be found in the main report.

The purpose of this document is to provide the detail of what the Commission found during its follow-on review. As such, it should be treated as a supplementary resource.

This report is organised in line with the recommendations made in our final *Frontier Firms* report (NZPC, 2021). Each recommendation is listed, followed by relevant progress in the implementation of existing policy and the development and implementation of new policy.

The recommendations in the *Frontier Firms* report begin in Chapter 4. Chapter 1 described what the inquiry was about, including key productivity and related concepts. Chapter 2 describes Aotearoa New Zealand's generally poor productivity performance and the challenges it faces as a small and isolated developed economy. Chapter 2 also outlines our view of the broad path that the country needs to follow to tackle these challenges.

We found the most promising path for New Zealand to lift its productivity is to foster the development of innovation ecosystems in which large, export-orientated frontier firms can emerge and thrive.

Frontier firms are the most productive firms in an economy and are vital to lifting national productivity and wellbeing. They do this by lifting their own productivity closer to the global frontier, growing larger and diffusing innovation through the rest of the economy.

We found a lot can be learned from the successes and failures of high-performing small advanced economies (SAEs) like Denmark, the Netherlands, Sweden, and Switzerland. High performing SAEs typically have several large globally competitive firms with outstanding records of exporting sophisticated and distinctive goods and services. Around these large businesses exist ecosystems of complementary firms, researchers and innovators, pipelines of workers with the right skills, investments in enabling infrastructure and regulations, mentors and investors with deep knowledge and understanding of the industry.

New Zealand generally lacks such firms, but a few examples at or close to the global productivity frontier show that it is possible to overcome the disadvantages of a small domestic market and distant location. To do so, it needs to increase the rate and extent of innovation and exporting which are both weak by the standards of high-performing SAEs.

Chapter 3 of the *Frontier Firms* report describes key features of frontier firms and detail findings about the productivity of frontier and non-frontier firms in New Zealand and five European SAEs (Belgium, Denmark, Finland, Netherlands, and Sweden). A striking finding of our inquiry was that the average labour productivity of New Zealand's frontier firms was less than half that of the best frontier firms in these five European SAEs.

The allocation of labour and capital across firms is important for productivity performance. Our research found that the most productive firms in these European SAEs had higher shares of total capital than the leading New Zealand firms. European frontier firms (in terms of their labour productivity) also had higher shares of total labour. These findings reflect that frontier firms in European SAEs, compared to in New Zealand, are more capital intensive and larger, employing more people.

Insights from Māori firms

The *Frontier Firms* inquiry found that the Māori economy exhibits many of the characteristics for firms to innovate, grow and support higher productivity and wellbeing. Māori authority businesses and Māori SMEs are more likely to export than New Zealand firms generally, and have higher rates of innovation and R&D.

The need to serve multiple objectives ("multiple bottom lines") can be a strong driver of ambition in Māori firms, which can also flow through to expectations on suppliers. High shareholder ambition can also spur innovation and experimentation, providing the underlying assets are not put at risk.

Māori firms operate within a unique Māori business ecosystem. Challenges arise from having to navigate the complexity of governance structures, relationships, and other dimensions. However, common values and features help bring Māori businesses together around shared goals. Formal and informal networks among Māori businesses are important for diffusing knowledge, exploring innovation, and enabling collaboration.

Despite their successes, Māori firms face barriers and challenges that are constraining their potential. The Commission recommended ways the Government should act to reduce these, to unlock the potential of current and budding Māori frontier firms, and help the Crown better meet its Te Tiriti obligations.

Recommendation 4.1: Mātauranga Māori and intellectual property

The Government, led by Te Puni Kōkiri, should take an all-of-government approach to address the recommendations of the Wai 262 report, and prioritise and accelerate action to protect mātauranga Māori and intellectual property.

The 2011 Waitangi Tribunal's Ko Aotearoa Tēnei report (known as the "Wai 262 report") included recommendations for changes to legislation and government policies and practices relating to indigenous flora and fauna, intellectual property, and science (among other things) (Waitangi Tribunal, 2011). The Government's approach to responding to the issues raised through *Wai 262* is Te Pae Tawhiti, a cross-government strategy led by Te Puni Kōkiri (TPK).

In January 2022 Cabinet noted the progress on improving the Government's approach to mātauranga Māori and other taonga, which has included the following mahi.

- Progressing tuku kaupapa with Te Taumata Whakapūmau, the original *Wai 262* claimant representative rōpū. This work includes:
  - The Ngāti Kuri Taonga Species Project to create a centre to support and develop local research relating to taonga species.
  - Resourcing and supporting a national engagement strategy coordinated by Te Taumata Whakapūmau. This engagement seeks to engage broader iwi and Māori to establish a mandate and process for engagement with the Crown on a joint work programme. It includes engaging within and across iwi at local, national, and international levels. The first hui, the Wai 262 Symposium, was held in August 2021.

- Exploring Traditional Knowledge Labels - these are fully customisable digital markers used by indigenous communities in other jurisdictions to establish proper attribution, access and use rights for traditional knowledge.

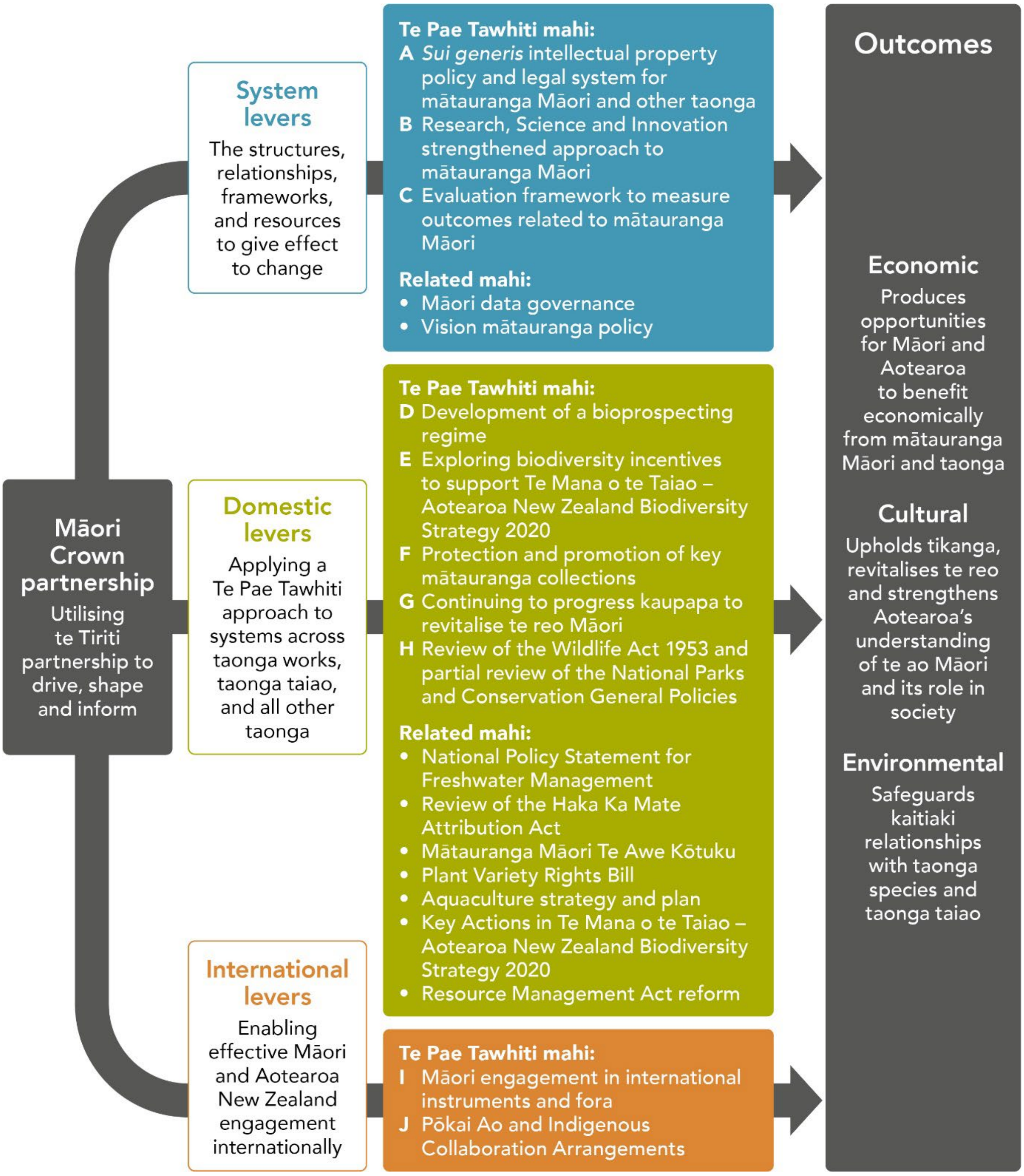
- Conducting a current state analysis to understand all existing and planned Te Pae Tawhiti-aligned work being progressed across government.

- Engaging Te Au Rangahau to investigate modelling approaches to better understand the economic and broader wellbeing and development benefits of protecting, preserving, and promoting mātauranga Māori and other taonga. This work estimated the potential benefits of global protections for mātauranga Māori and intellectual property at $76 billion a year.

However, Cabinet noted that progress with implementing Te Pae Tawhiti had been impeded by the impact of COVID-19. It agreed to a refreshed work programme to refine and refocus efforts on Te Pae Tawhiti. It also committed $27 million over four years to TPK to support this work as part of Budget 2022.

The refocused work programme, Te Tumu mō te Pae Tawhiti, has ten priority focus areas, including developing a policy and legal system for the protection, promotion, and preservation of mātauranga Māori; creating a measurement and evaluation framework to track results; developing a domestic bioprospecting regime; and undertaking work to support Māori engagement in international treaties and instruments (Figure 1).

Figure 1: Te Tumu mō te Pae Tawhitī



Source: TPK (2022d)

Te Tumu mō te Pae Tawhiti includes nine areas of aligned work that are already underway. These include work on the protection of taonga species through reforms to the Plant Variety Rights Act (which was passed in November 2022) and the Resource Management Act 1991.

The work programme also includes strengthening the way the research, science, and innovation (RSI) system enables and protects mātauranga Māori. This is being led by MBIE, in the context of Te Ara Paerangi: Future Pathways, and the White Paper set out policy directions in the quote below (the emphasis is in the original).

We will:

- ***Partner with Māori*** *to explore development of a dedicated platform for mātauranga Māori expertise in RSI.*
- ***Support the stronger deployment of RSI system resources to the regions****, potentially through supporting Māori to establish regional research platforms, or through leveraging improvements in digital connectivity...*
- ***Encourage and support RSI institutions to develop standards and guidelines*** *to ensure researchers have the competency to engage with Māori and te ao Māori, and vice versa (New Zealand Government (2022h), p. 45).*

It also states intentions to ensure appropriate Māori representation at all levels, and to include Māori-led priorities in national research priorities (NRPs).

The proposed changes present a double-edged sword for Māori, as they rely heavily on the capacity and capability of Māori in the RSI system to respond to requests for engagement and support. Their constrained capacity, together with growing demand for engagement with Māori researchers and communities, has been recognised and explored by the Science for Technological Innovation (SfTI) National Science Challenge. SfTI has also observed that Māori input is often assumed to be provided pro bono (Science for Technological Innovation National Science Challenge, 2022, n.d.). Alongside building the future pipeline of Māori researchers, SfTI has identified a variety of mentoring models for supporting the capability of Māori researchers. SfTI has described changes to research processes that can support Māori innovation in science teams (Science for Technological Innovation National Science Challenge, n.d.).

The overall direction of travel in protecting mātauranga Māori looks promising but requires Māori leadership. The Government will need to consider how it can help build the necessary capabilities across the RSI system, to give effect to its policy intentions. Māori should be adequately resourced for their engagement and contribution.

Any new platform that is created as part of the RSI reforms should start by engaging with the existing communities that are deeply involved in this mahi. For example, Rauika Māngai is the existing collective of Māori researchers across the Science Challenges. It is the leading platform for mātauranga Māori implementation, and includes a resource hub (Rauika Māngai, n.d.). Rauika Māngai includes representation from Ngā Pae o Te Māramatanga, which is Aotearoa' New Zealand's Māori Centre of Research Excellence, comprising a large network of Māori researchers (Ngā Pae o te Māramatanga, n.d.).

The Associate Minister for Māori Development is due to report back to Cabinet on progress with Te Tumu mō te Pae Tawhiti by 30 April 2023 (CBC-22-MIN-0004 refers).

Recommendation 4.2: Hui Taumata

Government should provide support and resourcing for a Hui Taumata (national Māori business summit) of iwi and Māori business stakeholder organisations. The Hui Taumata would:

- enable a national discussion by Māori for Māori on ways to support productivity, growth, innovation and resilience in the Māori economy;
- formulate actions to improve the Māori business ecosystem; and
- develop ideas for how government and Māori business networks can better work together.

The Government should invite the Iwi Chairs Forum, the Federation of Māori Authorities, the Māori Economic Development Advisory Board, and other key iwi and Māori business stakeholder organisations to establish a clear kaupapa/purpose, format, location, and date for the Hui Taumata.

Te Puni Kōkiri would lead government support for the Hui Taumata, working closely with the Ministry for Business, Innovation and Employment, the Treasury, the Ministry for Primary Industries, New Zealand Trade and Enterprise, and Callaghan Innovation.

In its response to the *Frontier Firms* inquiry report, the Government stated it agrees with the recommendation for a Hui Taumata and would continue to work on this. A national, one-off event has not yet been planned. However, TPK reports there is desire among iwi to be able to engage with the Crown on broad economic issues, including government supports for the Māori economy.

Several Māori business leaders who contributed to this review said an effective way to pursue national-level conversations could be focused discussions on topics, rather than an all-encompassing discussion across the Māori economy. This might involve a relatively small group of iwi and Māori business leaders – perhaps in a "hackathon"-type format,[1] focused on developing practical actions. It would require careful background thinking and ideas to facilitate a meaningful conversation.

Over 2021–2022, TPK held regional focus groups with over 150 Māori businesses. These hui elicited insights into Māori businesses' strategies for managing the impact of the COVID-19 environment, the barriers they encountered, and how they are responding to new opportunities (TPK, 2022e, p. 23).

Other organisations are also progressing work to improve government support for Māori business. The Reserve Bank of New Zealand Te Pūtea Matua (RBNZ) is leading work to reduce barriers to accessing capital by Māori businesses (discussed below). The Ministry for Business, Innovation and Employment (MBIE) is considering how it could improve support for small business, for example through its regional business partners.

[1] Hackathons are events where computer programmers gather to develop new approaches to solving problems or completing large projects that require collaboration.

Māori business leaders who provided input to this review had observed little improvement in support for Māori business since publication of the *Frontier Firms* report. One person described examples where government funding/grants are still unresponsive to the circumstances of Māori businesses (for example, by being too bureaucratic or cumbersome for Māori land trusts and structures).

Recommendation 4.3: Supporting Māori business capability

The Government, led by Te Puni Kōkiri, should provide culturally appropriate support to build the capability of Māori businesses to participate in government procurement processes. Support should include help to meet prequalification standards, participate in tendering processes and establish joint ventures/consortia. Any additional support for Māori business must be easy to navigate, and not exacerbate the current confusing clutter of programmes.

The *Frontier Firms* report noted that Government procurement processes offer potential for stimulating Māori business growth and that the new 5% target for the number of public service contracts awarded to Māori businesses is a good start. However, to achieve its objectives, this target will need supplementing with capability-building support for suppliers and procurement process improvement by procuring agencies.

The 5% target was part of a suite of progressive procurement settings agreed to by Cabinet in 2020. Progressive procurement is about buyers of goods and services looking beyond price to wider social and public value. It combines elements of social procurement, supplier diversity, indigenous procurement, and wellbeing measures. Other elements of the Government's progressive procurement policy include providing intermediary organisations to help match buyers and suppliers and verify businesses are meeting the definition of Māori business, and supporting long-term behaviour change of government agencies and business procurement practices.

Funding of $7.3 million was allocated through the COVID-19 Response and Recovery Foundation Package to support the Māori economy by accelerating progressive procurement. This resulted in the establishment and funding of a project team, Te Kupenga Hao Pāuaua, to support the design and implementation of the progressive procurement policy. The project is led jointly by MBIE and TPK. It aims to help build Māori business capability and shift government agency procurement practices. It does this by:

- prototyping approaches to reduce barriers for Māori businesses to engage in government procurement processes;
- assisting government agencies to implement the progressive procurement policy; and
- overseeing the development of a database of registered Māori businesses and some associated reporting functionality.

Budget 2022 provided the project with an additional $26 million over two years to:

- scale up local networks in regions to grow awareness of government opportunities and build capability;
- provide targeted one-to-one support to Māori businesses that are ready to deliver procurement solutions but need to lift capability to navigate and engage effectively in government tender processes;
- develop a centralised Māori business database; and
- continue to engage with and build capability of government agencies to achieve long-term change in government procurement processes.

To date, to build Māori business capability, the project team has:

- designed a tender-ready assessment tool called Te Tomokanga, which assesses the capability and needs of Māori businesses to engage in government procurement processes (aimed at supporting businesses that are not currently engaged);
- set up protypes and initiatives to support agencies to implement the policy and increase the number of Māori businesses engaging with government procurement;
- provided targeted support to 18 Māori businesses so they were tender-ready for government contracts. These businesses subsequently secured government contracts valued at around $8 million;
- engaged with over 600 Māori businesses spanning 25 industries; and
- piloted the provision of intermediary services through a single organisation, which has included some capability building services and support for verifying Māori businesses (Minister for Economic and Regional Development (Hon Stuart Nash) and Te Minita Whanaketanga Māori (Hon Willie Jackson), 2023).

All mandated government agencies are required to report against their progress in implementing the progressive procurement policy and the procurement target of contracts awarded to Māori businesses. Work to date has revealed some barriers and challenges faced by Māori businesses. The two main barriers identified are lack of Māori business awareness of the opportunities available through government procurement, and lack of capability to effectively engage in government procurement processes. In response, the project has continued to develop support to Māori businesses through targeted one-to-one capability uplift and local intermediary connect programmes. In addition, refinement of the provision of intermediary services is underway, allowing for specialisation in certain functions, increasing the focus on provision of services to government agencies, increasing the focus on the regional government procurement landscape and increasing the number of providers of intermediary services.

The project team recently reviewed the progressive procurement policy and reported back to Cabinet in December 2022. The review found that the 5% target is already being achieved. The first full year of data indicated that 6% of government contracts were awarded to Māori businesses. This meant more than 3,200 contracts were awarded to Māori businesses across the public sector, worth a total of about $930 million. In December 2022, Cabinet agreed to increase the procurement target to 8%. The target will be reviewed again in 2024.

Some of the Māori business leaders who contributed to this review said they were yet to see a shift in the attitudes and capabilities of public sector procurers, who were struggling to move away from conventional, conservative attitudes and a rules-based approach. This echoes the more general difficulty in effecting a culture shift in public procurement, which is discussed further under recommendation 6.1, below. Some also expressed a desire for greater aspiration and moving beyond a volume target. Suggestions included:

- introducing a value target;
- including reporting breakdowns by sector, and by incumbent vs new-entrant firms;
- building greater understanding of what Māori businesses can bring (reflecting their different delivery value); and
- measuring the contribution of procurement to wider outcomes that enable iwi and Māori community development and whānau wellbeing (such as creating employment opportunities, upskilling whānau and growing the value of assets).

We note officials considered a value target, in addition to or instead of a volume target. This has been implemented in some other counties, in response to total contract values levelling off despite the volumes increasing. This option was not recommended, because the volume target is considered to best meets the objective of increasing supplier diversity, and (unlike other countries' experiences) total value is still increasing.

Recommendation 4.4: Using and enhancing the Māori–Crown relationship

The Government should undertake further work to explore how the Māori–Crown relationship can be better utilised and enhanced, to unlock the potential of actual and potential Māori frontier firms and help meet the Crown's Te Tiriti obligations.

Refresh of He kai Kei aku ringa – the Māori-Crown Economic Development Strategy

MBIE, with the support of TPK and other agencies, has been working with the Māori Economic Development Advisory Board and Ministers to review and refresh the role of He kai Kei aku ringa – the Māori-Crown Economic Development Strategy. A refreshed strategy was agreed by Cabinet in December 2022. A report back to Cabinet on a supporting action plan is due to be completed by June 2023.

The Commission heard about various other new and ongoing Māori-Crown investment initiatives, including:

- Tāwhaki Joint Venture, a commercial partnership between Te Taumutu Rūnanga and Wairewa Rūnanga and the Crown. This partnership has a dual kaupapa to heal and rejuvenate the unique whenua at Kaitorete; and to advance Aotearoa New Zealand's aerospace industry through the development of aerospace activities and R&D facilities on the whenua (MBIE, 2022d).
- Work led by the Māori Spectrum Working Group and MBIE to develop a Māori radio spectrum entity (Māori Spectrum Working Group, 2022; MBIE, 2022b).

Improving Māori access to capital

The Reserve Bank of New Zealand released an issues paper in August 2022 (Reserve Bank of New Zealand Te Pūtea Matua, 2022a). The issues paper reported the findings of firm-level research that showed Māori businesses face higher financing costs than non-Māori businesses, with the implied annual interest rate being around 50 basis points higher. Characteristics of Māori businesses that explain much of this difference include higher debt ratios, less debt funding from shareholders, slightly lower productivity, and greater probability of having negative equity and younger working proprietors.

The issues paper also reported on the findings of stakeholder engagement, which identified the following issues constraining Māori access to capital:

- limited recognition of the transformative effect that successful Māori businesses can have on the wider community;
- challenges in borrowing against community-held whenua Māori;
- a shortage of hard data on Māori businesses and the Māori economy in informing good policy outcomes;
- the growing but comparatively limited capabilities of Māori firms;
- a lack of scale, coordination and understanding in the Māori business funding system; and
- systemic leadership and decision-making shortcomings in the financial sector.

These findings are consistent with those of the Commission's *Frontier Firms* inquiry. The Reserve Bank's issues paper set out several potential solutions that were raised in wānanga. They were summarised into five key themes:

- improve the ability to use whenua Māori as loan collateral;
- collect more and better data on Māori businesses;
- improve Māori firm capability, scale and coordination;
- build a coherent map to the Māori firm funding ecosystem; and
- reduce myopia in decision making and leadership.

Submissions on the issues paper were in broad agreement on the challenges and identified some additional challenges such as institutional distrust impacting Māori willingness to engage with the public sector. Feedback on the potential solutions was positive. Many submitters considered that interventions related to establishing a Māori capital provider and use of whenua Māori as collateral should be prioritised (Reserve Bank of New Zealand Te Pūtea Matua, 2022b).

The Government has started working with the National Iwi Chairs Forum to address the issues that have been identified. This will include ensuring Māori are able to fully access existing government business support and exploring how to provide Māori with better access to capital while these changes are made. The Reserve Bank is working with the banking industry to support the development of improved data, and products and services for Māori.

Recommendation 4.5: Te Ture Whenua Māori Act 1993

The Government, led by Te Puni Kōkiri, should explore, and consider practical steps it could take to reform Te Ture Whenua Māori Act 1993, alongside improved coordination of government services and support to Māori landowners for land development purposes. The overarching goal should be to rebalance the legislation to allow for more land utilisation and development, while recognising the importance of retaining Māori land in the hands of its owners and their whānau and hapū. The approach to change needs to be more ambitious than before, and properly informed by all reviews carried out in the last decade.

In our *Frontier Firms* inquiry, we found Māori land-based businesses are constrained by the land tenure and compliance requirements of Te Ture Whenua Māori Act 1993. We noted there is a long history of efforts to resolve these problems. A major review of Te Ture Whenua Māori Act 1993 was undertaken from 2011 to 2016 and proposed reforms included in a Te Ture Whenua Māori Bill introduced in 2016. However, the Bill attracted significant opposition and was not enacted. It was discharged in December 2017. Some of the less- or non-contentious reforms were later advanced by way of the Te Ture Whenua Māori (Succession, Dispute Resolution, and Related Matters) Amendment Act 2020 covering matters suggested in its title together with improvements to the way the Māori Land Court operates.

In the *Frontier Firms* inquiry, we commented that those 2020 amendments did not address the fundamental issues tackled by the 2012 review. We noted the challenge of balancing land retention and protection with effective governance and management to raise productivity and returns for Māori landowners. We recommended the Government should explore and consider practical steps it could take to reform the legislation, alongside improved coordination of government services and support to Māori landowners for land.

Major reforms to Te Ture Whenua Māori Act 1993 have not been progressed. The Māori Purposes Act 2022 made non-contentious amendments to extend certain timeframes for decision making and allow assembled owners of Māori land the option of meeting by electronic means (TPK, 2022a). Further reform is being considered, including a re-examination of the proposals that were not advanced when the 2016 Bill was discharged or subsequently progressed through later amending legislation.

As noted above, the Reserve Bank's work on improving Māori access to capital is looking at how to improve the ability to use whenua Māori as loan collateral.

TPK has expanded its Whenua Māori Service, which provides support to Māori landowners, trustees and whānau to realise their whenua aspirations. Following a pilot programme of regional advisory services, the programme became permanent and nationwide in September 2021. Over 2021/22 the service:

- held 27 capability-building wānanga;
- supported 14 community coordinators;
- invested $740,000 in landlocked land case studies to investigate and protype solutions to barriers to accessing whenua Māori for utilisation and development; and
- invested $180000 in an iwi-led whenua Māori development project (TPK, 2022e).

Some Māori business leaders who provided input to this review emphasised the paramount importance of protecting the land, as it is much more than a business asset. Some also commented on the importance of maintaining aggregation of control and profits, to enable meaningful re-investment and delivery of long-term sustainable growth and value.

Recommendation 4.6: Research on Māori firms

> The Government, and the Productivity Commission, should invest in further qualitative and quantitative research on Māori firm performance and productivity. This work should be coordinated with the work on the Government's Māori Economic Resilience Strategy.

TPK has proceeded with a quantitative research work programme, and, with our analytical support, is building its in-house capability for firm-level research using microdata from the Longitudinal Business Database and the Integrated Data Infrastructure. TPK has also improved its data extraction techniques.

In July 2022, TPK released its second Te Matapaeroa report – *Te Matapaeroa 2020: More insights into pakihi Māori* (TPK, 2022b). This provides updated analysis of trends in Māori businesses and sole traders, including new insights on the role of wāhine Māori in business.

Alongside Te Matapaeroa, TPK released a new data visualisation tool that allows users to explore data on Māori businesses, including trends over time, differences by region and industry, and preliminary data on the impacts of COVID-19 (TPK, 2022c).

Most of the Māori business leaders who provided input to this review were unaware of this data set and tool. However, they emphasised the importance of data – particularly data that provides insights at a regional level – to Māori businesses and iwi, for understanding and planning, and ultimately for supporting rangatiratanga. This suggests scope exists for increasing communications to lift awareness and use, and ensuring they are accessible.

Research is underway on Te Matapaeroa 2021, which will provide further insights into how Māori businesses performed during the COVID-19 pandemic. TPK told the Commission planned future research includes longitudinal analysis of the determinants of Māori business growth, and analysis of productivity differences between Māori and non-Māori businesses.

Exporting and innovation

New Zealand needs more firms exporting specialised, distinctive, high-value products at scale. To achieve this, governments need to support firms to overcome the hurdles to exporting, attract high value adding, export oriented foreign direct investment (FDI) with rich links to the local economy, and help firms build scale through supportive innovation ecosystems in areas of focus.

The Government supports exporting and attracting FDI through New Zealand Trade and Enterprise (NZTE) and other partners. The Commission found this support should be better evaluated, and successful programmes scaled up.

Recommendation 5.1: Foreign Direct Investment

The Government should take a more proactive and deliberate approach to attracting foreign direct investment (FDI) that is innovative, oriented to exporting, likely to stay long-term and a source of spillover benefits. It should integrate FDI attraction with a focused innovation policy. The measures that can be used to upgrade an innovation ecosystem can also be part of a negotiated package to attract high-quality FDI. Such a programme requires careful monitoring, evaluation and adaptation to New Zealand circumstances to ensure it produces net benefits.

Work is happening on an investment attraction strategy

In its 2020 election manifesto, the Government signalled an intention to develop an investment attraction strategy (IAS). Ministry of Business Innovation and Employment (MBIE) officials advised they are working on aspects of investment attraction and expect to progress this work with the Minister of Economic Development over the next few months. New programmes to attract desirable FDI may emerge when the new IAS is revealed. We have pointed to successful programmes run by other small advanced economies (SAEs) such as Ireland. Denmark and Singapore. These are clearly more deliberate and better resourced than New Zealand efforts.[2]

[2] For more information about FDI attraction programmes in other countries, see Box 5.2 in the Commission's Frontier Firms report (NZPC, 2021, p. 84).

NZTE is primarily responsible for investment support on behalf of the government. Its dual focus is attracting high-quality FDI to New Zealand and assisting New Zealand firms to raise capital. NZTE seeks to facilitate international investment that is "good for New Zealand" so that it makes the greatest positive impact on the wider economy. Specific criteria for judging when international investment is "good for New Zealand" are when the investment:

- brings needed capital that is not available or not enough in New Zealand;
- creates high-skill, high-value jobs;
- transfers valuable skills and or intellectual property to New Zealand;
- facilitates access to global supply chains and new customers;
- showcases the New Zealand brand to the world;
- brings competition to the domestic market – reducing costs for New Zealand consumers; or
- builds New Zealand infrastructure (NZTE, 2022b, p. 12).

These criteria are consistent with FDI that creates spill over benefits, although export orientation receives less emphasis. Since July 2020, NZTE has helped complete 61 deals involving international investors, bringing FDI of $1.98 billion to New Zealand. Recent examples include Costco (a $100 million-plus greenfield investment to serve New Zealand consumers); Helios Energy (developing multiple large-scale solar farms in New Zealand); and Doordash (a US-based delivery services platform that is establishing operations throughout New Zealand) (pers. comm. from NZTE, 6 April 2023),

Attracting FDI, particularly from Multi-National Corporations (MNCs) requires a well-resourced and long-term, patient approach. The small size and remote location of the New Zealand economy makes attracting high-quality (first tier) MNCs a challenge, especially with the limited resources and levers New Zealand has applied in comparison to other similar economies. NZTE has had some success with attracting first tier MNCs and greater success with second and third tier MNCs[3] .

In the absence of an explicit IAS, officials across several agencies (eg, MBIE, NZTE, the Ministry of Foreign Affairs and Trade, the Ministry of Primary Industries, Callaghan Innovation, and the Overseas Investment Office (OIO)) work collaboratively to smooth the pathway for attractive FDI prospects. Agreement exists on the desirability of investments that are greenfield, cutting-edge and in areas novel to New Zealand. One strength is the country's ability to get things done quickly (such as OIO clearances and developing regulatory regimes like regulations for a space industry). New Zealand also benefits from its reputation for lack of corruption, ease of doing business, and being clean and green. NZTE has recently launched a marketing campaign pointing to some of these potential attractions (NZTE, n.d.). However, competition is tough, especially when other countries often allocate greater resources and are more proactive, in addition to offering generous financial incentives to attract investment.

Overall, there is a sense that New Zealand is increasing efforts to attract international investment following COVID-19 border shutdowns. However, New Zealand's efforts remain low-key in comparison to those of many other SAEs.

[3] Describing companies as Tier 1, 2, or 3 is fairly loose but useful way to distinguish the largest, wealthiest and most experienced companies (Tier 1) from the more modest ones (Tier 3) with Tier 2 companies being somewhere in the middle.

The Commission's recommendation in its *Frontier Firms* inquiry on the sort of FDI the country should seek attracted the attention of one large company. It felt that it had the attributes of a large, well-established, innovative, and dynamic foreign enterprise with the potential to energise and lift an industry or sector in New Zealand in terms of skills, knowledge, innovation, and international connections. Based on its own strategic and commercial reasons, Amazon Web Services (AWS) has decided to invest around $7.5 billion to establish an "AWS region" in New Zealand over 15 years and work with local companies that are keen to exploit the efficiency gains, and innovation and export potential of digital cloud-based services.

AWS wrote:

> *AWS believes that the investment proposed by AWS is exactly what the recent New Zealand Productivity Commission report on frontier firms calls "the right sort of FDI," which provides a range of important spill-over effects and, specifically, invests in innovation, grows new export markets, creates a demand for skills, encourages more training, attracts international talent, and builds career paths that help keep skilled people in New Zealand. In addition, the right sort of FDI provides access to global value chains and, through the diffusion of innovation, can help domestic firms raise their productivity and develop a network of specialized partners, such as suppliers and researchers, over the long term. In every respect, we believe an AWS local infrastructure investment meets this test of the "right sort of FDI" to boost New Zealand business productivity and accelerate both domestic and oriented growth.*

The Innovative Partnerships Programme aims to attract cutting-edge international companies and R&D

The Government launched its Innovative Partnerships Programme in March 2018. The small-scale programme has attracted a limited number of R&D investments, such as self-piloting electric air taxis, gaming, space research, and development of a probiotic bacterium for human consumption (see discussion of Recommendation 7.2 for more information).

The Government has launched an Active Investor Plus visa

Since the *Frontier Firms* report, the Government and officials have developed a new investor visa that changes the conditions for migrants seeking residence through committing to invest in New Zealand businesses. The changes involve a shift away from allowing passive investments, for example in bonds, to encouraging active investment in high-growth businesses. This is a desirable shift.

The Government launched its new Active Investor Plus Visa in September 2022 – too recently to evaluate its impact. The Government made some additional policy and technical decisions in December 2022 to provide clarification to interested investor migrants and other stakeholders. These relate to what investments count as "acceptable". In principle, acceptable investments are those in New Zealand entities that clearly contribute to the Government's economic strategy (by being in high growth potential firms or contributing to positive social and economic impacts). NZTE is the “steward” of what investments count as acceptable and has issued guidance. Different types of investment receive different weights: direct investment in businesses receive three times the weight of investments in listed equities and philanthropic entities, while investment in private equity or venture capital funds carry twice their weight. An applicant would have to invest $15 million if their investment were all in listed equities or an approved philanthropic entity (Invest New Zealand, n.d.b, n.d.a).

The Active Investor Plus visa may produce good results for New Zealand by attracting not only active investment but also active and talented entrepreneurs. Yet such programmes carry risks that they will be used primarily to gain residence and the applicants will manipulate rules to quality. While more like New Zealand’s previous investor-visa category (which allows investments in passive assets to count), a Grattan Institute evaluation of the Australian investor visa found it to be highly ineffective in promoting business dynamism (Coates et al., 2021). These risks make ongoing and independent evaluation of the Active Investor Plus visa imperative.

Recommendation 5.2: Evaluating support for exporters

New Zealand Trade and Enterprise (NZTE) should regularly commission independent evaluations of its services. These evaluations should use a variety of approaches and methods to assess the effectiveness of their services, and to inform improvements and choices about the future mix, design, and delivery of services.

To facilitate quantitative evaluation of impact, businesses receiving NZTE support should be identified in the Longitudinal Business Database (including the type of support they receive) to allow for more robust, long-term assessment of NZTE’s performance.

Fundamental to successfully running a programme of focused innovation is monitoring and evaluation of initiatives. Focused innovation policy is a learning process, requiring the right governance arrangements, as well as monitoring and evaluation to learn and enable adjustments in direction. Focus areas will not be set in stone but need to be refreshed and adapt over time.

Arrangements for monitoring and independent evaluation need to be built in from the outset, with dedicated funding. Results measurement should focus on outcomes. Evaluation arrangements should be transparent and visible, with evaluation findings published as a matter of good practice.

Recommendation 5.2 is aimed at improving the evaluation of NZTE’s services given that NZTE is the key agency for supporting exporters and exporting, and commands significant public resources to deliver them. It is important that the individual services and their mix are as effective as possible. In response to our recommendation, the Government asked the Ministry of Business, Innovation and Employment (MBIE) to lead an Internationalisation Support Review (ISR). After starting with a wide scope, the ISR’s focus has narrowed. MBIE is working closely with NZTE on ways to improve alignment of NZTE's Focus Customer support with the Government's Economic Plan, generate greater spill over to the wider economy, and improve the extent to which the support is making a difference. The ISR has involved a comprehensive examination of NZTE's strategy and operations. A further topic in the ISR is improving NZTE's data management and sharing, in line with Recommendation 5.2 (based on MBIE and NZTE pers. comms. 20 January 2023 and 6 April 2023).

NZTE advised it is committed to monitoring and evaluation. It has a suite of measures for engagement and impact that are outlined in its Statement of Performance Expectations (NZTE, 2022b). NZTE has recently restructured and expanded its data team to improve the quality and consistency of its data. More rigorous evaluation of services will become possible by implementing the Commission's recommendation to tag the firms that NZTE works with in the Longitudinal Business Database (LBD), including which services the firms have received and when. This will provide data to enable improved, objective evaluation of NZTE services and could be made a condition for firms to receive services. The anonymity of the firms would be protected. Callaghan Innovation's new Ārohia Innovation Trailblazer grants – to support firms undertaking non-R&D innovation – include such a condition. MBIE and NZTE have both indicated that tagging is likely to happen following the ISR. The data collected would be used by:

- MBIE, MFAT and NZTE to monitor and evaluate NZTE services and to develop policy more generally; and
- researchers using the LBD (with the anonymity of individual firms fully protected).

The Commission's review finding is the ISR, though not yet finished, is proving a useful assessment of NZTE's services that aim to support innovative firms overcome the fixed costs of starting to export, or of expanding by exporting new products or existing products to new markets. The ISR is also an opportunity to further improve the evaluation of NZTE's services by:

- monitoring and analysing data on its business customers over time at the firm level; and
- tagging which firms receive which services in the LBD and making this a condition for firms to receive NZTE services.

Innovation ecosystems and firms

Recommendation 6.1: Public procurement and innovation

The Government should adequately resource and support public sector procurement professionals and local firms to build innovation specific capacities. This will help both parties make the most of mutually beneficial opportunities to support innovation, and to achieve wider benefits from public sector procurement budgets.

In the *Frontier Firms* report, we noted the Government can play a role in supporting innovation through the way it procures goods and services, because of the scale and resources provided by its purchases. However, even when innovation is made, an explicit objective of government procurement policy can conflict with traditional procurement goals such as ensuring value for money. The effectiveness of government procurement in stimulating innovation therefore depend on the skills and capacity of procurers, particularly the ability and appetite to manage risk and uncertainty.

We found that parties on both sides of the procurement equation will need to build innovation-specific capacity, to ensure the recent changes to procurement policy translate into increased innovation. We recommended the Government should adequately resource and support both public sector procurement professionals and innovative local firms, to build the needed capabilities.

A reset of the government procurement system

In November 2021, Cabinet agreed to a reset of the government procurement system, to achieve greater public value from government procurement.

In February 2022, the Government agreed to refreshed strategic priorities for procurement. One of the desired features of the refreshed system is that it will "encourage and foster innovation, particularly through supporting New Zealand's businesses to develop, grow and to win government contracts both domestically and overseas". Innovation will be fostered through contract and supplier relationship management: "innovation comes from strong supplier relationships that focus on delivering new solutions (innovation), ongoing improvements and adding value" (Minister for Economic and Regional Development (Hon Stuart Nash), 2021a para 38 and footnote 4, p. 10).

The work giving effect to this strengthening of supplier relationships and contract management includes developing standards and expectations, and guidance materials. Toolkits for "professionals" (government staff involved in supplier relationship management activities) and "leaders" (those looking to run supplier management programmes) have been developed. Other work is underway to build government procurement capability, including developing a framework of core procurement competencies, and a cross-agency community of practice to support skills development.

Toolkits for government procurement practitioners

The toolkit for professionals state that "innovation and improvement" is one of six focus areas to consider when seeking to measure value from a contract. It does not provide guidance on how to weight innovation with other dimensions of value or balance it against risk and traditional procurement goals.

The guide describes approaches to innovation:

- Open innovation – where the procuring agency actively seeks ideas for improvement without providing an innovation brief for suppliers.
- Guided innovation – where the agency provides the supplier with a focused "innovation brief", to help guide ideas for improvement.

The guide states that "successful innovation requires a high level of organisational maturity". It explains that open innovation "can be more costly and time-consuming than guided innovation, but it can lead to breakthrough opportunities" (New Zealand Government Procurement, n.d.b).

The toolkit includes a "innovation identification and tracking tool" to help assess innovation ideas. This tool is a simple Excel spreadsheet template that captures very basic, high-level descriptive information about a contract. It has fields for entering weightings and 1-5 ratings of factors which include benefit, cost, alignment with strategy, duration of benefit, and risk, but no guidance on how to assess these factors.

The toolkit for leaders has simple checklists and process guidance. It contains a short paragraph on supplier innovation, to encourage agencies to "use a relationship model that encourages the sharing of information" such as "implementing discussions around innovation into strategic meetings". It explains that "the better they understand your own challenges the more likely they will increase supplier willingness to design innovative solutions" (New Zealand Government Procurement, n.d.a).

Progress has been patchy

A report back to Cabinet in August 2022 found the capability of public procurement practitioners remains patchy, with many tending to take a "rules-based approach rather than the outcomes-based approach the Government wants" (Minister for Economic and Regional Development (Hon Stuart Nash), 2022).

Outside of the work on progressive procurement discussed above, the Commission did not identify examples of the government providing support and capability building within innovative local firms, to help them access procurement opportunities and meet delivery expectations.

Government procurers need to grow their ability and appetite to manage risk

These findings suggest further effort is needed to build the new skills and capacity needed to support innovation through public procurement. Research shows the specific qualities needed in public procurement professionals include a culture of experimentation and risk-taking, and top-level management support for allowing a higher level of procurement risk and uncertainty. Recent research by Stek (2021) identifies a range of competencies needed (Figure 2).

Stek summarises these by saying:

> *The central part of the success of innovation buying in the public sector lies in the procurer's entrepreneurial behaviour, who must be courageous, proactive, and persistent to be creative and think out-of-the-box (Stek, 2021, p. 103).*

This calls for multi-functional procurement teams. More practical guidance is also needed on how to balance traditional procurement objectives with the risks and uncertainties inherent in innovation.

Figure 2: Competencies of public sector procurers of innovation

Internal relations

'the persuasive, sensitive and networking procurer who is establishing internal relations'
Being persuasive and being able to 'sell procurement', i.e. having the ability to get involved early in the procurement process; being visible for the internal partner; having organisational sensitivity, i.e. understanding the own organisational governance and the value of procurement for the organisation; having close relationships with 'Legal', HRM and R&D.

Bridging

'the entrepreneurial and visionary procurer who is a driver of innovative change'
Having courage and being persistent; being able to translate vision into practical plans; managing change processes, i.e. creating commitment for innovations; being confident to innovate; having technical knowledge of the own product or process; being curious; being able to listen, to ask critical questions and to distinguish the 'real need' behind the demand of the internal partner; working in multidisciplinary teams; having knowledge of sustainability issues, circular economy solutions, digitalisation and analytical skills (Big Data); having knowledge on laws and regulations and contract development; being proactive; having communication, presentation and networking abilities; being creative and inventive, being able to think 'out-of-the-box' and holistic thinking.

External relations

'the market driven procurer who is challenging the suppliers to experiment and innovate'
Being connective and staying in touch with the market by having an open dialogue with the market; performing category strategy development; performing supply market analysis and early supplier involvement, i.e. being challenging and experimental towards suppliers.

Source: Stek (2021, pl 108).

As part of this follow-on review, Dr Anne Staal and his colleagues at Auckland University of Technology and Victoria University of Wellington suggested to the Commission that private firms can also use their own procurement practices to stimulate innovation in their upstream supply chains. This is not something that the *Frontier Firms* inquiry specifically explored but may warrant further research.

Recommendation 6.2: Research and Development Tax Incentive

By the end of 2021, Inland Revenue, the Ministry for Business, Innovation and Employment, and Callaghan Innovation should carry out a stocktake of the operation of the Research and Development Tax Incentive (RDTI) from its start to the end of the 2020–21 tax year. The stocktake should:

- assess the causes of difficulties that some firms have found in establishing the eligibility of their R&D activities for the RDTI;
- assess whether the RDTI is on track to meet its policy objectives;
- identify and implement amendments to statutory eligibility criteria, guidelines and administrative procedures that will best resolve identified problems; and
- consider supplementing the RDTI with the use of grants to fill eligibility gaps, to help the RDTI better meet its policy intentions.

The Government has successfully introduced the Research and Development Tax Incentive (RDTI) over the last three years, replacing the previous Growth Grant programme that supported business R&D. The RDTI is an example of a desirable, broad-based innovation policy that recognises the wider social and economic benefits of business innovation. The *Frontier Firms* report noted “strong evidence exists that tax incentives to raise firms’ R&D are effective both in increasing private sector effort and in raising productivity” (p. 90).

The RDTI provides a 15% tax incentive for eligible business R&D activity incurring eligible expenditures. The scheme is administered jointly by Inland Revenue (which assesses the eligibility of business entities and expenditures, and approves tax incentives), Callaghan Innovation (which advises Inland Revenue on the eligibility of R&D activity) and MBIE (which leads the design of policy and monitors the scheme in the context of wider RSI policy).

Firms can apply for General Approval in advance of undertaking R&D, which provides them with assurance they will receive the incentive for their R&D activity, provided they continue to meet the eligibility requirements. General Approvals can be granted for up to three years. The Government is bringing in a system of “in-year” payments to help firms incurring the cost of R&D to better manage their cash flow.

Budget 2022 appropriated around $473 million for the demand-driven scheme, representing about 20% of all government RSI outlays (New Zealand Government, 2022b). Even for the 2021-22 tax year, the actual number of firms receiving tax credits and the total value of those credits will not be known for some time, as supplementary returns for that year are not due until May 2023.

Early teething problems with the RDTI appear to have been resolved with more business-friendly guidance, greater familiarity with eligibility criteria, and in-year payment of the RDTI (Inland Revenue (2021a, 2021b); Callaghan Innovation, Inland Revenue and MBIE (2023)). Officials have advised a majority of firms that previously received Growth Grants have transitioned to the RDTI. Officials have been regularly monitoring applications for, and processing of, General Approvals as well as the submission and processing of supplementary returns. The number of applications and submissions has risen steadily. At the same time, processing times have shortened (in part reflecting applicants' greater familiarity with requirements). The profile of firms participating in the RDTI scheme is a reasonable match for relevant firms reporting R&D activity in Stats NZ's Business R&D Survey. Legislation prescribes that the RDTI be independently reviewed every five years, with the first review due after the end of the 2023-24 tax year (NZPC, 2021).

Support for business innovation not eligible for the RDTI

The Government is also introducing two new grant programmes, administered by Callaghan Innovation, to provide support for innovating firms who do not meet the eligibility criteria for the RDTI.

The New to R&D Grant, provides support (capped at $400 000) for R&D and capability development for up to two years, for firms that are at the beginning of undertaking R&D activities. The intention is to prepare them to access the RDTI in the future (Callaghan Innovation, 2023).

The Ārohia Innovation Trailblazer is a contestable grant which will support non-R&D innovation activities not covered by other government funding initiatives. It is designed to help businesses whose innovation activity is likely to build capabilities or create opportunities with wider benefits across the New Zealand innovation system. It will be targeted at businesses doing pioneering innovation or building platforms that will help other innovators within New Zealand (Callaghan Innovation, 2022a).

Together, the two grant programmes will total $250 million over four years (Minister of Research, Science, and Innovation (Hon Dr Megan Woods), 2022).

Recommendation 6.3: Building business-research links

In implementing its research, science, and innovation (RSI) strategy, the Government should allocate a significant part of its RSI budget to invest in supporting linkages within innovation ecosystems by:

- building business-oriented research capabilities in public research institutions (Crown Research Institutes and universities);
- incentivising more and better links between businesses and public research institutions (Crown Research Institutes and universities); and
- strengthening international connections.

The Te Ara Paerangi White Paper (see discussion below under Recommendations 8.1 and 8.2) signals an intention to increase links between research organisations and industry end-users, and, over the next three years, to strengthen support for commercialisation. It also signals an intention to strengthen international connections between New Zealand and international researchers (New Zealand Government, 2022h).

The White Paper identifies a specific initiative, completing New Zealand's association with Horizon Europe. This now allows New Zealand researchers and research organisations to apply to Pillar 2 of Horizon Europe, the largest ever European Union (EU) research and innovation programme, on equal terms as researchers from EU member states (MBIE, 2023c).

Some of the Industry Transformation Plans (ITPs) (discussed below under Recommendations 7.1 and 7.2) identify initiatives that could lead to the expansion of business-led industry-research organisation collaborations, such as the New Zealand Product Accelerator, and the Food Innovation Network.

Recommendation 6.4: Reducing programme clutter

The Government should review the suite of programmes designed to assist firms with innovation and exporting. The review should identify and implement ways to:

- reduce and consolidate the number of programmes;
- simplify the process for firms to apply for assistance; and
- make it easier for firms to identify and access relevant programmes, including by providing a common platform and "front door" across programmes.

This review should consider ways to improve the connectivity between Māori businesses and the government supports for innovation and exporting.

A strong theme that emerged from our engagement, case studies, and submissions in the *Frontier Firms* inquiry was the plethora of government support for innovation makes for a siloed, fragmented, cluttered, and confusing system. We learned some firms find it so difficult to navigate, they give up on seeking assistance. Similar concerns were expressed by Māori businesses. We reached the view that these are valid concerns and expressed this in a finding (F6.9) as well as the above recommendation (NZPC, 2021, p. 115).

F6.9 New Zealand firms that seek government assistance for innovation and exporting have a bewildering choice of programmes and points of contact. This can make it difficult for:

- firms to access the assistance they desire; and
- government agencies to apply assistance in a way that best achieves the Government's objectives.

Officials have been taking steps to help businesses by means of the third method mentioned in Recommendation 6.4 but did not report using the first method – of rationalising, reducing, and consolidating the number of programmes offered by different agencies. At best, these efforts have provided web-based tools to help businesses navigate the underlying complexity rather than reducing it. An example of such a tool is the funding explorer tool offered by business.govt.nz (business.govt.nz, n.d.).

Even so, agencies seem to be achieving greater awareness of the overlap between the support they offer and that many of them serve common clients. As noted, Callaghan Innovation and NZTE have taken steps to identify common clients, share information and improve handovers.

An initiative from the “Fit for a Better World (FfBW)” primary-sector programme illustrates how much overlap and complexity exists across agencies. Officials from MPI, MBIE, Callaghan Innovation, NZTE and Kānoa – Regional Economic Development and Investment Unit have formed the FfBW Investment Acceleration Team with a shared Microsoft Teams platform and fortnightly meetings. This initiative has revealed a lot of overlap in the businesses supported by the different agencies and prompted a “one door in” approach for new inquiries from businesses. This is a worthwhile step, but there is clearly scope for rationalisation across individual agency programmes and initiatives. Officials acknowledge this but work is yet to begin.

Focused innovation policy

Recommendation 7.1: Choosing and funding areas of focus

As part of its industry strategy, the Government has identified areas with "high potential" in which to develop industry transformation plans. As a complement to broad innovation policy, the Government take these areas as a starting point and should partner with stakeholders to:

- confirm the choice of a small number of areas of the economy to focus innovation effort, for the purposes of raising firm productivity and export success (while ensuring other wellbeing objectives are met); and
- support these focus areas with a substantial and enduring commitment of public resources, conditional on the private sector at least matching these resources.

Other small advanced economies provide examples of the required level and duration of public funding – in the order of $20 to $40 million each year for each broad area of focus, for periods of five to ten years.

Recommendation 7.2: Governing focused innovation areas

The Government should partner with stakeholders to develop and put in place transparent arrangements for the governance, implementation, monitoring, and evaluation of its focused innovation areas.

Overall governance and oversight of the focused innovation areas should include senior representation from Government, Māori, industry (firms and workers), researchers and educators. This governing body should be responsible for setting strategic directions, recommending areas of focus, and overseeing the strategy as it proceeds.

Governance in each chosen area of focus should be devolved to independent multi-stakeholder bodies. Each devolved body will make decisions on resourcing, implementation, monitoring, and evaluation of initiatives within its area of focus.

The Government has yet to put in place a complete package of focused innovation policy

Chapter 7 of the *Frontier Firms* report sets out the key features of effective focused innovation policy (in addition to those set out in the recommendations above). International experience suggests that to be fully effective, focused innovation policy must put in place a near complete package of all these features.

Focused innovation policy must, in selected areas of the economy, provide a credible path to material economic impact, which means having:

- governance and implementation processes that develop a shared view in chosen areas of what is needed for success, and build links and collaboration among researchers, firms and government agencies;
- government and private co-funding of initiatives to bring forth common and realistic perspectives on opportunities for success;
- a focus on new activities (rather than support for business as usual) combined with a willingness to take an experimental "portfolio" approach, accepting that not all initiatives will succeed;
- transparent monitoring and evaluation of initiatives, adjusting the mix over time; and
- a consistent but adaptive approach to strategic direction that allows sufficient time for innovative initiatives to bear fruit.

To reduce the risk of established interests capturing policy for private benefit, focused innovation policy must also be transparent about the key judgement calls on where to focus effort, as well as the nature, extent, and target of government assistance.

We have reviewed progress with the Government's Industry Strategy and the development of a new vision for the research, science, and innovation (RSI) system (see discussion under Recommendations 8.1 and 8.2). The Commission has also reviewed a small selection of other initiatives of a type that could contribute to effective focused innovation policy.

Overall, the Commission found the Government has yet to establish a complete package of governance, funding, and evaluation arrangements for focused innovation policy. Even so, the Government is implementing a range of initiatives which could provide elements of an effective strategy for focused innovation policy.

High-potential industry transformation plans lack key features of effective focused innovation policy

As part of its industry strategy, the Government, in 2020, identified five "high potential" areas of focus to enable "the scaling up of highly productive and internationally competitive firms". The Government has since made steady progress on developing ITPs in these areas of focus. The work has been led by the Ministry of Business, Innovation & Employment (MBIE) and the Ministry for Primary Industries (MPI). Officials have used advisory, steering, and working groups to develop the ITPs, involving business and union interests, Māori and, in a few cases, academics and researchers. Cabinet approves consultation drafts and final versions of ITPs.

A description of published ITPs follows.

Advanced Manufacturing

The Advanced Manufacturing ITP was published in March 2023 (New Zealand Government, 2023b; O'Riley, 2023). The plan identifies 20 initiatives under six priority areas for future action. The ITP does not focus on advancing specific technologies or product areas. Rather, it sets out a range of sector-wide actions, covering all manufacturing in New Zealand. One initiative (14) intends to "complete a map of current networks of support for advanced manufacturing", while another (15) aims to "develop a preferred model to strengthen networks and collaboration". A further initiative (16) is to "prepare a Business Case for a potential *Aotearoa New Zealand Centre for Advanced Manufacturing Excellence*". Initiative (17) aims to "review, adjust and expand initiatives that link innovation, research and development, and science with commercial outcomes" including the New Zealand Product Accelerator, and other initiatives aligned with Te Ara Paerangi priorities. Budget 2022 appropriated a contingency of $30 million in total for the Advanced Manufacturing ITP to cover the 2022-23 and 2023-24 years (New Zealand Government, 2022c). Initiative (3) includes investigating accelerated depreciation and other mechanisms to increase investments in advanced manufacturing technologies.

Agritech

A refreshed Agritech ITP was published in January 2023 (with submissions invited by April 2023) (New Zealand Government, 2023a). The first Agritech ITP was published in July 2020 (NZPC, 2021). Progress to date has been around:

- better identifying agritech as a potential export sector;
- identifying issues facing the sector;
- supporting participation by New Zealand agritech firms in international trials, facilitating investment in the agritech sector through establishing the Finistere Aotearoa Fund[4];
- and better measuring and publishing the story (used in the United Kingdom) of the New Zealand agritech sector.

Another ITP initiative, working with New Zealand Trade and Enterprise (NZTE), was a regional accelerator programme for nine agritech companies targeting Latin America. Callaghan Innovation and NZTE have also helped showcase New Zealand agritech companies in other markets. Subject to a detailed business case, the refreshed ITP includes a proposed Horticulture Technology Catalyst to build domestic alignment and access to international connections, access to skilled labour and overall critical mass. The ITP sets out other initiatives in six areas, including building "a smart innovation ecosystem through collaboration that attracts international interest" (p. 14). This includes improving access to trialing and testing facilities for agritech solutions. The ITP sets out a high-level framework for measuring progress. Budget 2020 appropriated $11.4 million for the Agritech ITP for the three years to 2022-23. Budget 2022 appropriated a further $5 million for the Agritech ITP in 2023-24 (New Zealand Government, 2022c).

[4] This fund is valued at up to $40 million with half each of this investment coming from New Zealand Growth Capital Partners (established in 2002 by the New Zealand Government) and from Finistere ventures (Finistere Ventures, 2021).

Digital Technologies

The Digital Technologies draft ITP was published in January 2022, with a list of almost 50 actions (New Zealand Government, 2022d). The ITP has a significant focus on skills and talent development (building on the Digital Skills and Talent Plan released in October 2021), growing exports (working with NZTE and Callaghan Innovation), building Māori participation, telling the sector's story, increasing understanding of the economic value of data, developing a strategy for the safe adoption of artificial intelligence (AI) technology, and promoting changes in government procurement to benefit the sector. Budget 2022 appropriated $7.26 million in 2022-23, $7.04 million in 2023-24 and $4.5 million in 2024-25 for the Digital Technologies ITP (New Zealand Government, 2022c).

Food and Beverage

The Food and Beverage draft ITP was published in December 2022 (New Zealand Government, 2022g). The plan proposes 16 actions to achieve four broad transformations. The second transformation is "increasing investment in innovation and attracting capital for growth". Actions under this theme include:

- increasing support for the Food Innovation Network (FIN);
- developing between one and three open-access scale-up facilities in industries with significant opportunity;
- identifying a current entity as the entry point to the food innovation system;
- forming a network of specialist navigators (include Māori navigators) to support businesses with development requirements; and
- mapping and improving access to capital for scaling up.

Other transformations are to strengthen the focus on consumers and markets, build capabilities in the sectors, and tackle regulatory issues to enable food innovation, while protecting Māori interests. Budget 2022 appropriated a contingency for the primary sector ITPs of $7 million in 2023-24, $15 million in 2024-25 and $14 million in 2025-26 (New Zealand Government, 2022c).

Forestry and Wood Processing

The Forestry and Wood Processing ITP was published in November 2022 (New Zealand Government, 2022f). The plan sets out almost 40 actions in 12 priority areas. These areas include driving science and innovation across the sector, using data and analysis to lift performance and innovation, increasing the use of technology, and increasing the manufacture of advanced wood-based products. The ITP also proposes actions around developing the future workforce, building on the work of the Forestry and Wood Processing Workforce Action Plan. Budget 2022 appropriated $4 million in 2022-23 for the Forestry and Wood Processing ITP, and a share of the primary sector ITP contingency in later years (New Zealand Government, 2022c).

Assessment of ITPs

Despite useful progress, the industry strategy and the five "high potential" ITPs lack key features we have recommended for effective focused innovation policy. While these ITPs are at different stages of development (with some still in draft form), none of the ITPs yet has sufficient funding to support material innovation effort likely to make a significant economic impact. Lack of sufficient funding has adverse consequences for effective policy.

- With only a few exceptions, research and academic organisations do not appear to be significantly engaged in the design and implementation of the ITPs. The exceptions include the Crown Research Institute (CRI), Scion, which has participated in the Forestry and Wood Processing ITP; leaders from the New Zealand Product Accelerator, who participated in the Advanced Manufacturing ITP; and leaders from FIN and from Massey University Food HQ, who participated in Food and Beverage ITP.
- None of the ITPs has yet identified and put in place innovation initiatives that have drawn in substantial co-funding from businesses, suggesting they are still far from making a demonstrable economic impact.
- Governance of the strategy for each ITP is still effectively in the hands of Cabinet, which approves the final form of ITPs on the advice of officials (albeit considering advice from stakeholder groups).
- ITPs tend mostly to set out actions which cover their whole respective sectors, with a reluctance to choose specific areas for more focused innovation effort. A few ITPs plan to identify areas for focused effort, and to investigate specific innovation infrastructure (such as expanding "product accelerator" provisions, or the Food Innovation Networks), but these are subject to further work and have uncertain outcomes in terms of future resources.
- Most of the government funding allocated to ITPs is likely to be taken up by government officials implementing the identified actions and initiatives.
- In areas covered by the two primary sector ITPs, major government-supported innovation effort is taking place largely separate from the work of the ITPs. This calls into question the role of the ITPs in leading transformative innovation.
- The industry strategy as a whole – and individual ITPs - continue to lack a clear and well-resourced focus on monitoring and evaluation.

Other innovation policy initiatives

We reviewed a small selection of other initiatives that have some of the key features of focused innovation policy. While these initiatives are promising, they lack some features – such as overall governance arrangements, or well-formed links with other initiatives – that would make them a more integral part of an overall economic strategy.

Centre for Climate Action Joint Venture

The Centre for Climate Action Joint Venture, announced by the Government and industry partners in October 2022, has the scale, mission, and ambition of focused innovation policy we envisaged in our *Frontier Firms* report. The initiative could form part of a suite of National Research Priorities (NRPs) if these were already in place. Instead, the announcement of the joint venture has largely passed under the radar of the current thrust of both industry and RSI policy. This is illustrative of the fragmentation often characterising current approaches.

The Government and industry partners set up the joint venture to tackle on-farm greenhouse gas emissions, as part of the establishment of the Centre for Climate Action on Agricultural Emissions. ANZCO Foods, Fonterra, Ngāi Tahu Holdings, Ravensdown, Silver Fern Farms and Synlait are participating with the Government in the 50:50 long-term joint venture. The Centre combines the new joint venture with the existing New Zealand Agricultural Greenhouse Gas Research Centre (NZAGRC) (created in 2009). The board of the joint venture, chaired by Sir Brian Roche, brings together senior leadership experience in the primary industries, research science and innovation, mātauranga Māori and government (Centre for Climate Action on Agricultural Emissions, n.d.).

The joint venture will drive a targeted research and development programme, support the pathway and uptake of new tools and technologies, and develop partnerships and raise funds to finance the development of potential solutions to reduce agricultural emissions. Current research at the Centre includes jointly funded research on beef and lamb genetics, and on the development of a methane-inhibiting bolus for ruminants (Centre for Climate Action on Agricultural Emissions, n.d.).

“Initial indicative commitments would see around $172 million invested over the next four years by industry and government to develop and commercialise practical tools and technologies for farmers” (Minister of Agriculture (Hon Damien O’Connor), 2022). Industry partners in the joint venture have made indicative commitments that will rise to around $35 million in 2025, matched by the Government. The Government’s contribution is part of almost $340 million in funding over four years, announced in Budget 2022, to strengthen the role of research and development in reducing on-farm emissions.

The Government is also working with the NZAGRC to attract PhD and post-doctoral students into this area of research. It will invest $9 million over six years for this purpose (Centre for Climate Action on Agricultural Emissions, n.d.).

Sustainable Food and Fibres Futures fund

The Sustainable Food and Fibre Futures (SFF Futures) fund has substantial overall scale and draws in economically significant industry co-funding. Even so, it lacks a strong overall strategic focus, and has only indirect connections with the primary sector ITPs. According to some industry participants, the SFF Futures fund is light on support for food processing as opposed to growing and gathering food. The SFF Fund’s predecessor, the Primary Growth Partnership, included a strong commitment to evaluate funded initiatives, and the overall performance of the fund (NZPC, 2021, p. 137). Such a commitment is not yet evident for SFF Futures projects although MPI officials have assured us that evaluation will be rigorous. The officials have also recently promoted the fund to food processors which has stimulated applications from them (pers. comm. 26 April 2023).

The Government established the SFF Futures fund in 2018, to replace the Primary Growth Partnership fund and the Sustainable Farming fund. The SFF Futures fund provides co-funding for a deliberately broad range of primary sector research projects. Budget 2022 appropriated $68 million for the SFF Futures fund in 2022-23. MPI expects private sector co-funding in the order of 60% for projects expected to have commercial outcomes. Funded projects can range from small (costing around $100,000) and short-term, to large multi-million and multi-year programmes of research (Ministry for Primary Industries, n.d.).

MPI, assisted by an advisory group, assesses eligible projects against nine criteria which include sustainable benefits to New Zealand, innovation that is beyond business as usual, a clear path to market or other application, the ability to deliver, good governance, the fit with relevant government strategies, and reflection of Te Tiriti o Waitangi partnership. Benefits to New Zealand can be environmental, economic, social, or cultural.

The SFF Futures fund Investment Advisory Panel comprise six members with extensive primary sector business and research experience, including Māori business experience. MPI makes the final decision on projects where the government contribution is less than $1 million, with the Minister of Agriculture making the final decision on projects larger than that.

The Innovative Partnerships programme

Innovative Partnerships is a programme led by MBIE. Though relatively small in scale, the programme has features that could contribute strongly to focused innovation policy in chosen areas. Innovative Partnerships attract world-leading technology companies to base operations in New Zealand, and therefore contributes to developing innovation ecosystems here.

MBIE runs the Innovative Partnerships programme to help R&D intensive foreign businesses connect, collaborate, and invest in New Zealand (MBIE, 2022a). Budget 2022 appropriated $9 million in 2022-23 for the programme, half of which is to fund its administration (New Zealand Government, 2022a).

The aim is to attract international businesses using world-leading technologies to take up opportunities for product development in New Zealand. MBIE helps such companies make connections with relevant New Zealand businesses, agencies, research organisations and universities. The programme promotes New Zealand's advantages as a location for innovation – pointing to its skilled workforce; favourable regulatory environment for businesses and for testing new technology; policies to support innovation through grants, assistance in kind, tax credits, and the availability of investment visas.

The Innovative Partnerships programme has worked with a variety of international companies, often through signing memoranda of understanding. Partners include Axiom Space (a US firm that builds space programme infrastructure), the Japanese gaming development company JP (which is working with the New Zealand Centre for Digital Excellence in Dunedin), Maxar Technologies (a space and data analytics company), Wisk (a California-based company developing electric air taxi technology), Shiratori, a Japanese pharmaceutical and high-value nutrition company (working with AgResearch on probiotic bacterium products), and Airbus (which has signed a letter of intent around testing its unmanned aircraft technology in New Zealand).

Recent expressions of the Government's economic strategy put less emphasis on focused innovation policy

We have reviewed recent communications on the Government's high-level economic strategy. Earlier advice on the strategy (in the context of Budget 2022) recognised the importance of focused innovation policy. More recently, in September 2022, the Government released an economic plan that emphasised the need for innovation across "all businesses" in the economy (although it also referenced a range of specific initiatives, such as the ITPs) (New Zealand Government, 2022e). The Government appears to be working to implement existing initiatives in its industry strategy, rather than taking stock and launching a fresh approach based on the recommendations made in *the Frontier Firms* inquiry.

Recommendation 7.3: Skills and capabilities for focused innovation policy

The Government should partner with other stakeholders to develop and implement a strategy to build the skills and capabilities within the public sector and more widely to successfully implement its focused innovation policies. The strategy should draw on experience already available in New Zealand and internationally in the devolved governance and operation of multi-stakeholder economic development programmes.

The Commission has not identified specific initiatives to build skills and capabilities to successfully implement the Government's focused innovation policies. International experience suggests such skills are built up over time through a well-monitored and experimental process that retains institutional knowledge and skills over extended periods of years or even decades. Most comparator small advanced economies have long experience with designing and implementing focused innovation policy and have built a culture and understanding of how to do it effectively (Crawford, 2021).

As noted under Recommendation 7.1 and Recommendation 7.2, in developing ITPs, officials have gained experience in collaborating with counterparts in business, worker organisations, research institutions and educators to get a shared picture of strategic directions. The Government should use this learning to carry forward focused innovation policy – with more attention to developing devolved governance arrangements for substantial, jointly-led innovation effort.

Recommendation 7.4: Strengthening innovation ecosystems

The Government should:

- review its funding channelled through Callaghan Innovation and New Zealand Trade and Enterprise, including funding targeted at individual firms to support innovation and exporting; and
- design and implement policies and mechanisms to give greater weight to strengthening the innovation ecosystems in areas of focused innovation policy.

The purpose of this recommendation from the *Frontier Firms* inquiry was to get the Government to align the work of its key agencies for supporting firms to innovate and export with the crucial task of building thriving innovation ecosystems in areas of economic focus. Those agencies are Callaghan Innovation and New Zealand Trade and Enterprise (NZTE). This alignment would be part of what is needed across government to support a strategy of focused innovation. As noted in our main follow-on review document, while government programmes across various domains need to serve all users, they must be of excellent quality, and aligned with requirements in the areas of focus. This is especially so for innovation and exporting, which are central to the overall economic strategy we argued for in our *Frontier Firms* report.

Callaghan Innovation has responded to the *Frontier Firms* report by including in its new strategy the concepts of frontier firms and areas of focus (it calls them "sectors with high potential") and has started a Frontier Ventures programme. "Frontier ventures" is Callaghan Innovation's term for frontier firms, "the most productive and innovative New Zealand businesses, with a global outlook and huge export potential." (Callaghan Innovation, 2022b, p. 2) Callaghan Innovation also states that it will "focus on high potential sectors which provide a mechanism to offer targeted innovation support aligned with Government priorities, such as ITPs or research priorities". (Callaghan Innovation, 2022b, p. 2) Callaghan Innovation is therefore trying to build into its strategy and programmes the vision of frontier firms and innovation ecosystems in areas of focus. Yet, until the Government is clear on its priorities, Callaghan Innovation will have to guess these, or choose what they are.

As noted under Recommendation 5.2, the Government, in response to the *Frontier Firms* report, instituted an Internationalisation Support Review (ISR) led by MBIE working closely with NZTE. The ISR is not focusing on NZTE's potential to strengthen innovation ecosystems. However, it is exploring options for how the International Growth Fund can be used to make a greater contribution to the Government's broader economic objectives (pers. comm. from MBIE 6 April 2023).

NZTE remains committed to its strategy to grow a larger New Zealand cohort of value-adding, at-scale, international companies targeting niches where New Zealand has (or can build) competitive advantage (NZTE, 2022b, 2022a). It deploys most of its resources and support on a sub-set of exporters most likely to fit the characteristics of a frontier firm (or potential frontier firm). This is the NZTE focus portfolio. In addition, and partly as a response to the *Frontier Firms* report, NZTE has re-structured and formed three sector teams (Food, Beverage, and Consumer Goods; Technology and Services; and Manufacturing) to support the Government's Industry Transformation Plans (ITPs). NZTE sees ITPs as the Government's chosen mechanism for building areas of focused innovation. (pers. comm. from NZTE 6 April 2023). NZTE leads several ITP workstreams that support innovation and exporting.

NZTE does not exclude industries or sectors of the economy when it chooses firms to offer intensive services to. Yet, it does respond to Government direction to apply a positive weight to certain characteristics such as being a Māori business, or a business offering products and services that lower greenhouse gas emissions. Once areas of focus are agreed, the implementation of Recommendation 5.2 would see NZTE services tailored to the needs of firms in those areas, and for NZTE to apply a preference to serving such firms.

Strategic direction in innovation policy

Recommendation 8.1: Research, science, and innovation strategy governance and alignment

The Government should update and confirm its research, science, and innovation (RSI) strategy to signal its intended innovation effort and direction over the next five to ten years.

The RSI strategy (and a significant quantum of associated funding) should be clearly aligned with the Government's industry strategy.

The Government should develop and put in place transparent arrangements for the governance, implementation, and monitoring of its RSI strategy.

Governance and oversight of the implementation of the Government's RSI strategy should include high-level representation from Government, Māori, industry (firms and workers), researchers and educators.

Recommendation 8.2: Implementing a RSI strategy

The Government should engage with other stakeholders (researchers, educators, industry (firms and workers) and Māori) to develop a transparent implementation plan for its research, science, and innovation (RSI) strategy. After initial engagement, the Government should publish a consultation draft and invite submissions from stakeholders. The implementation plan should cover (among other things):

- how the areas for action under the RSI strategy will be resourced and over what timeline;
- how a significant quantum of resource under the RSI strategy will be aligned with the Government's industry strategy;
- proposed changes to policies and practices (including funding criteria) that will better achieve the objectives of the RSI strategy;
- which agencies will take the lead on the actions; and
- arrangements to monitor and evaluate initiatives and the overall success of the RSI strategy.

The Te Ara Paerangi process has replaced the draft RSI strategy

At the time of the *Frontier Firms* inquiry, the Government had published a draft RSI strategy (MBIE, 2019a). The *Frontier Firms* report recommended that, in finalising the draft RSI strategy, the Government should clearly align it with its industry strategy and assign a significant quantum of RSI resources for that purpose. Subsequently, the Government replaced the draft RSI strategy with a new approach to designing a future RSI system - Te Ara Paerangi: Future Pathways.

In 2021, the Government issued its Te Ara Paerangi Green Paper on the future of the RSI system. After receiving extensive submissions, it published a White Paper in December 2022 (New Zealand Government, 2022h). Te Ara Paerangi sets out a high-level roadmap to enable the RSI system to better meet the needs of New Zealanders, now and into the future (albeit leaving details on resourcing, policy processes and implementation for later decision).

The Government aims to increase investment in innovation; grow connections between research, industry, and other end-users; increase investment in and deliver greater impact for Māori and Pacific people; attract more international investment and promote more international collaboration on innovation; and better attract and retain a skilled RSI workforce.

These aims reflect an assessment that New Zealand’s RSI system is currently too small and fragmented, lacks system-wide direction, and is insufficiently responsive to evolving national needs. The White Paper also identifies under-representation of Māori and Pacific people in the workforce and women in senior roles; lack of career stability; and the need for more diverse pathways between academia and the industry, government, health, and social sectors.

Over time, the Government will also review the form of and funding arrangements for public research institutions – such as Crown Research Institutes (CRIs) – and make changes that better enable them to contribute to the Te Ara Paerangi vision.

National Research Priorities could be a vehicle for focused innovation policy

Te Ara Paerangi sets out the Government’s intention to establish National Research Priorities (NRPs) to align resources and focus collective action on areas of critical importance. The Government is designing a process for choosing NRPs and implementing them over the next several years. It intends to channel a greater proportion of RSI resources to mission-led research to tackle social, environmental, and economic challenges and opportunities.

Te Ara Paerangi could be a vehicle for focused innovation policy, as envisaged in the *Frontier Firms* report. A subset of the proposed National Research Priorities should be in areas of focus that are chosen to raise firm productivity and export success (while ensuring other wellbeing objectives are met). However, much will depend on the way national research priorities are selected, funded, and implemented in future years. For instance, while Te Ara Paerangi recognises the industry strategy, the extent to which the ITPs will be considered as part of the NRPs is undecided.

Effective monitoring and evaluation should be a key element

Te Ara Paerangi expresses a high-level commitment to increase the impact of an "adaptable" RSI system in achieving societal goals. Adaptability implies effective monitoring and evaluation – both of individual RSI initiatives and programmes, and of the overall strategy – but the White Paper does not say anything substantial about monitoring and evaluating the impact of policies and initiatives, or about adjusting the RSI strategy based on evaluation.[5]

Based on international experience and expert analysis, we strongly recommend the Government adopt an adaptive learning approach to focused innovation policy. Not all initiatives will be successful, and others will meet unanticipated barriers and setbacks that require tackling through changes to policy or regulation or implementing further measures to succeed. Adaptive policy requires a commitment to the monitoring and evaluation of the broad strategy, and of component initiatives.

The Government should take strategic decisions about the balance of research, science, and innovation funding

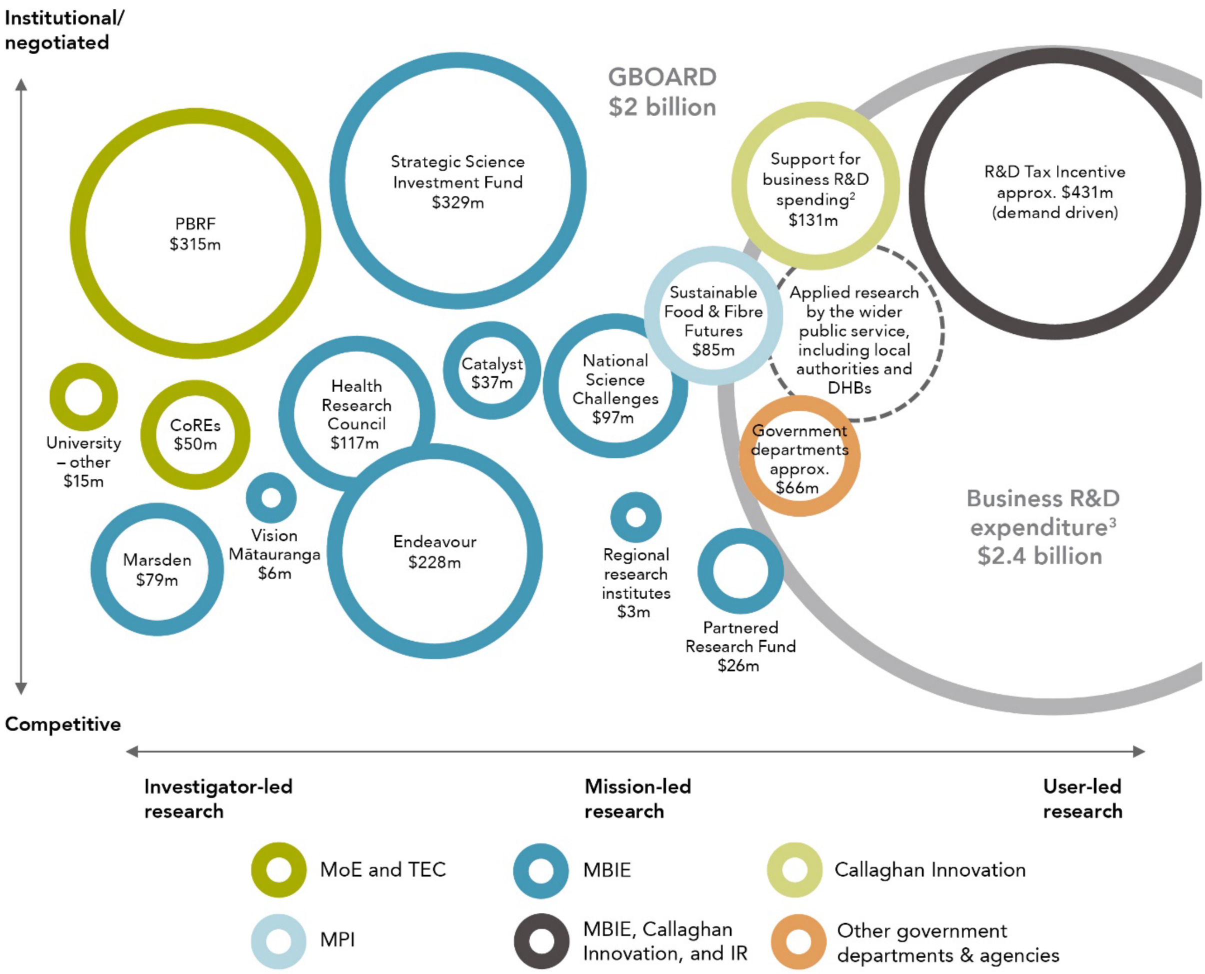
Te Ara Paerangi sets out the Government's intention to increase funding for the RSI system as a proportion of GDP, to increase total (public and private) spending on R&D to 2% of GDP (it stood at 1.4% in 2020) and to move a greater proportion of RSI resources to mission-led research. The Government also faces choices around how much of its RSI resources should support innovative activity that will have direct impacts through higher productivity and export competitiveness. We recommend that, in deciding on NRPs, a high-level governance group set up for the purpose should also help the Government to make choices around the overall balance of RSI funding.

The Government devotes substantial resources to support business R&D

Given the direction set out in Te Ara Paerangi has yet to be implemented, funding for RSI is currently broadly like that described in the *Frontier Firms* report. Figure 3 shows the balance of funding on two dimensions: who determines the topics of government-funded research, and the way in which funding is decided. It also shows which agency administers each of the RSI funds.

[5] MBIE, as a complement to the Government's then draft RSI strategy, published a position paper on the impact of research. "It [did] this by presenting an impact measurement framework, and establishing principles, definitions and measurement approaches. It also [set] out MBIE's expectations for public research funders, public research organisations and researchers" (MBIE, 2019b, p. 1). MBIE advises that this work is being taken forward through the Te Ara Paerangi process (pers. comm. 17 March 2023).

Figure 3: Projected funding for research, science and innovation, 2021-22



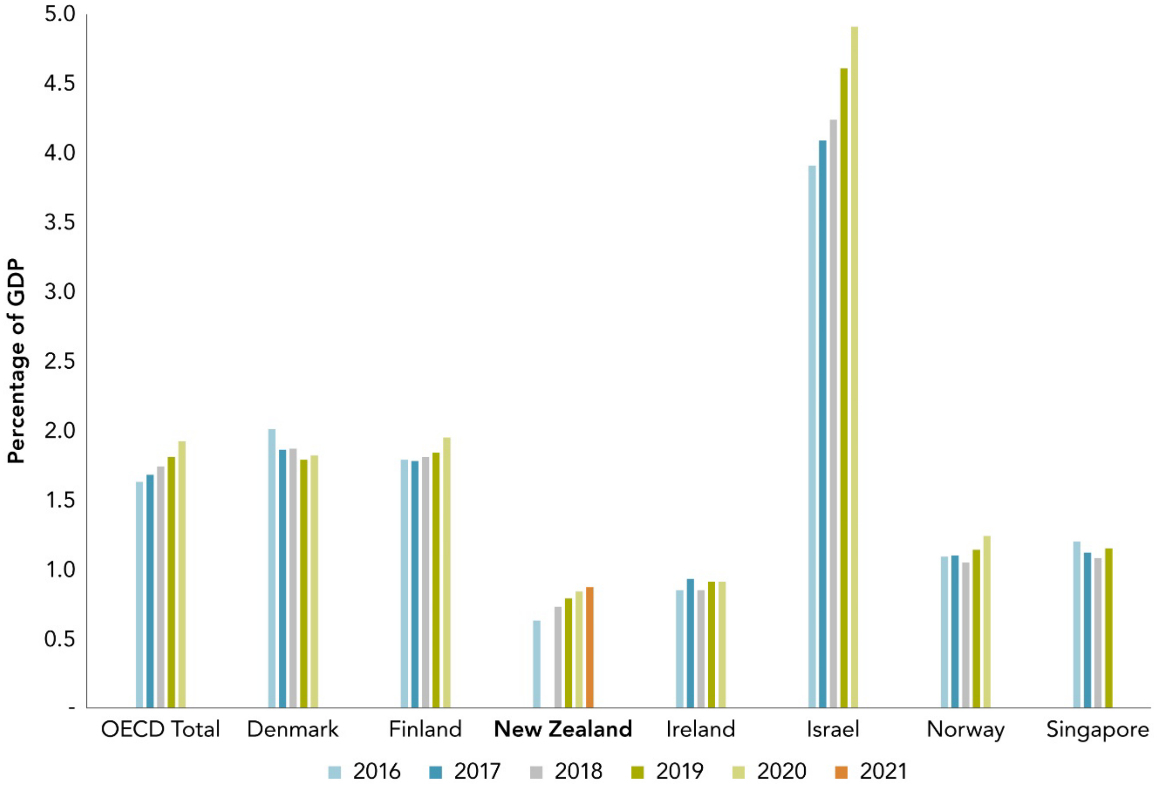
Source: MBIE, updated from MBIE (2019a)

Notes:

1. Dollar amounts represent appropriations used in the GBOARD (Government Budget outlays and appropriations on R&D) calculation. The figure reports projected funding for the 2021–22 financial year, to exclude recent one-off funding in response to COVID-19.
2. Support for business R&D spending, delivered by Callaghan Innovation, includes R&D grants, services, and repayable loans. It excludes the R&D Growth Grant, which no longer accepts applications: the R&D Tax Incentive has replaced it.
3. Business expenditure on R&D is based on the Business R&D survey.
4. Funds that support investigator-led research mostly go to universities and research institutes, and funds that support user-led research mostly go to innovative firms.
5. Abbreviations: CoRE: Centre of Research Excellence, DHB: District Health Board, IR: Inland Revenue, MBIE: Ministry of Business, Innovation and Employment, MoE: Ministry of Education, MPI: Ministry for Primary Industries, PBRF: the Performance-Based Research Fund, TEC: Tertiary Education Commission.

Stronger growth in business expenditure on R&D (BERD) is the most significant change from the projections for 2021–22 in Figure 3. BERD stood at $2.8 billion in 2021 – $400 million higher than projected in Figure 3 (Stats NZ, 2022). Even so, while BERD as a proportion of GDP has risen strongly in New Zealand over the last five years from a low base, it remains well below BERD in comparable SAEs, and in the OECD overall (Figure 4).

Figure 4: Business R&D (BERD) as a percentage of GDP - selected countries



Source: OECD Main Science and Technology Indicators (MSTI). OECD.Stat

Notes: Figures from some countries may pertain to the previous year.

Strategic choices around support for non-R&D innovation

The *Frontier Firms* report noted "innovation involves far more than developing new products or new production technologies. It includes changes in supply chains, distribution networks, marketing and markets, and the network of relationships among researchers, firms, and other economic actors" (NZPC, 2021, p. 89). Innovation in this broad sense can have broader economic benefits than those created by R&D alone.

Innovation is a learning process, as pioneer firms discover what they can produce and export successfully. This benefits other firms that follow in their footsteps, perhaps making their own adjustments to business activity (Hausmann & Rodrik, 2003). For instance, learning may involve adapting existing international technologies to New Zealand's circumstances, or it may involve discovering how to build effective supply of suitable quality inputs.

Successful innovation may also require the establishment of shared facilities or the co-ordination of investment across government, business, researchers, and educators. Stalemate can happen when no single firm has the incentive to resource "industry goods", or to make investments in the absence of necessary things like public infrastructure, skilled workers, regulation, or complementary investment by other firms.

Difficulty in coordinating investments, plans and regulatory settings can mean the potential for beneficial social and economic outcomes is not realised. Current settings in the forestry and wood processing industry illustrate this. The industry exhibits:

- harvesting technology that leaves waste biomaterials with adverse environmental, economic and social impacts;
- a strong contribution to meeting New Zealand's net greenhouse gas emissions-reduction commitments;
- an impending shortage of forestry-derived biomass for existing and new products with environmental benefits; and
- available technology to expand such uses, and to produce high value biochemicals.

Current government and industry-led initiatives (including the Forestry and Wood Processing ITP) do not yet seem well organised to make the necessary collective strategic choices. These require decisions around regulation, complementary technologies, scale and the combination of business and government actions that will realise the potential for better economic, social, and environmental outcomes in forestry and wood processing.

Strong arguments exist for extra focus and effort in areas where this sort of innovation effort is likely to have wider societal and economic benefits. In the manner described earlier, the Government should facilitate focused innovation areas, and contribute funding, taking these benefits into account. Where business commercial interests are involved, those businesses should also make a substantial contribution.

Balancing support for the "new" with realising the innovation potential of existing technologies and industries

Another tension revolves around whether NRPs should support new technologies and even new industries, or whether they should support innovation in existing industries. We have heard concerns that current decision-making processes around priorities (for instance in the Government's industry strategy) do not allow sufficient weight for the "new" and risk capture by the "old" (existing technologies and industries).

Innovation is complex, cumulative, risky and path dependent (and somewhat unpredictable) (NZPC, 2021). The economic complexity literature finds innovation resulting in successful exporting will most likely build on an economy's existing capabilities (Hausmann et al., 2014). Existing capabilities are embodied in current economic activity and in the innovation ecosystem that supports that activity (including government provision of infrastructure, regulation, education and training, supply networks; and knowledge of markets).

Existing industries and technologies can be the platform for productivity-enhancing innovation and export success. A sizeable existing industry (for example, the food and beverage industry in New Zealand) can provide a platform for rapid development and application of new processes and new technologies with substantial economic impacts.

Even so, successful innovation may also arise in technologies that are apparently novel to New Zealand (see discussion under Recommendation 7.1 and Recommendation 7.2). Other capabilities of the innovation ecosystem – such as supportive regulation, availability of a skilled workforce, existence of suppliers of inputs to production, and complementary infrastructure investments – will be part of the attraction for new technologies.

Fears about the risk of capture of government resources by vested interests underlie some of the reluctance to fund more innovation in traditional industries. The *Frontier Firms* report outline strategies to mitigate the risks of capture. These include maintaining a relentless focus on innovation; transparency about choice of areas for focus; transparency about the nature, extent, and target of government assistance; a requirement for business co-funding for initiatives; and transparent monitoring and evaluation of initiatives (NZPC, 2021; Rodrik, 2008).

In practice, a considerable proportion of the Government's RSI expenditure does support innovation in existing primary industries (through the SFF futures fund and primary-sector CRIs). However, as argued above, this expenditure could achieve greater impact through focused innovation policy given effect through well-selected NRPs. Whether more support from RSI expenditure should be afforded to stimulate innovation in other existing New Zealand industries is a matter for strategic judgement.

Balancing "business pull" with "science push"

We have heard arguments that current funding policy and institutional arrangements place insufficient emphasis on "business pull" as opposed to "science push" as a significant driver of productivity-enhancing research and innovation effort. The Te Ara Paerangi White Paper signalled an intention to increase links between research organisations and industry end-users, and, over the next three years, to strengthen support for commercialisation. This includes possibly expanding and adding to existing "entities and networks" such as the New Zealand Product Accelerator and KiwiNet (which links businesses and university researchers), and the Health Tech Activator (New Zealand Government, 2022h, p. 40). The Food and Beverage ITP looks at expanding the Food Innovation Network, while the Advanced Manufacturing ITP proposes expanding initiatives like the New Zealand Product Accelerator. More generally, universities are a large and incredibly important source of research excellence, yet a challenge exists to use that excellence for greater impact and benefit for Aotearoa New Zealand.

Proposals in the White Paper for expanding initiatives to increase the impact of "business pull" on New Zealand's RSI effort do not yet have a clear path forward. The choice of NRPs to give effect to focused innovation policy should include attention to how to carry these proposals forward.

Setting National Research Priorities is opportunity to rebalance government support for research, science, and innovation

The Government has not yet made clear strategic choices around where the balance of its support for RSI should lie. Choices include what proportions of support should be for:

- mission-led research;
- implementing technologies that are new to New Zealand vs supporting innovation in existing technologies;
- non-R&D business innovation; and
- initiatives that facilitate “business pull” in shaping public research effort.

The Te Ara Paerangi process, combined with expert high-level governance arrangements for the choice of national research priorities, provides the Government with an opportunity to make clear and considered strategic choices around the balance of its support for RSI.

Recommendation 8.3: Independent review of innovation policies

The Government should commission a comprehensive independent review of New Zealand’s innovation policies. The review should consider:

- the Government’s full range of objectives for its innovation policy, but pay particular attention to the objective of increasing the success of frontier firms in exporting in areas of sustained competitive advantage;
- New Zealand’s circumstances as a small advanced economy and how this shapes a preferred approach to innovation policy;
- the role of mātauranga Māori in New Zealand’s innovation ecosystem; and
- the broad range of policies that impact export success.

A review panel should have expertise in assessing the scope, shape and resourcing of innovation policy and the governance of innovation institutions and processes, as well as a thorough knowledge of New Zealand’s existing institutions and innovation policies. It should have experience in assessing the effectiveness of innovation policies in small advanced economies. It should draw on expertise in mātauranga Māori and on Te Ao Māori.

The Government has not commissioned an independent review of the New Zealand’s innovation policies. Instead, it has used the Te Ara Paerangi process to review and set strategic directions for the RSI system (as described in the discussion of Recommendation 8.1 and Recommendation 8.2).

Talent and leadership

Recommendation 9.1: Closer research-industry collaboration on skills

Collaboration between research institutions and industry for the purpose of developing skills should be improved and scaled up as part of a focused innovation policy process.

The Government has not yet clearly established areas of focus for innovation policy and so has not used such an approach to strengthen collaboration between research institutions and industry. Research organisations, with some exceptions, are not substantially involved in the work of ITPs (see discussion of recommendations Recommendation 7.1 and Recommendation 7.2). In addition, the Government has yet to identify national research priorities (NRPs) under the Te Ara Paerangi process (see discussion of recommendations Recommendation 8.1 and Recommendation 8.2).

In higher education, an example of targeted skills development is the Centre for Climate Action to find ways to lower agricultural emissions. As part of the Centre, the NZAGRC is funding a strong programme of PhD and post-doctoral research in the area (see under "Other innovation policy initiatives under Recommendation 7.2 for more information about the Centre). This is an example of the approach we envisaged in making Recommendation 9.1.

The Te Ara Paerangi White Paper recognises the need to improve career pathways for young researchers including reducing the current overreliance on short-term and casual contracts. It notes stable and rewarding career pathways are needed to attract and retain a talented and diverse workforce (New Zealand Government, 2022h, p. 29). This includes the possibility of applied or industry PhDs (p. 48 of the White Paper). The White Paper also recognises the need to "facilitate researchers to address the challenges" reflected in the NRPs (p. 38), yet it does not include a concrete plan to achieve this desirable goal.

Recommendation 9.2: Management and leadership skills

A range of government-funded support for building firm-level management and leadership skills are already in place. Existing and pilot programmes should be evaluated for their effectiveness before additional schemes are developed or rolled out.

The Government should identify opportunities for improving its support for building firm level ordinary and dynamic management capabilities. It should do this through a collaborative process involving industry, central and local government, iwi and Māori business interests, and private-sector providers.

Proposed new programmes in the food and beverage sector

The draft food and beverage industry transformation plan (ITP) proposes programmes to build the sector's workforce capabilities in leadership skills, and innovation and entrepreneurship. Proposed actions are:

- working with MPI, industry and Māori to expand the reach and accessibility of relevant courses and programmes;
- establishing an annual leadership programme for emerging sector leaders, including a specific pathway for Māori, and
- establishing food and beverage internship placements for industry graduates in existing overseas programmes[6], including a specific pathway for Māori, and connecting these students to domestic food and beverage employers when they return to Aotearoa New Zealand (New Zealand Government, 2022g).

A pilot programme to build dynamic capabilities for innovation

As noted under Recommendation 7.4 above, Callaghan Innovation has restructured its activities to focus more on frontier firms ("frontier ventures"), and small, innovative ventures that have the potential to reach the frontier within five years (high potential sectors and Māori innovators). It will provide intensive, wrap-around support for the 1,000 highest impact customers across these two groups (Callaghan Innovation, 2022b).

One of Callaghan Innovation's new services currently being developed is dynamic capabilities training, to help build innovation and commercialisation skills (Callaghan Innovation, 2022b). The programme has so far been piloted with a cohort of 24 business leaders from 12 firms. Ten firms completed the programme. The pilot involved three full day workshops, three coaching sessions and three cohort sessions.

[6] Existing programmes include the Prime Minister's Scholarships, Centres for Asia Pacific Excellence, Asia NZ Foundation and the International Horticulture Immersion Programme.

Callaghan Innovation undertook a review of the programme through interviews and surveys of participants (Callaghan Innovation, 2022c). Measured outcomes were self-assessed use of dynamic capabilities, changes implemented to managerial and personal routines, and impacts after six months (commercial pivots and new partnerships). It found 75% of participating firms reported a change in innovation routines and two-thirds changed their management routines and decision making, based on learnings from the programme. Seven businesses reported specific positive outcomes attributable to the programme. The overall Net Promoter Score was 45.

The organisation is now looking to roll out a second pilot to continue development of the programme, test the size of the market, and explore different co-funding models for the programme.

No evidence of systematic evaluation of existing programmes

A best practice approach to evaluation includes independence (evaluations being conducted by external evaluation experts) and transparency (through publishing evaluation reports). In our discussions with a range of government agencies, we did not find evidence of a systematic approach to evaluating existing programmes before introducing new schemes.

Robust evaluation disciplines are important for ensuring interventions are meeting their objectives. They can also inform the rationalisation of supports, by indicating which programmes are not effective or do not represent good value for money.

The new pilot programme for building dynamic capabilities, run by Callaghan Innovation, shows promise. However, in the absence of systematic monitoring and evaluation, and rationalisation of support, even if this programme proves to be successful, its visibility and effectiveness could be lost in the existing clutter of programmes.

Recommendation 9.3: Review of migration policy

The Government should commission a review of migration policy. The review should:

- consider the optimal level and mix of permanent and temporary migrants to support innovation and productivity, in the context of a broader population strategy; and
- assess the role and objectives of migration policy, together with New Zealand's education and training system, in meeting firms' demand for labour.

The review should consider how migration policies can best contribute to attracting and retaining the right skilled migrants to grow New Zealand's current and future frontier firms. This would include migrants with needed expert research and technical skills, as well as entrepreneurs, investors, and experienced business leaders.

The review should also look at how to reduce inflows of low-skilled and temporary migrant workers over time. As part of this, the review should consider the aspirations of New Zealanders to attain higher skills and education, and jobs commensurate with their skills.

The *Frontier Firms* report noted that, despite large inflows of immigrants over the 10 years leading up to the COVID-19 border closures, shortages of skilled labour continued. The border closures exacerbated the shortages, and these remain despite borders re-opening in 2022. "This suggests an ongoing mismatch between the supply of labour and the needs of firms, that is not being met either by the domestic education and training system, or by skilled migration" (NZPC, 2021, p. 156).

We also found a mismatch exists at the lower-skilled end of labour supply and some New Zealand industries, including the primary sector, rely heavily on temporary migrant labour to meet their seasonal employment needs. We describe what has been happening to tackle this issue in the section below on "R9.4 Reliance on seasonal migrant labour".

More generally, we saw the issue of employers having easy access to lower-cost and relatively unskilled migrant labour as a potentially serious barrier to firms innovating and investing in automation to achieve higher productivity. Alongside changing immigration settings to reduce inflows of low skilled and temporary migrant workers, the Government's role could "include supporting industries to accelerate the development of automation and other labour-saving technologies, build the necessary skill base for higher-tech production practices, and make jobs more attractive to domestic workers" (NZPC, 2021, p. 160).

These concerns led us to recommend the Government should:

- commission a review of migration policy (Recommendation 9.3);
- work collaboratively with industries that currently rely on seasonal migrant labour, to develop a planned transition away from such reliance (Recommendation 9.4); and
- commission empirical studies to assess the impacts of working holidaymakers, international students, and workers in the Recognised Seasonal Employer (RSE) scheme on local labour markets, automation, and productivity (Recommendation 9.5).

The Government has undertaken a "rebalancing" of its immigration settings

Following our recommendation (Recommendation 9.3), the Government conducted its own immigration policy "rebalance" and asked the Commission to hold an inquiry into immigration policy settings.

The initial billing for the Government's intended major reform was a "reset" but this was changed to "rebalance" to suggest something less radical. Even so, the changes announced in May 2022 were significant. The intent of the rebalance is to make it easier to attract high-skill migrants, especially those in global shortage, "while supporting some sectors to transition to more productive and resilient ways of operating, instead of relying on lower-skilled migrant workers" (Immigration New Zealand, 2022a, p. 1).

The rebalance, as announced, has the following main features.

- A new Accredited Employer Work Visa system making it easier for accredited employers to apply and get approval for new migrant workers especially those in priority skill categories.
- A Green List of priority high-skilled, hard-to-fill occupations (eg, in the construction, engineering, health and ICT sectors) for immediate permanent residence with no cap, plus a second list with no cap but qualifying for permanent residence after two years in New Zealand (eg, medical technicians, nurses, midwives, electricians, plumbers and dairy farm managers).
- A wage threshold at the median wage (around $28 per hour) but with carve-outs for some lower paid occupations experiencing shortages (eg, for workers in the care, tourism, hospitality, and horticulture industries) to give those industries time to adjust. Those workers are to be paid a minimum of $25 per hour.
- Automatic open work rights for partners of migrants who qualify under the Green List or who are paid at least twice the median wage.
- All migrants on an Accredited Employer Work Visa who earn twice the median wage or more can qualify for residence after two years.
- Online and faster applications and approvals for the new Accredited Work Visa.

In addition to these features and in response to COVID-19 border closures exacerbating labour shortages, the Government created a special, one-off 2021 Residence Visa as a "streamlined pathway to residence for most temporary migrant workers already in New Zealand, and their offshore partners and dependents" (Immigration New Zealand, 2022a, p. 5). The numbers involved are large – up to 200,000 people were included in applications up to May 2022.

The stated intent of the rebalance to encourage high-skilled migrants and boost productivity in industries reliant on low-skilled, low-waged migrants is in line with arguments we made in the Frontier Firms report. However, business, and other organisations have strongly pushed the Government for continued access to lower-skilled migrants to fill job vacancies. These pressures have led to expansion of the Green List and to more and longer carve-outs from the wage threshold. In addition, Working Holiday schemes, the RSE scheme, and student work visas – which are the main sources of lower-skilled and lower-paid labour – are either to continue or have been expanded (see below under "R9.4 Reliance on seasonal migrant labour").

As described under "R5.1 Foreign Direct Investment", in September 2022 the Government launched a new Active Investor Plus visa that changes the conditions for migrants seeking residence through committing to invest in New Zealand. The changes involve a shift away from allowing passive investment, for example in bonds, to encouraging active investment in high-growth businesses. This is a desirable shift, but it is too soon to know whether the programme will result in a greater flow of talented investors and entrepreneurs to New Zealand.

The Government also asked the Productivity Commission to conduct an immigration inquiry

In May 2021, the Government asked the Productivity Commission to undertake an inquiry into "immigration settings for New Zealand's long-term prosperity and wellbeing". In this inquiry we carried out extensive reviews of existing research, conducted and commissioned new research, consulted widely, invited submissions on an issues paper and our preliminary findings and recommendations, and published a final report in April 2022 with 24 recommendations (NZPC, 2022b).

Important characteristics (relevant to the *Frontier Firms* inquiry) of a successful working-age immigration policy

- Immigration policy should support and complement opportunities for local residents and workers and the development of their skills. Immigration that simply replaces or substitutes local supply of skills and experience will not raise the long-term levels and diversity of human capabilities, nor overall prosperity and wellbeing.
- Policy needs to be flexible and adaptable to change. The sort of skills, experience, and capability a country needs in one period are not necessarily the same as what is needed later.
- Policy and practice should prioritise people who are most likely to make the greatest contributions to the country. The number of people who can be accommodated at any one point in time will always be limited. Given this, New Zealand should seek people who will make the largest positive impact, broadly considered across the various dimensions of wellbeing.
- Policy needs to be consistent with other government policies, and particularly those regarding education, training, workforce development, and absorptive capacity considerations.

Findings relevant to the *Frontier Firms* inquiry

- Immigration is not likely to be the solution nor the cause of New Zealand's productivity challenges.
- On average, immigration is not driving down wages nor displacing local workers, but this can occur in particular locations and times for some workers. Alongside this, however, if firms have easy access to low-cost migrant labour, this can reduce the need for them to raise wages to attract local workers, or to innovate and invest in capital equipment to raise productivity. It can also disincentivise locals to train for these positions and discourage employers from investing in training locals. Finally, high volumes of migrants can stretch absorptive capacity and harm the wellbeing of residents and migrants.
- Currently, no consistent feedback mechanisms are evident to link skill shortages in the immigration system to potential responses in the education and training system. This inconsistency limits the likelihood that the education system will meet employers' needs and weakens accountabilities on employers to train and develop local workers.
- The immigration system has an important role in helping to develop innovation ecosystems in areas of economic activity on which New Zealand is focusing to achieve superior productivity performance. This role would encourage the entry of top talent – migrants with the skills, knowledge, smart capital, and international connections to help innovation ecosystems become world class.
- A flat-rate levy on all temporary migrant labour could be a better tool than a wage threshold (even though both are blunt) to manage low-skilled migration, because it would not exclude low-skilled yet highly valued migrant labour. For instance, the migrants could be highly valued because they complement local workers and technology in the production of goods and services of high value.
- Tying migrants to a single employer can harm productivity by preventing workers moving to firms where they can be most productive. It can also harm migrants through increasing employers' power over them, which in some cases lead to exploitation.

Key recommendations relevant to the *Frontier Firms* inquiry

- Publish an Immigration Government Policy Statement (GPS) to clarify how immigration will be managed and connected to other government objectives, including what investment will be made in absorptive capacity.
- Create stronger links with education and training policies through the GPS and by requiring Workforce Development Councils to report on how demand for migrant labour and skill gaps inform their training priorities.
- Reduce the use of Skills Shortage Lists for immigration purposes and encourage wages to reflect scarcity.
- Regularly review visa categories and the residency points system to ensure they sufficiently prioritise high-skilled migrants.
- Cease the practice of tying migrants to a single employer.
- Provide additional funding for the Labour Inspectorate to support labour market regulation, the proposed accredited employer scheme, and the integrity of the immigration system.

The Government's interim response to the Commission's immigration inquiry report

The Government announced an interim response to the Commission's immigration report in early April 2023 (MBIE, 2023a). It generally agrees with the report's recommendations. The response grouped the recommendations into three main themes and pointed to what the Government is doing under each of these.

Improve productivity and labour market outcomes by better connecting the immigration, skills, training, and education systems

To achieve this, the Government points to actions under its Review of Vocational Education including Workforce Development Councils, Regional Skills Leadership Groups alongside its industry transformation plans to achieve "a high-productivity, high-wage, low-emissions economy"

Increase transparency and the public's understanding of the strategic direction for the immigration system.

MBIE will consult with Māori, the new Migrant Community Reference Group and other key stakeholders and report back to Cabinet by mid-2023 on a draft GPS.

Engage with Māori as Te Tiriti partners to build enduring partnerships

This includes considering what Te Tiriti means for immigration policy, and the opportunities and impact of immigration policy for Māori.

Immigration policy is not being used to foster innovation ecosystems

Immigration is a policy area, among others, in which the Government has not to date used its levers to foster thriving innovation ecosystems in areas of focus. For example, the rebalance gives priority to occupations on the grounds of skill gaps and labour shortages, rather than to migrants especially suited to contributing to areas of focused innovation. Likewise, the new Active Investor Plus Visa applies neutrally across the economy.

Our *Immigration:fit for the future* inquiry recommended the Government make it easier for top talent to enter New Zealand to help develop innovation ecosystems in areas of focus. We called for Immigration New Zealand to work with businesses, researchers, educators, iwi and other stakeholders to identify, prioritise and refine, over time, the conditions of entry of top talent (NZPC, 2022b, p. 65). Applying greater weighting to migrants with talent and skills in focus areas would be one way to achieve this.

To date, the Government has not made significant moves to implement this recommendation.

The Edmund Hilary Fellowship Programme selects an annual cohort of international and domestic fellows that, over several years, has built to a sizable community of over 500 people. The programme's aim is to attract innovators, entrepreneurs, and investors to New Zealand:

> *...to collectively solve pressing issues facing humanity, through a globally unique visa programme. Today, the Fellowship is a community of 500+ people from New Zealand and around the world who are tackling local and global challenges, from climate change to social inequities to business growth and productivity. (Edmund Hillary Fellowship, n.d.)*

This programme is another example of where selection could be weighted towards those with talent and expertise in the areas for focused innovation. Currently, this does not happen, and it will be difficult to do until areas of focus are clear and well defined.

Recommendation 9.4: Reliance on seasonal migrant labour

The Government should work collaboratively with industries that currently rely on seasonal migrant labour, to develop a planned transition away from such reliance, and determine the role of government in supporting that transition. This may include:

- supporting industries to accelerate the development of automation and other labour-saving technologies;
- building the necessary skill base for higher-tech production practices; and
- helping to make jobs more attractive to local workers (eg, in horticulture, by coordinating work across multiple crop types to provide work for all or most of the year, with associated training).

As noted above under Recommendation 9.3, the *Frontier Firms* report found that a mismatch exists in the lower-skilled end of labour supply. Some New Zealand industries, including in the primary sector, rely heavily on temporary migrant labour to meet their seasonal employment needs, including through the Recognised Seasonal Employer (RSE) scheme and the Working Holiday Scheme.

Research commissioned for the inquiry found very limited economic analysis has been done on the effects of the substantial increases in temporary migration to New Zealand on local workers, automation, and productivity (Wilson & Fry, 2021). Wilson and Fry looked at evidence from overseas, including studies into the economic impacts of the ending of the bracero programmes in the US, which were cooperation agreements with Mexico for seasonal workers. They found Californian tomato growers responded to the cessation of the programme by automating harvesting tasks that had been undertaken manually by braceros. New research by San (2023) builds on this research, presenting strong evidence the presence of low-cost labour inhibits the development of labour-saving technological innovations.

We recommended the Government should work collaboratively with industries that currently rely on seasonal migrant labour, to develop a planned transition away from such reliance.

A variety of initiatives is underway

An extensive range of relevant reforms, reviews and initiatives is underway across government, many involving sector representation or consultation. They include: the Reform of Vocational Education (RoVE), Industry Transformation Plans, Employment Strategy and Employment Action Plans, the identification of Regional Economic Priorities, the rebalance of immigration policies and review of the RSE scheme, and co-investment in projects to support automation in the primary sector.

Sector workforce strategy

As part of RoVE, the Government has established Workforce Development Councils (WDCs) to provide bottom-up advice on vocational education from an industry and regional perspective. Muka Tangata is the WDC representing the food and fibre industries, which include horticulture, dairy, sheep, beef and other livestock farming, viticulture and winemaking, fishing, and seafood processing.

Muka Tangata has developed an initial sector workforce development plan (Muka Tangata, 2022). This plan recognises the food and fibre sector's current dependence on migrant labour, including to meet seasonal production peaks. The plan also recognises the need to build a domestic skill base for higher technology production practices (both the specific skills needed for agritech developments, as well as more generic digital skills) (Figure 5).

The plan states the high rate of growth in the sector means it will "continue to be reliant on migrant labour for the foreseeable future, both to meet seasonal demands and to fill specialist positions that have high levels of skills requirements" (p. 34).

However, the plan also acknowledges the Government's "rebalancing" of immigration policy settings will reduce the supply of temporary migrant labour available to meet seasonal demand. Changes that have been signalled include a reduction in the number of temporary visas, and increased limitations on routes to residency for some temporary migrants. However, while the reforms introduce median wage thresholds for most employers, exemptions will apply for some sectors that currently rely on lower-skilled migrant workers. Sector agreements, including for meat processing and seafood, will provide short-term or ongoing access to lower-paid migrants, to provide time for these sectors to "improve working conditions, and put significant effort into retaining, retraining and upskilling New Zealanders, or changing labour needs" (Immigration New Zealand, 2022a).

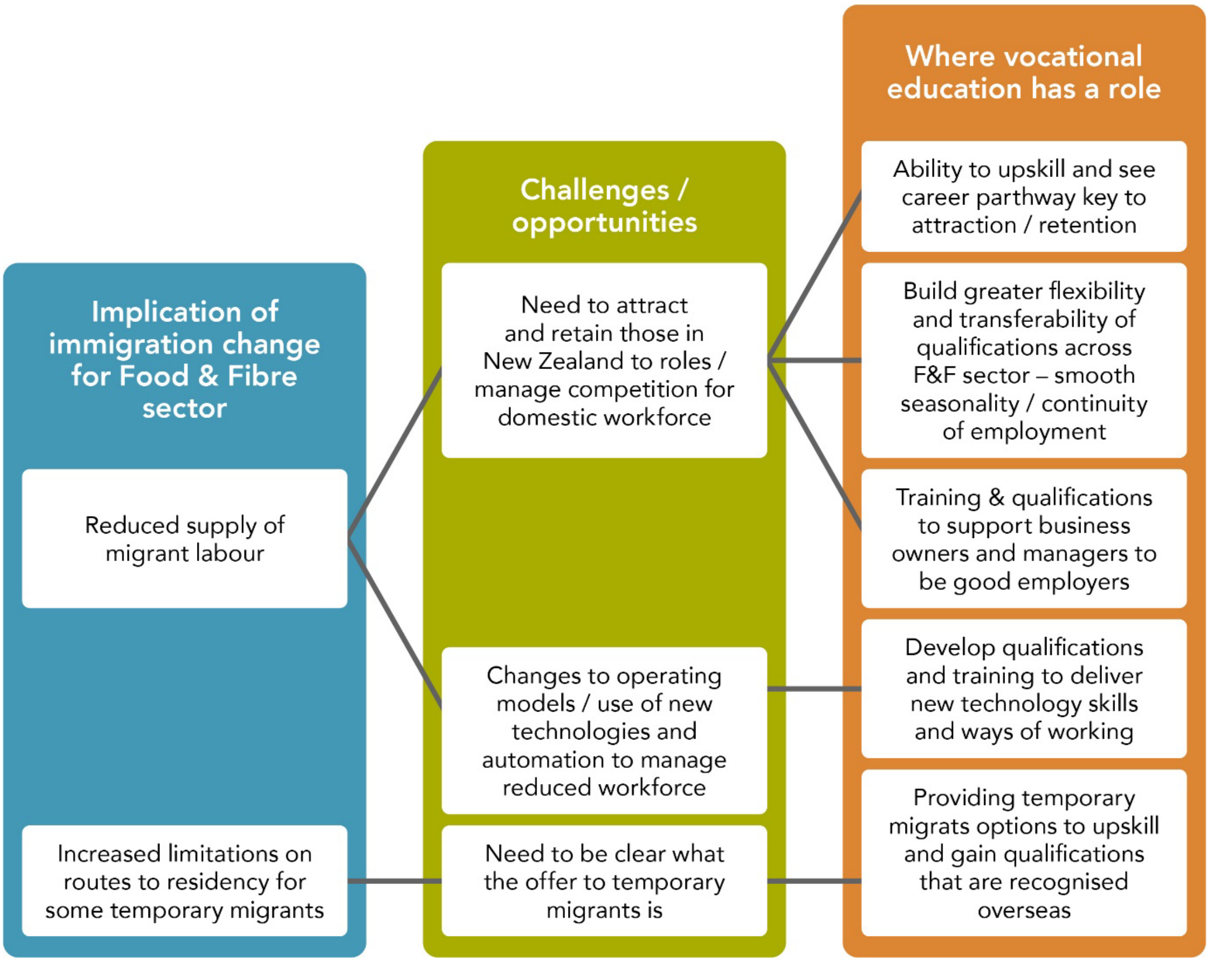
Potential actions outlined in the sector workforce development plan include:

- increased recognition of skills and qualifications across different parts of the sector, to open up options for smoothing seasonal employment peaks across the wider sector;
- developing and communicating clear career pathways, that allow flexibility to move across the sector; and
- developing qualifications and training to build new technological skills and support new ways of working.

The plan notes that some iwi and Māori businesses are exploring ways to manage the seasonality of employment, including how their kaimahi can move between different parts of the sector or to other sectors in the same locality with different seasonal peaks.

It also notes that during the COVID-19 related border closures, some firms cooperated (within a locality, or across parts of the supply chain) to develop new ways to manage their collective workforce. It recommends further research on the scope for wider application of these models.

Figure 5: Immigration rebalance and vocational education for the food and fibre sector



Source: Muka Tangata (2022, p. 35)

Regional Skills Leadership Groups

Another component of RoVE has been the establishment of 15 independent advisory groups known as Regional Skills Leadership Groups (RSLGs). The aim of the RSLGs is to provide a regional voice in identifying and supporting better ways of meeting future regional skills and workforce needs (MBIE, 2022c).

The RSLGs have developed Regional Workforce Plans. These plans focus on regional solutions to regional issues, but also raise national issues where action by central government may be needed. MBIE is coordinating a government response to the issues raised in the plans.

Some of the Regional Workforce Plans identify the seasonality of employment as an issue. For example, the Bay of Plenty plan lists managing seasonality as its top aspiration. This plan notes the Bay of Plenty horticulture and viticulture sector will remain reliant on RSE workers into the medium-term. However, opportunities for transitioning workers between different parts of the production cycle through the year exist in other industries such as forestry and agriculture. Proposed actions include work to better understand regional cross-sector seasonality workforce patterns to better inform future planning, supporting the development of on-the-job training and skills development, and exploring the impact of automation, robotics and AI for the future workforce (Bay of Plenty Regional Skills Leadership Group, 2022).

The Marlborough Regional Workforce Plan also identifies labour seasonality as a challenge for its wine industry, and one which is increasing as the industry expands. The plan notes growers require innovation in mechanisation as well as an efficient and experienced workforce. Its immediate action is to support Wine Marlborough to develop a workforce plan for the Marlborough wine industry, in collaboration with Muka Tangata (Marlborough Regional Skills Leadership Group, 2022).

Industry Transformation Plans

The draft Food and Beverage industry transformation plan (ITP) focuses on building the innovation and commercialisation skills needed to support the development and growth of high-value firms in the sector. The draft ITP discusses the sector’s workforce challenges but does not explicitly identify seasonality or dependence on seasonal migrant labour as an issue. It makes references to relevant initiatives such as RoVE, the immigration rebalance and the food and fibre workforce strategy, and positions itself as focussing on key skills gaps (leadership, innovation and entrepreneurship) not addressed by these other programmes (New Zealand Government, 2022g).

One of the actions in the Agritech ITP is implementing the Horticulture Technology Catalyst. The Catalyst aims to help address the problems for horticulture technology development and automation of small-scale and fragmented production through "building domestic alignment and access to international connections and partnerships, access to skilled labour, and the overall critical mass for New Zealand's horticulture technology sector” (New Zealand Government, 2023a, p. 14). Drivers for this work include the growing domestic and global market demand for horticulture technological innovations. The ITP refers to Western Growers, a significant American horticulture play that aims to automate 50 per cent of its harvesting by 2030 (New Zealand Government, 2022g, p. 15).

Aotearoa Horticulture Action Plan

The *Aotearoa Horticulture Action Plan*, released in February 2023, sets out actions aimed at increasing the industry's proportion of permanent workers, supported through automation, and enabling employment options for seasonal peak management and counter-seasonal work. Specific actions include:

- Create a workforce transition plan that delivers on seasonal, permanent, regional, and national workforce needs.
- Enable strong collaboration between sectors, regional and industries to contribute to a permanent workforce.
- Start a targeted and ongoing campaign to promote New Zealand horticulture jobs for holiday visa applicants and enable seasonal visas for counter-seasonal work options.
- Align policy settings, incentives, and government support to encourage investment in, and use of agritech and automation (Ministry for Primary Industries, 2023a).

Sustainable Food and Fibre Futures projects to support automation

The Government's Sustainable Food and Fibre Futures fund has been co-investing in a range of innovation projects, including projects to increase automation in the horticulture industry. These include development of an autonomous asparagus harvester, and a hybrid autonomous vehicle for trellised orchard systems (Ministry for Primary Industries, 2023b).

No clear commitment to transition away from seasonal migrant labour

Various plans to manage the seasonality of employment are being developed across multiple national and regional level processes, including through Muka Tangata and various Regional Skills Leadership Groups. Even so, the Government has not demonstrated a clear intention or commitment to work with industries to transition them away from a reliance on seasonal migrant labour. Nor is there a coordinated, regional, or sector-wide approach across government to support such a transition. The *Aotearoa Horticulture Action Plan* signals some promising actions such as encouraging investment in automation, but it is not clear how this plan fits with the other processes underway. Furthermore, recent changes to immigration policy serve to reinforce industries' dependence on seasonal migrants.

Review of the RSE scheme is not focused on productivity

MBIE has commenced a review of the Recognised Seasonal Employer (RSE) scheme. The review began in 2019 but was delayed due to COVID-19. It has now been reactivated and is due to report back to Cabinet for policy decisions in June 2023.

The objectives of the review are:

- sustainable long-term administrative settings that work effectively for the New Zealand government and employers; and
- a scheme that respects RSE workers and upholds their rights and dignity through an improved set of policies and guidelines backed by consistent and ethical employment practice.

The fundamental objectives of the scheme remain the same. However, MBIE notes the administrative structure of the scheme has come under “immense strain” over the years. This has resulted in the scheme becoming fragmented and unsustainable, which has led to “inequitable distribution of its costs and benefits (particularly for RSE workers and Pacific sending countries)” (MBIE, 2023b, p. 10).

The review comprises workstreams that are systems-focused, worker-focused, and Pacific-focused. They cover issues including worker wellbeing and accommodation, the flexibility of the visas (including the ability of workers to move between RSE employers), the processes for setting the annual cap on the number of RSE workers, and for allocating workers across firms.

One of the objectives of the scheme is to “promote best practice in the horticulture and viticulture industries to support economic growth and productivity of the industry as a whole” (MBIE, 2023b, p. 7). The process for setting the cap on workers could be used as a tool to help incentivise growers to innovate and shift to less reliance on seasonal labour (for example, having a sinking cap over time).

The cap has just been significantly increased. In September 2022 the Government raised the cap on the number of RSE workers by 3,000, to 19,000 for the 2022–2023 year (Immigration New Zealand, 2022b). This is the largest single increase in the cap since 2009. It was originally set at 5,000 in 2007. This suggests it is unlikely the Government will adjust the scheme to encourage a planned transition to lower such reliance. MBIE notes that while the RSE is not the single lever for productivity in the sector, the scheme provides a “unique point of leverage” for both productivity and Pacific development outcomes. However, it states that resolving the identified issues with the scheme does not guarantee either productivity or development outcomes in the long-term (MBIE, 2023b, p. 12).

In December 2022, the Human Rights Commission published a review of worker conditions in the scheme (New Zealand Human Rights Commission, 2022). The Commission found gaps in the scheme that may enable systemic patterns of human rights abuses throughout the country. It found that, due to a lack of oversight, regulation, enforcement, and human rights protections within the RSE scheme, employers can exploit workers with few consequences. This is despite the Human Rights Commission repeatedly hearing that human rights abuses within the scheme are only by a “few bad apples in the industry”. The Human Rights Commission urged the Government to urgently review the scheme through a human rights lens and implement human rights-based changes before the next season in 2023.

MBIE notes that policy decisions resulting from the current review "will need to balance the benefits to the worker with resulting costs to employers" (MBIE, 2023b, p. 11). From a productivity perspective, failure to ensure (and price in) basic worker wellbeing, and more fundamentally to address the power imbalances inherent in the scheme, imply that productivity differentials between RSE and local workers are over-stated. In turn, this will encourage ongoing firm reliance on under-priced seasonal migrant labour and do little to support the development of automation and innovation.

Recommendation 9.5: More research on temporary migration

Any review of migration policy must be based on New Zealand's particular circumstances. More evidence on the economic impacts of temporary migration in New Zealand will be needed to support such a review. The Government should commission empirical studies to assess the impacts of working holidaymakers, international students, and workers in the Recognised Seasonal Employer scheme on local labour markets, automation, and productivity.

As noted above under Recommendation 9.4, a report prepared for the *Frontier Firms* inquiry found very limited research on the impact in New Zealand of substantial increases in temporary migration on local workers, automation, or productivity (Wilson & Fry, 2021). It noted that some studies of the RSE scheme provide limited empirical information, but evidence on the effects of the Working Holiday Scheme is scant.

MBIE produced an econometric study in 2018 – based on an earlier study by McLeod and Maré (McLeod & Maré, 2013). The MBIE study found the overall impact of temporary migration on local workers has been modest and positive, with some larger positive and negative effects in various subgroups including young people and beneficiaries. Technical challenges prevented this study from separately identifying the impact of working holiday makers and RSE workers. The study did not examine the impact on capital investment or productivity. MBIE recommended further detailed analysis of the interrelationship between migrant employment and the employment of New Zealanders (MBIE, 2018).

We agreed in the *Frontier Firms* inquiry that New Zealand-specific research on temporary migration was limited, and it was important to fill this gap given the rapid increase in temporary migration up to the COVID 19 border closures. This led us to Recommendation 9.5 that more empirical research on the economic impacts of temporary migrants is desirable. Events following the 2022 re-opening of borders reinforce the need to understand temporary migration better. As noted, RSE worker numbers are now being permitted to a new higher ceiling. In addition, recent statistics show that non-New Zealand citizen migrant arrival numbers are climbing rapidly again (albeit from the much lower levels during the COVID-19 period) (Stats NZ, 2023).

Research for the Productivity Commission's immigration inquiry adds to knowledge about temporary migration

Six pieces of research for the Productivity Commission's inquiry into immigration settings add to knowledge about temporary migrants.

- *Immigration by the Numbers* is a collection of graphs and commentary, noting the major trends in New Zealand's immigration story, the characteristics of migrants, and the impact of immigration on a range of economic measures (NZPC, 2022a). The research found the number of temporary migrants in New Zealand more than doubled in the decade before the COVID-19 pandemic, vastly outstripping growth in the wider labour market. This occurred over several visa types, including Essential skills, Study to work, Working holiday, RSE and Work to residence visas. While not all temporary migrant workers are low-skilled, most low-skilled migrants are on some form of temporary visa.

- A piece of exploratory work by the Commission fed into *Immigration by the Numbers*. It used longitudinal data on individual migrants (anonymised) to track their time paths from entry to New Zealand until when they either leave the country or gain residence and remain. A key question this research is trying to answer is: what are the characteristics of temporary migrants that lead to better or worse earnings and employment outcomes?

- *Migration and firm-level productivity* examined how migrants of different types contribute to productivity in New Zealand (Fabling et al., 2022). Using administrative data on the flows of migrants into and out of New Zealand, and on visa types, earnings, and jobs between 2004 and 2019, the research explored how the relative productivity and wages of migrants differ – both from those of the New Zealand-born and across different groups of migrants. The research uncovers in which industries skilled and low-skilled migrants work. It distinguishes "skilled non-residents" from "other non-residents". Temporary migrants (ie, those who will not remain in New Zealand and gain residence) are in both groups but are a greater proportion of the latter than the former group.

  The following are among the findings of this research.

  - Migrants that are not on skilled visas are associated with lower output, lower productivity, and lower wages than moderately skilled New Zealand-born workers.
  - A group of low-productivity industries are intensive users of migrants, in particular migrants who are temporary and whose visas do not depend on the applicant's skills. Examples of these industries are "accommodation and food services", "horticulture and fruit services" and "administrative and support services". Conversely, a group of high productivity industries are dependent on skilled migrants. Examples of these industries are "chemical, rubber and non-metallic manufacturing", "finance, insurance and superannuation" and "telecommunications, internet and library services".

- A piece of on-going research is expected to be published as a Productivity Commission and Motu working paper in the next few months. This research uses micro-data on firms and seasonal workers in the horticultural industry (many of whom are temporary migrants – both RSE workers and those on working holiday visas) to investigate the impact on businesses who did not receive RSE workers compared to those that did because of the sudden closure of New Zealand borders when COVID-19 struck. The working paper will describe the impact on the businesses, their responses, and the impact on, and responses of, workers to the unexpected vacancies and labour demand.

- A case study of the aged residential care industry which employs a lot of migrants including temporary migrants (Knopf, 2022).

- A case study of the construction industry which employs a lot of migrants including temporary migrants (Schiff, 2022).

The two case studies provide a rich picture about the employment and experiences of migrants in these industries in New Zealand.

Innovation-enabling regulation

Recommendation 10.1: Keep regulations up to date

The Government should prioritise keeping regulations up to date with technological and other changes, where not doing so would curb innovations that have potentially high payoffs in wellbeing. This action should apply especially in areas of focus for innovation.

Where such changes require new or updated regulations, their design and operation should allow flexibility in achieving the desired regulatory outcomes, without compromising adequate monitoring and enforcement.

Regulatory stewardship expectations

Keeping regulations up to date is a key part of regulatory stewardship. Under the Public Service Act 2020, government departments have stewardship obligations for the primary legislation they administer, and secondary legislation (regulation) made under that legislation.

The expectations for stewardship of individual regulatory systems are set out in guidance published by the Treasury (New Zealand Government, 2017, p. 3). This stewardship role includes responsibilities for monitoring, review, and reporting on existing regulatory systems.

Reviewing regulations means a department should:

> *periodically look at other similar regulatory systems, in New Zealand and other jurisdictions, for possible trends, threats, linkages, opportunities for alignment, economies of scale and scope, and examples of innovation and good practice.*

The Treasury holds functional leadership of the regulatory stewardship system. However, regulatory stewardship by government departments operates as a devolved responsibility, so Treasury lacks visibility of particular processes individual agencies have put in place for monitoring and reviewing their regulatory systems.

Recent examples of work to update regulatory systems

Regulatory Systems Amendment Bills (RSABs) are omnibus legislative vehicles that enable statutory provisions to be kept up to date, in line with the original intent of the legislation (they do not permit significant policy change). They were created in response to the Commission's 2014 inquiry into regulatory institutions and practices (NZPC, 2014), which noted it can be difficult to find time on the parliamentary calendar for "repairs and maintenance" of existing legislation. RSABs are used by the Ministry of Business, Innovation and Employment (MBIE) and other large regulatory agencies. To date, five RSABs (developed by MBIE, the Ministry of Transport and the Department of Internal Affairs) have been passed, each of which amended between six and 24 Acts. Several more are underway.

We have also identified some isolated examples of work to review, improve and develop innovation-enabling regulatory systems that has occurred since our *Frontier Firms* inquiry was completed. For example, work under the Government's Innovative Partnerships programme to support the development of ecosystems in transformative technology areas and emerging sectors. This includes supporting regulatory and policy settings, such as work by, the Ministry of Transport, the Civil Aviation Authority (CAA) and MBIE to create an enabling regulatory environment for advanced unmanned aircraft (MBIE, 2020). It is important regulatory regimes are designed and resourced in a way that enables and does not stifle innovation.

In the food and beverage sector, new products, and production methods, such as those around alternative proteins (for example lab-based meats), will test the fitness-for-purpose of current regulatory settings. These include the regulatory systems for food safety, and approvals of new organisms (under the Hazardous Substances and New Organisms Act 1996). A recent report from Te Puna Whakaaronui found that, while the food safety and HSNO regimes are not likely to impede the development of novel foods such as alternative proteins, the approval process for new microbial strains used in production processes (such as for precision fermentation dairy products) is time consuming and costly, particularly if they involve the use of genetic technologies (Te Puna Whakaaronui, 2022).

The draft food and beverage ITP states policy makers and regulators do not yet have a clear view on what changes may be required to these regulatory systems, to accommodate novel foods. The draft ITP proposes action to make it easier for innovators to navigate the regulatory systems around food innovation. This includes proposed work to evaluate the regulatory regimes for alternative proteins and new and evolving production and manufacturing methods (including those that use genetic technologies) (New Zealand Government, 2022g).

New guidance has been published

In December 2022, the Treasury published a new regulatory stewardship resource for government departments (The Treasury, 2022). This resource outlines nine topics with discussion prompts intended to help departments undertake some structured workshops or conversations about aspects of the state of their regulatory stewardship practice and the performance of their regulatory systems.

One of the topics is "opportunities to ease compliance and support innovation". The guide suggests government departments consider:

- Whether there are new technologies or business models being introduced or considered that could affect currently regulated activities, and how well the current regulatory system can accommodate these innovations or be changed to allow or support them.
- Whether the regulatory system could be made more adaptable to make it easier to accommodate future, yet unseen, innovations.

Recommendation 10.2: Dairy industry regulation

The next review of the Dairy Industry Restructuring Act 2001 in 2024 or 2025 should include an assessment of the effect on Fonterra and the wider dairy sector of the removal of Fonterra's obligation to accept the re-entry of its farmer supplier shareholders who have left the cooperative to supply another processor and then wish to return.

If the review finds the net effects of removing the obligation are negative, then the Government should reimpose it. Subsequent reviews should make similar assessments as needed and depending on Fonterra's future market share of farmgate milk.

Recommendation 10.2 came from the Commission's concern that amendments in 2020 to the Dairy Industry Restructuring Act 2001 (DIRA) would weaken competition and innovation in dairy processing. This risk exists because the amendments removed Fonterra's obligation to take back supplier farmers who depart to supply another processor, which makes farmers more reluctant to leave Fonterra. This in turn makes it more difficult for other milk processors to enter or expand. The context for this is that Fonterra is still the dominant milk processor in New Zealand. As the purchaser 79% of total milk volume (down from 96% in 2001), it still possesses substantial market power.

Recommendation 10.2 was to assess the effects of the amendments on the dairy sector at the next review of DIRA due in 2025. In the Minister of Economic Development's Cabinet Paper proposing the Government's response to the *Frontier Firms* inquiry, he agreed ending Fonterra's obligation to returning farmers would "make it harder for smaller, independent processors to compete, resulting in losses in efficiency and competition in the dairy market" (Minister for Economic and Regional Development (Hon Stuart Nash), 2021b, p. 17).

Yet in 2022 the Government passed further amendments to the DIRA that further shore up Fonterra's ability to maintain its high market share of suppliers. It seems another case of changing regulations (in this case to facilitate Fonterra's capital restructure) at the company's behest with little regard to the negative impact on competition and innovation in the wider sector. The capital restructure dramatically reduces a farmer-supplier's requirement to own Fonterra shares and has collapsed the share price (by around 40%). This further inhibits existing suppliers leaving Fonterra (because it would crystallise a large loss on sale of their shares) and encourages other suppliers to sign up with Fonterra. An important context for this, is total milk supply in New Zealand appears to have peaked, making it more difficult for processors to find suppliers.

Associated amendments in the recent Bill seek to mitigate the further risk that Fonterra substitutes higher milk payouts to farmers (above a fair market price) for lower dividends to its farmer shareholders – thus further worsening the competitive position of other commercial users of raw milk. Yet even these measures – to make the process of setting the base milk price more transparent and independent of Fonterra – got weakened through the legislative process.

Encouragingly, Fonterra states it is committed to innovation as part of its new strategic direction to achieve greater value from existing milk supply given that the days of a growing supply are over (Fonterra, 2021). Added to this, Fonterra and the New Zealand dairy sector generally need to retain or gain social licence for their industry in terms of a smaller negative environmental impact.

Fonterra says its higher-value products will centre on business-to-business ingredients associated with the huge rise in interest in nutrition as part of healthy and active living. This interest is strengthening as the incomes of the large populations in Asia grow.

To enhance its social licence, Fonterra is converting the energy source for some of its milk dryers from coal to either wood biomass or electricity (using highly efficient industrial heat pumps). It is also participating in the Centre for Climate Action on Agriculture Emissions which aims "to strengthen the role of research and development for new tools and technology to reduce on-farm emissions." (Minister of Agriculture (Hon Damien O'Connor), 2022) Under the umbrella of the Centre, a joint venture has been set up involving the Government, ANZCO Foods, Fonterra, Synlait, Ravensdown, Silver Fern Farms and Ngāi Tahu which plans to spend $170 million over four years with that figure co-funded by the Government and the private partners.

Recommendation 10.3: Introduce a consumer data right

The Government should introduce a consumer data right consistent with Australia's sectoral-designation regime. Banking or the wider finance sector should be one of the early designated sectors, to facilitate the development of efficient and effective open banking and open finance in New Zealand.

Following this recommendation to develop and implement a new regime to facilitate consumer data rights (CDRs), the Government decided in July 2021 to implement a legislative framework to allow consumers to securely share data held about them with trusted third parties. It will be rolled out sector by sector starting with banking – which is key to the development of innovative services and greater competition through what is known as "open banking".

Other countries such as Australia are ahead in open banking but have encountered teething problems. Australia has implemented a CDR regime and implemented it for open banking. However, it has experienced higher-than-expected costs (including compliance costs for participants) in areas such as security and privacy. The Government and officials in New Zealand are sensibly taking time to develop policy, learn from the Australian experience and avoid those problems. This learning-by-others'-mistakes approach slows progress but should ultimately prove more durable and effective. The lead policy agency is MBIE, and it appears to be working effectively with key stakeholders such as banks, the banking API[7] Centre , the Commerce Commission, the Office of the Privacy Commissioner, the Department of Internal Affairs, and Māori (especially regarding indigenous data rights).

Potential innovations and wins from an effective open-banking regime include e-invoicing, cheaper and easier payment services, auto receipts and reconciliation, identity, and trust services (such as for anti-money laundering purposes), lower compliance and administration costs for the business sector, mortgage services, and paperless guarantees and warranties. Overall, it ought to enhance competition and consumer choice in financial services.

The Government hopes to introduce primary legislation this parliamentary term, but MBIE officials think tsuch a goal is ambitious relative to the design issues still to be worked thorough and solved.

In his opening Statement to Parliament on 21 February 2023, the Prime Minister, Hon Chris Hipkins said the Government will introduce legislation establishing a consumer data rights framework this year. The Minister for Commerce and Consumer Affairs, Duncan Webb, is enthusiastic, having stated:

> *It's a real ambition of mine… If I can move this along, and it makes things more effective, better for people, better for the finance sector and better for consumers, I think that's something to be really proud of. (Moore, 2023)*

[7] The banking API Centre is managed by Payments NZ, an organisation owned by New Zealand banks for the purpose of enabling an efficient payments system. APIs (application programming interfaces) are software tools that set standards that enable different software systems to "talk" to each other and perform a set of tasks.

Recommendation 10.4: Review genetic modification regulation

The Government should undertake a full review of the regulation of genetic modification (GM), to ensure it is fit-for-purpose and supports domestic innovation. The review should:

- consider the emerging regulatory approaches in other jurisdictions, particularly New Zealand's key product destination and competitor markets;
- consider the trade and regulatory enforcement impacts from different treatment of GM technologies in different markets;
- assess consumer attitudes in New Zealand and internationally;
- consider the potential impacts on New Zealand firms that wish to retain GM-free status, and on New Zealand's reputation and brand more generally;
- recognise Māori views on GM and the rights and interests of iwi in taonga species (indigenous flora and fauna);
- coordinate with the whole-of-government work that is considering the recommendations of the Wai 262 report, in particular those relating to GM legislation;
- look beyond the Hazardous Substances and New Organisms Act 1996, across all relevant acts and regulations, to ensure consistency of definitions and approach;
- assess the fitness for purpose of the current regulatory oversight and enforcement arrangements;
- consider the merits of separate legislation and/or a standalone regulator for genetic technologies; and
- undertake wide public engagement, including with Māori and industry, and backed by information resources to support public understanding of modern GM technologies.

A narrow review is underway

The Ministry for the Environment (MfE) has begun work to improve the regulatory requirements for genetically modified organisms (GMOs) for laboratory research and biomedical research and development. This work does not include reviewing the regulatory settings for field trials, conditional releases, or full releases of GMOs. MfE is now in the final stages of developing policy options for this piece of work.

The Government has signalled discussions with the primary sector

The Government's response to the *Frontier Firms* inquiry stated the government considers it timely to start informed conversations around New Zealand's use of GM technologies. This intention was subsequently signalled in the draft food and beverage industry transformation plan (ITP), released in December 2022. The ITP contains 16 proposed actions, one of which is to "hold a discussion with the food and beverage sector on the role of genetic technologies in the sector's future" (New Zealand Government, 2022g, p. 5).

In February 2023, Te Puna Whakaaronui published a report on the current state of genetic technology and its regulation (Te Puna Whakaaronui, 2023). The report aims to provide a neutral evidence base to support an informed conversation around GM and its regulation. It notes that among Aotearoa New Zealand and its main trading partners, the UK and EU and New Zealand are the only jurisdictions where the regulations remain purely process based, as opposed to the product traits-based approach of other countries. Both the UK and the EU are in the process of regulatory changes that (if passed) would exempt certain gene editing techniques from broader GMO regulations. The report refers to recent reviews, including Frontier firms, and others by the Royal Society Te Apārangi, the Prime Minister's Science Advisor and Food Standards Australia New Zealand, that have all concluded Aotearoa New Zealand's existing regulations are out of step with technology and no longer fit-for-purpose.

More recently, the *Aotearoa Horticulture Action Plan* released by the Government in February 2023 includes an action to "lead formal discussion on the role of advanced breeding techniques (eg gene technologies) to speed innovation (Ministry for Primary Industries, 2023a, p. 18). MPI's draft long-term insights briefing on demand-side options in the food sector notes a conversation about how to take advantage of biotechnology and the sector's reputation for "natural" foods "may be useful" (Ministry for Primary Industries, 2023c, p. 39).

Recommendation 10.5: Improve and scale up quarantine facilities for plants

The Ministry for Primary Industries' work on designing new post-entry quarantine facilities for new plant varieties and breeding material and improving the capacity and efficiency of the import health standards processes, is welcome investment. This work should consider:

- how to scale up existing processes and facilities to relieve the backlog of applications and increase future capacity;
- ways to make the system more efficient, while managing risks appropriately; and
- how costs are shared across applicants, wider industry and government, to develop a sustainable pricing model that incentivises innovation.

An interim PEQ facility

MPI received funding in Budget 2020 to invest in an interim Level 3B post-entry quarantine (PEQ) facility, which will be completed in October and will be able to take material from March/April 2024. This will increase capacity from 30 cultivars a year to 75, while a long-term solution is progressed.

Business case for a permanent facility

A detailed business case for the construction of a new, permanent PEQ facility has been progressed for Cabinet consideration in March 2023. The aim is for the facility to be completed by 2028/29, and able to receive plants by the end of 2029/30. The preferred option is for a fully government owned and operated facility. The construction of this facility is dependent on Cabinet approval of the business case and associated funding.

Speeding up plant importation times

MPI is leading a working group that is exploring opportunities to speed up importation times. This includes looking at reducing PEQ times and having lower levels of PEQ for some materials.

Some of the ideas being considered are:

- Relying more on advanced diagnostic techniques to detect pests of concern (for example high throughput sequencing and polymerase chain reaction), and less on inspecting plants for disease symptoms over prolonged periods in quarantine. If this is feasible, it could be used to speed up the quarantine process.

- Making more PEQ space available by removing the outdated method of biological indexing from our import health standards and replacing it with sensitive molecular detection techniques (such as PCR).

- A PEQ space booking and prioritisation system, to make the most efficient use of the facility. MPI has developed a booking policy, based on what types of material can share space and if importers are willing to share. MPI will be seeking industry and importer feedback on the policy and expressions of interest process in May 2023 before decisions are made for implementation from 1 July 2023.

Plant germplasm import pathway strategy

As part of a new Plant Germplasm Import Council, Ministry for Primary Industries (MPI) has contributed to the development of a joint industry/government-owned strategy for the plant germplasm import pathway (Plant Germplasm Import Council, 2022). This identifies short- and long-term pathway enhancements. The strategy sets out a KPI for work to improve the PEQ system, that the queue for PEQ space is reduced to under 12 months. MPI is in the process of implementing this strategy, jointly with industry.

Import health standards

MPI is looking at more efficient ways of delivering or amending import health standards (IHSs) for the importation of new varieties, to deliver more standards and amendments, more quickly. Work to date has involved process changes and an increase in staffing. This has resulted in an overall increase in the number of IHSs delivered from nine in 2017 to 62 in 2022.

Cost recovery model

MPI is working on cost-recovery options that fairly reflect the split between public and private benefits. MPI is considering three options:

- industry fully funded, and
- two government-industry cost-sharing options.

MPI commissioned work on price elasticities, market sustainability and differentiated prices to inform their analysis and decisions. They will be seeking industry and importer feedback on the new prices in May 2023 before decisions are made for implementation from 1 July 2023. The agreed pricing/funding model will apply to both the interim and permanent PEQ facilities.

Recommendation 10.6: Health system reform and healthtech

The Government should use its intended major health system reform to improve the mandate, funding and incentives for DHBs to participate in the healthtech innovation ecosystem, for the mutual benefit of the healthtech sector, and the efficiency, effectiveness and accessibility of New Zealand's health and disability system.

The Government announced the shape of its major health reforms after the Commission's *Frontier Firms* final report The thrust of our Recommendation 10.6 was whatever shape emerged, the new system should have features that make it more open to innovation than the old system of District Health Boards (DHBs). This will potentially enable better access to health services, better health outcomes, and cost savings, as well as stimulate and nurture New Zealand's relatively small but promising health technologies ecosystem.

Some positive signs for innovation following reform

While it is still early days for the new health system, the Commission notes highly experienced and capable staff in health innovation occupy senior positions in Te Whatu Ora, Health New Zealand. Dr Dale Bramley has been appointed to fill a new position – the National Director, Service Improvement and Innovation. This is in addition to a position of General Manager, Emerging Health Technology and Innovation – Data and Digital (held by Jon Herries) as well as an Institute for Innovation and Improvement based at Te Whatu Ora, Waitematā with a Director – Evidence, Research and Clinical Trials, Dr Robyn Whittaker, who was previously a champion of innovation at Waitematā DHB. These appointments and positions are a positive sign for health innovation following the reform.

The Commission met with Jon Herries and Robyn Whittaker. They made several interesting points.

- The COVID-19 pandemic brought change and sped it up – quite a lot of innovative things are now possible off the back of systems developed for vaccine passes (the enabling IT and data platform). Examples include new systems for after-hours services (for instance Practice Plus in the lower North Island) and electronic prescriptions.

- Te Whatu Ora, as a crown entity, can enter into commercial partnerships. This was not possible for either the Ministry of Health or the DHBs. The ability allows capital to be moved between partners and to cross-share ownership between partners. Te Whatu Ora has already been approached by some large international players.

- A $350 million investment is going into a national health computer/information system (Hira). This is a flexible, multi-use platform for which some 200 APIs[8] have been built, with new ones coming onstream over time. The work is making progress on the fundamental challenges of accuracy, security, and privacy in relation to personal identity and connecting people's health information.

- Te Whatu Ora is collecting a list of innovation projects happening around the country. The challenge is to use the power of the single national system to locate and spread best practice around the country, while managing the risk of a single (monopoly) approach suppressing innovation and making the system worse. Likewise, a tricky balance exists between innovation and safety. The new Therapeutic Products Bill has risks for innovation because it will tighten the regulation of medical devices (see below).

- The ability of young New Zealand healthtech firms to collaborate with the public health system on testing new products is still limited.

- A recent paper captures valuable lessons for health system innovation from experiences at Waitematā DHB, which we found in our *Frontier Firms* inquiry was one of only two former DHBs that took innovation seriously (Whittaker et al., 2022).

On the negative side, as noted in the *Frontier Firms* inquiry, while the MedTech Centre of Research Excellence has played an important role in encouraging collaboration and nurturing an active innovation ecosystem, the Government has now defunded it. Some temporary funding from MBIE will end in April 2023 and Auckland University has put in some funding. Precision Driven Health, jointly funded by Orion Health and MBIE, has also lost government funding and is struggling to replace it.

On a brighter note, the Health Research Council has changed its funding criteria to prioritise problem-driven rather than idea-driven research.

[8] APIs are application programming interfaces. These are software tools that set standards that enable different software systems to "talk" to each other and perform a set of tasks.

A perspective from the digital health sector

The Commission also met with the Digital Health Association (DHA, formerly New Zealand Health IT) an umbrella group of around 200 digital health businesses and partners across New Zealand. The DHA, reflecting the views of their members on the reforms and the Therapeutic Products Bill, made the following key points.

- While there was optimism in the sector at the start of the reforms, uncertainties about where authority lies and what constitutes a region are confounding renegotiations for digital health services previously supplied to and approved by DHBs. Short, one-year, interim contracts are the common default. This is creating high transaction costs for both suppliers and funders, reducing productivity and stifling innovation. In addition, up to 1500 IT projects from the DHB days are on hold for review.

- COVID-19 was an accelerator for digital health. However, the DHA is concerned that the momentum on digital health – as an enabler of better health outcomes for people and more efficient and better workflow management for clinicians and the health workforce – has since slowed.

- The DHA has a favourable view of the potential of Hira – now that work has got properly underway with an appointed leader and serious funding. Hira has the potential to provide consumers with more control of their health and wellbeing, and health providers with a broader, more connected view of a patient's health data. If achieved, it will also provide a supportive space for innovation. It will take the form of a modern data-exchange "layer" where current disparate systems across the previous DHBs connect and communicate in a trusted way.

- Te Aka Whai Ora (the new Māori Health Authority) is a world first for indigenous healthcare. Ryl Jensen, CEO of the DHA, thinks the country could become a global leader in this sphere and should embrace and champion the new entity. Te Aka Whai Ora is pro-innovation. As a new, well-led organisation, new thinking is easier, it is not held back by legacy systems and precedents, and it seems willing to consider digital health solutions that will improve Māori health, and ultimately health outcomes for the whole population.

- New Zealand Trade and Enterprise (NZTE) is good at working with individual firms but does not have the funding to promote a whole sector such as digital health and medtech. In this regard, the DHA said that NZTE compares unfavourably with Enterprise Ireland which runs events such as global healthcare forums to bring in international buyers and sets up innovation labs in partnership with Irish universities to fund and promote new innovative digital healthtech and medtech. Ireland has become a healthtech innovation hub experiencing strong year-on-year growth from the Asia Pacific and Americas regions.

- The DHA is seriously concerned the Therapeutic Products Bill, currently before parliament, defines health Software as a Medical Device (SaMD) too broadly. It believes the Bill will inadvertently catch health software that is low risk in nature and subject it to costly and unnecessarily regulation. The DHA believes the Bill currently:
  - does not align with the sensible, risk-based regulation practices used in other jurisdictions such as Australia and the US;
  - fails to take into account the rapid rate of digitalisation, and the nature of software development via frequent updates;
  - jeopardises the Government's own plan – Te Pae Tata, Interim Health Plan 2022 –to achieve digital transformation in the health sector, including innovative digital solutions to improve Māori health outcomes (Te Whatu Ora & Te Aka Whai Ora, 2022);
  - risks negative impacts on efficiency, R&D, innovation, growth and competition in the health software industry;
  - risks raising development and compliance costs of much health software for no offsetting gain, with these costs being passed onto health providers and, ultimately, the taxpayer; and
  - would require low-risk new health software to be authorised by a Therapeutic Products Regulator. Australia has a narrow definition of what constitutes SaMD which does not catch low-risk health software. In contrast, the definition in Japan is broad and, as a result, it took Apple two years to obtain the authority to sell its watches in Japan (because they qualified as medical devices).

The DHA has submitted a full account of its concerns to parliament's Health Select Committee (Jensen & Maennchen, 2023)

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