MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

New Zealand's areas of (economic) strength

A literature review

CEU Working Paper 22/01

February 2022

New Zealand Government

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Authors

Chief Economist Unit

Sharon Pells, sharon.pells@mbie.govt.nz

Acknowledgements

Thanks to Michelle Hill for her help with the literature search. Thanks also to Mark Lea and Ron Crawford for their valuable suggestions. This paper also reflects helpful feedback and discussion with many other colleagues from across MBIE and the New Zealand Productivity Commission, Treasury, MFAT and Inland Revenue.

CEU Working Paper 22/01

February 2022

Ministry of Business, Innovation & Employment
PO Box 1473
Wellington 6140
New Zealand
www.mbie.govt.nz
0800 20 90 20
Media enquiries: media@mbie.govt.nz

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ISBN (online) 978-1-99-102230-1

Abstract

This report presents the findings of a literature review about New Zealand's areas of economic strength (and critical weakness) compared with other countries. As well as considering 'traditional' areas of economic strength using a product/industry lens, this review deliberately takes a broad view of areas of strength. On the former, New Zealand has current and historic strengths in agriculture, some niche manufactures and tourism. On the latter, New Zealand has performed consistently well over time in areas such as fundamental institutions, social capital/trust, health, education and employment. New Zealand's comparative weaknesses include our persistently poor productivity performance, and some environmental and distributional outcomes. The persistence in many strengths and weaknesses highlights the role of path dependence in New Zealand's economic development.

JEL classification

O10, O25, O130, O43

Keywords

Economic Development, Institutions and Growth

Executive summary

- **This report examines Aotearoa New Zealand's areas of economic strength** – concepts and ways of thinking about a country's areas of economic strength, methods for assessing those strengths, and evidence about New Zealand's strengths (and critical weaknesses). We defined areas of economic strength as 'specific economic or other dimensions in which a country has an advantage relative to other countries'. We deliberately took a broad view of relevant concepts, methods and evidence, in order to consider strengths from alternative angles.
- **The motivation is that there is interest in a more focused approach to economic development policy.** This focused approach would involve government explicitly targeting innovation policy and other economic development policy, effort and resources, at a small number of areas. Any future decisions about potential areas of focus are likely to take into account New Zealand's existing areas of strength.
- **Many concepts help us think about a country's economic strengths.** We brought together insights from relevant theories in the framework in Figure 1 below. The basic idea is that 'deep roots' factors like geography, fundamental institutions and culture shape a country's capabilities and inputs, which influence outputs like products, which in turn influence outcomes. Key take-outs are that a country can have strengths and weaknesses all along this chain, and ultimate outcomes reflect determinants (and choices) further down the chain. While government has little influence over slow-moving 'deep roots' factors, it has a greater choice set in terms of capabilities and inputs, such as in relation to the education, innovation, and other systems and their related institutions.
- **In New Zealand, backwards-looking methods have mainly been used to assess our comparative strengths.** These methods include revealed comparative advantage (a common method), economic complexity, bibliometrics, and various indices and dashboards of competitiveness and wellbeing. These methods essentially draw on historic data to compare New Zealand's strengths and weaknesses with those of other countries. While this comparative analysis has the benefit of benchmarking New Zealand's performance relative to others, it does mean that it misses domestically-focused strengths and in particular mātauranga Māori, kaupapa Māori, Māori and Pacific culture etc.
- **There is an opportunity to use other methods to explore New Zealand's strengths.** For example, strategic foresight methods would complement existing backwards-looking studies. These methods would provide insights about how our strengths could develop given the influence of external factors and global megatrends, and paint a picture of various possible or preferred futures and what they imply for the capabilities and strengths that might be needed. Methods that draw on mātauranga Māori would identify strengths that are unique to New Zealand. Using a broader range of methods would build on the findings of this present report.

- **New Zealand's comparative strengths often reflect 'deep roots' factors.** Compared with other countries, New Zealand has strengths and specialisations in research in agriculture and biological sciences, and in products related to agriculture, partly reflecting a climate conducive to agriculture. Similarly, New Zealand has strengths in tourism, partly reflecting the country's natural beauty. Strong social connections likely reflect underlying strengths in social capital, trust and 'deep' institutions.
- **Importantly, New Zealand has strengths in wellbeing.** Self-reported wellbeing among New Zealanders is comparatively high, as are some other measures of wellbeing. This finding is striking in comparison with standard metrics like GDP per capita for which New Zealand fares less well than many other developed countries. Given that New Zealanders' wellbeing is the ultimate policy goal, it is important not to lose sight of the factors that likely contribute to this performance.
- **Looking at changes over time, there is persistence in many strengths.** Compared with other countries, New Zealand has performed consistently well in areas such as fundamental institutions, social capital/trust, health, education and employment – see Figure 1. New Zealand also has persistent strengths in agricultural research and agricultural products. While emerging product strengths are dispersed across broad product groupings, they still tend to be directly or indirectly related to agriculture, reflecting New Zealand's core strengths – and path dependence – in this area.
- **New Zealand also has some unique strengths.** Figure 1 is based on international comparisons, and so does not pick up New Zealand's unique strengths. These unique strengths include Te Tiriti o Waitangi, Māori culture, tikanga and mātauranga, and the values and culture derived from Māori and Pasifika and the other diverse groups that make up New Zealand's population. These strengths are integral to what sets us apart as New Zealanders.
- **Geography plays a role in our comparatively weak material living standards.** New Zealand's small population size and remoteness are frequently assessed as critical weaknesses, although are probably better thought of as distinctive features. These features likely contribute to weak investment in infrastructure and R&D, skills mis-matches, and low trade intensity and product complexity. In turn, these weaknesses contribute to New Zealand's persistently poor productivity performance, and hence low income levels. While we cannot alter New Zealand's geographic location, we can help address some resulting weaknesses through investments in infrastructure, innovation, human capital etc.
- **New Zealand has weaknesses in some environmental and distributional outcomes.** New Zealand has comparatively high levels of greenhouse gas emissions per person and many threatened species. These findings about New Zealand's environmental performance based on 'hard' measures contrast with those from surveys about how other countries view New Zealand, which highlight things like New Zealand's greenery and respect for nature. New Zealand also has comparative weaknesses in some inequality measures, including income inequality, and (especially) housing affordability. Overall, these findings seem important in the context of major societal challenges like climate change and inequality.

Figure 1: Summary of New Zealand's comparative economic strengths and weaknesses

Framework	'Deep roots' factors & determinants	Inputs and capabilities	Outputs	Outcomes
New Zealand's current strengths	Fundamental institutions Social capital and trust Climate conducive to agriculture Natural environment and natural beauty	Education and skills Research impact overall Research in agriculture & biological sciences ICT infrastructure	Products directly or indirectly related to agriculture, niche manufactures and tourism	Subjective wellbeing Wellbeing overall (esp compared to GDP) Employment rate Health Social connections
New Zealand's current weaknesses	Small population size Distance from major centres	Skills mis-matches Investment in R&D, especially business R&D Some aspects of infrastructure eg roading, shipping connections	Exports are mainly low complexity eg agriculture and tourism Low trade intensity Collaboration between businesses and research organisations Productivity	Income and wealth Income inequality Housing affordability Time off work GHG emissions per capita Threatened species
Persistence over time	Persistent strengths in fundamental institutions, social capital and trust Persistent weaknesses in size/distance	Persistent strengths in education and skills, and agricultural research Persistent weaknesses in skills mis-matches, and investment in infrastructure and R&D	Persistent strengths in agriculture, niche manufactures and tourism Persistent weaknesses in trade intensity, collaboration between businesses and research organisations, and productivity	Persistent strengths in subjective wellbeing, health, employment rate, and social connections Persistent weaknesses in time off work and (especially) income

Source: Author, based on the studies covered in this report

- **Path dependence suggests that many of New Zealand's current strengths may be important in the future.** This report essentially provides a reality check when thinking about the future. New Zealand is still a largely biologically-based economy. Despite many calls for a more diverse economy, shifting New Zealand's exports away from traditional areas like agriculture and tourism has proven challenging.
- **However, the effects of global megatrends like climate change imply that a shift in direction might be needed.** New Zealand has ambitious climate goals, and livestock and transport account for a large proportion of emissions. The threats (and opportunities) posed by climate change imply the need to develop new strengths in traditional areas like agriculture and tourism and in other areas.
- **Government plays a role in shaping New Zealand's capabilities and strengths** – and in addressing critical weaknesses – to help prepare for the future. A shift towards strengths for a possible or preferred future might involve consideration of factors such as global megatrends that will shape the future, opportunities for New Zealand in global markets, Te Tiriti o Waitangi and other important commitments, and the type of economy New Zealanders want in the future. Given the powerful path dependence described above, achieving any desired shift in direction would require strong, focused and co-ordinated effort across the public and private sectors. Technology and innovation provide a possible way of breaking path dependence and supporting the transition. Strong governance and social processes would also be needed to support any shift.

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1 Introduction

1.1 Background and motivation

Identifying New Zealand's economic strengths is a topic of enduring interest. Understanding our past and present strengths (and weaknesses) helps when considering future strengths, and hence what a future New Zealand economy could achieve for New Zealanders. This has two aspects. The first is that what we are good at today is also what we are likely to be good at in the future. The second is around identifying any *new* strengths that might be needed to achieve desired outcomes in the future. The gap between the two indicates where efforts should be focused today.

Calls for a more focused approach to economic development policy date back to at least the early 2000s, and often centre on specific industries such as the knowledge industries (MBIE 2018a). More recently, some have suggested that, rather than focusing on industries, innovation policy and other economic development policy should focus on addressing major societal challenges (see for example Mazzucato 2021, Schot and Steinmueller 2018). This implies the need for a broad view of economic strengths.

Recently, interest in a more (explicitly) focused approach to economic development policy has been growing,[1] due in part to the Productivity Commission's 2021 frontier firms inquiry. One suggestion that has gained traction is: "…finite government resources also need to be deliberately focused on a small number of high-potential areas rather than being thinly spread in what David Skilling terms "sub-therapeutic doses"".

The recent heightened attention on a more focused approach to economic development policy has triggered an interest in better understanding New Zealand's areas of economic strength, and hence provided the motivation for this report.

1.2 Objectives

This report examines the following questions:

1. **What do we mean by 'areas of strength'?** What definitions and concepts are helpful when thinking about a country's strengths (and critical weaknesses)?
2. **What alternative methods are available for assessing areas of strength?**
3. **What do we know about New Zealand's existing areas of strength?** And about New Zealand's critical weaknesses? How have these changed over time?
4. **What are the implications for future strengths?**

The ultimate purpose is to contribute to the evidence base for any potential areas of focus for economic development policy. The purpose also includes identifying any new analyses that might usefully be undertaken to further contribute to this evidence base.

[1] It could be argued that science investments, industry policy etc *imply* a focus for ED policy.

1.3 Scope and limitations

This report is based on a review of international and New Zealand studies focused on the questions above. The literature search was conducted mid-2021. We started by searching for theories and concepts that help understand a country's areas of economic strength. We used these concepts to identify related methods, and then identified studies about New Zealand's strengths and weaknesses based on those methods. The scope is discussed further in Table 1.

Table 1: Scope of literature review

Dimension	In scope	Out of scope
Approach	• Review of international and New Zealand literature.	• Any new quantitative or other analysis, although the aim is to lay the groundwork for such analysis by identifying promising methods.
Unit of analysis	• Country-level analysis. While economic strengths can be assessed at various levels (eg industry-, region- or business-level), a country-level lens is valuable. This reflects that countries' development paths can follow quite different trajectories, partly based on country-specific factors (Jones 2016).	• Areas of strength at an industry-, region- or business-level etc. This means, for example, that the literature about the agglomeration benefits of cities is not covered.
Time horizon	• Current and historic areas of strength, and how these have changed over time. • Broad considerations for any new strengths that might be needed in the future.	• A detailed analysis of new strengths that might be needed in the future.
'Areas of strength'	• Areas in which New Zealand has an advantage relative to other countries ie based on international comparisons. • Mainly areas of economic strength, but also other dimensions of wellbeing, reflecting that wellbeing is the ultimate goal. • Industries in which New Zealand has a comparative advantage, but also other aspects of the economy, reflecting that modern economic development policy has tended to shift away from a purely industry lens.	• Domestic/internal factors and other areas for which international comparisons are not relevant. • Areas of focus for government's effort/resources, although the aim is to contribute to the evidence base for any decisions about that.
Methods for assessing strengths	• Ones traditionally used in economics, like revealed comparative advantage, economic complexity mapping etc. • Other novel, or future-focused, methods such as nation branding and foresight.	• Methods that do not involve international comparisons.

The limitations of our approach include that, because of the relatively wide scope of the topic, this report does not provide a comprehensive assessment of New Zealand's areas of strength. In addition, the focus on international comparisons means the review largely misses important domestic strengths, in particular Māori and Pacific culture, knowledge and practices. The comparative analysis also means that New Zealand's absolute performance is not covered; absolute performance is important when assessing poverty, for example.

2 What do we mean by 'areas of strength'?

In this report, we define 'areas of strength' as 'specific economic or other dimensions in which a country has an advantage relative to other countries'. We found many alternative concepts and ways of thinking about a country's areas of strength – there was no single dominant theory. In some ways, rather than strengths, it is probably more helpful to think about the distinctive characteristics of a country that drive its economic and wider performance. 'Deep roots' or legacy factors, such as geography and institutions, are helpful in this context. We develop a framework that builds on 'deep roots' and other concepts.

2.1 Definitions

2.1.1 The definition of 'strength' varies with context

The term 'strength' is defined in the Oxford Dictionary as 'being physically strong'.[2] However, the meaning varies with context. As well as physical strength, the term can relate to bravery, power, taste etc.

In an economic context, the term 'strength' is often used but is rarely defined. One useful way of thinking about strength is advantage – 'the quality or an ability that a person or thing has that gives them an advantage'.[3] This definition emphasises that strength is relative, an idea picked up in some of the economic theories below.

2.1.2 A strength can also be seen as a weakness

The term 'strength' is normative – it is based on opinion or value judgement. In contrast, positive statements are fact-based.

This means that a strength can also be perceived as a weakness. For example, New Zealand's small population and isolation are generally seen as weaknesses. But these attributes have helped us during the COVID-19 pandemic, and so in this context could be considered a strength. So, it is probably more helpful to think of size and distance as distinctive features of New Zealand rather than strengths or weaknesses.

2.1.3 We provide a working definition of 'areas of strength'

Here, we define areas of strength as 'specific economic or other dimensions in which a country has an advantage relative to other countries'. This emphasises that strength is relative, and that we are not looking at macro indicators of overall economic strength such as GDP, but specific facets of the economy in which New Zealand has a strength.

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[2] https://www.oxfordlearnersdictionaries.com/definition/english/strength
[3] Ibid.

2.2 Theories and concepts

2.2.1 'Deep roots' factors include geography, institutions and culture

One way to think about a country's areas of strength is to identify 'deep roots' factors or long-term legacy factors. These factors are generally used to explain why growth has or has not taken off in some countries (Ketels 2016), but can also be helpful to identify the provenance of a country's specific strengths.

The two prime factors are institutions and geography (Ketels 2016). The important role of institutions has long been noted in economic research. Some have focused on the importance of the rule of law, others on the role of property rights. What type of institutions a country ends up with often reflects the country's colonial history (Ketels 2016). In New Zealand, institutional arrangements are hopefully amenable to change beyond colonial legacies through implementing Te Tiriti o Waitangi principles.

Others have focused more on the role of geographic factors (Sachs 2012, cited in Ketels 2016). Geographic conditions like climate (including exposure to certain diseases), coastlines (access to trade routes), and the presence of specific natural resources have in this view had a deep underlying impact on the development path of economies.

Culture – language and traditions – also shapes a country's economic development (OECD 2019a). Te ao Māori is an important aspect of New Zealand's culture.

2.2.2 A long-term view emphasises innovation and path dependence

Like 'deep roots' theory, evolutionary economics takes a long-term view of how economies evolve and change. Evolutionary economics draws on insights from biological evolution such as the theory of 'survival of the fittest'.

Evolutionary economics – and many other economic theories – highlights the role of innovation in economic development. More profitable technologies and innovations tend to be imitated and adopted, and so these technologies diffuse across the economy (Nelson 1995). Importantly, ideas are not used up in the same way as other resources – once an idea is invented, it can be used by one person or one thousand people simultaneously. So, innovation can lead to increasing returns to scale (output increases more than inputs), and thus productive and sustainable development.

Evolutionary economics also highlights the role of path dependence in economic development – what has occurred in the past persists. As Nelson (1995) put it, "strong inertial tendencies preserve what has survived the winnowing or selection processes". Reasons for path dependence in innovation include network effects ie that the benefits of using a particular technology rise with the number of other users (eg Facebook), and that infrastructure assets are often locked in due to the high costs of switching to alternatives (Aghion, et al. 2014, cited in Stern and Valero 2021). Status quo bias and other behavioural factors also play a role in path dependence (Geels and Schot 2007).

Key insights are that a country's future areas of strength are likely to build on historic ones, so that it can be hard to break away from existing areas of strength. Innovation potentially provides a way of doing so, but is itself prone to path dependence.

2.2.3 Countries have capabilities that shape their strengths

The legacy factors described above shape a country's resources and capabilities. 'Capabilities' are commonly defined as the ability or capacity to do something.[4] Capabilities tend to be conceptualised at the person- or organisation-level, such as workers' skills and knowledge, which may not be fully utilised in their current jobs.

Importantly, capabilities are about potential – to be useful, capabilities need to be actually exploited. Teece (2019) made this point in his highly cited firm-level dynamic capablities framework. He grouped dynamic capabilities into three clusters – 'sensing', 'seizing' and 'transforming'; to create value, firms need to seize opportunities. In support of this theory, there is growing evidence that differences in managerial capability drive productivity differences among firms (Syverson 2011).

At the country level, nations can be thought of as more than the mere sum of their parts (Fagerberg and Srholec 2017). They are also repositories of knowledge, institutions and resources, that is, capabilities, which significantly influence the creation of economic value and shape a country's strengths.

Technology, education and governance were identified by Fagerberg and Srholec (2017) as particularly important capabilities at the country level. Both theoretical and empirical studies support the role of innovation and education in economic growth, and in a range of other outcomes (MBIE 2016). Networks of productive relationships, social and physical infrastructure etc, are also part of national capabilities.

A key insight is that capabilities can be used in different ways in the future, providing some flexibility to develop new strengths, and hence a source of resilience.

2.2.4 Comparative advantage reveals something about a country's strengths

Comparative advantage theory is a classic concept of international trade based on David Ricardo's seminal paper of 1817 (Wosiek and Visvizi 2021). A country has a comparative advantage in producing a particular good if it can produce that good at a lower relative opportunity cost than other countries.

Importantly, patterns of trade reveal something about a country's economic strengths, as they reflect the 'deep roots' factors above. The relative productivity of different products is conditioned by political, economic, and cultural factors of the country, as well as production factors, such as capital, labour, raw materials, and knowledge (Wosiek and Visvizi 2021). However, Ricardian comparative advantage leaves it open about which of these factors is driving the comparative advantage.

The product cycle theory developed by Vernon (1966, 1979, cited in Siggel 2006) suggests that the sources of comparative advantage may change over the life cycle of products. In the early stages, comparative advantage is based on the first-come advantage of the country in which the product was developed. The cost advantage shifts to lower cost countries, due to advantages like factor abundance. Later on, scale economies and learning effects may become the source of comparative advantage.

[4] https://dictionary.cambridge.org/dictionary/english/capability

2.2.5 Competitiveness tends to be seen in terms of productivity and cost

Economic strength is often associated with concepts of competitiveness (Rim, et al. 2020). However, competitiveness, unlike comparative advantage, has not been rigorously defined in the economic literature (Siggel 2006). In addition, competitiveness is conceptually easier at the firm- than the country-level. Microeconomic theories focus on businesses' competition for market share, profits, exports etc. In contrast, there is less consensus about what competitiveness means at the macro or country-level (Ketels 2016). Unlike businesses, countries tend not to directly compete with each other, although arguably they compete for labour, investment etc.

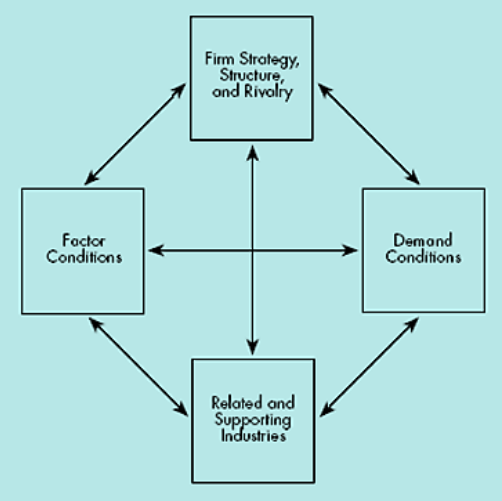
At the country level, competitiveness tends to relate to concepts around productivity and cost (Siggel 2006, Ketels 2016).

2.2.6 Porter emphasised the 'home base' that nations provide to firms

In his highly influential (1998) book about country competitiveness, Michel Porter aimed to identify why particular countries succeed in particular industries. His theories start with individual businesses and industries and build up to the economy as a whole.

Porter argued that the primary role of the nation from a competitiveness perspective is the 'home base' it provides to businesses. Since businesses typically develop within a domestic context before expanding internationally, the home base plays a key role in shaping the identity and character of the business, and its approach to strategy, as well as the availability and quality of resources available. Four key 'home base' factors shape businesses' sustainable competitive advantage – see Figure 2.

Figure 2: Determinants of national competitive advantage - Porter's 'diamond'



- **Firm Strategy, Structure, and Rivalry** – conditions governing how businesses are created and managed, as well as the nature of domestic competition.
- **Demand Conditions** – local demand conditions.
- **Related and Supporting Industries** – the presence or absence in the nation of supplier industries and other related industries that are internationally competitive.
- **Factor Conditions** – natural resources, infrastructure, skills, capital, and land. Porter stressed 'specialised factors' of skilled labour, capital, and infrastructure, which are harder to generate quickly and require long-term investment and cultivation.

Source: Porter (1990)

Key insights from this model include its recognition that *differentiation* advantage through quality, product features etc is at least important a determinant of competitiveness as cost (Grant 1991); previous models were preoccupied with cost.

2.2.7 How people 'vote with their feet' reveals a location's strengths

In the same way that export patterns reveal something about a country's strengths, so too do people's location decisions. This reflects that people 'vote with their feet' and move to locations that improve their wellbeing (Faggiana, Olfertc and Partridgea 2011). Therefore, understanding the factors determining net migration to a location can help discern the revealed preferences of the population. Looked at the other way around, the same factors reflect what makes the location attractive and therefore provide one angle into the strengths of the location.

'Spatial equilibrium' is a prominent theory in this context. This theory argues that migration is an equilibrating mechanism that operates when one location has greater expected utility than does another location (Grimes, Oxley and Tarrant 2012). People are essentially making location decisions based on the amenities, job opportunities, house prices etc of different locations. Therefore, if a location or country attracts more people, this reveals that the location must have preferred attributes.

2.2.8 Wellbeing, and other concepts that look beyond purely economic strengths, are consistent with te ao Māori

Wellbeing frameworks take a broader view of a country's strengths, compared with the economic theories above. Stiglitz, Sen and Fitoussi (2009) wrote a seminal report about wellbeing. This reflected Sen's earlier 'capabilities' approach to wellbeing, which distinguished between people's capabilities (what they can potentially be and do) and what they choose to do with these capabilities (their actual functionings). The OECD's 'Better Life Index' is based on the work of Stiglitz, Sen and Fitoussi. Treasury's Living Standards Framework (LSF) is largely based on the OECD's wellbeing work (Smith 2018).

Taking a broader view of strengths is consistent with te ao Māori. A te ao Māori lens to wellbeing emphasises inter-generational wellbeing, the role of Te Tiriti o Waitangi, and collectivist or whānau-centred thinking rather than individualistic thinking (McLaren 2019). Te Puni Kōkiri and the Treasury (2019) explored how Māori perspectives might be included in the LSF. The Treasury developed He Ara Waiora to help it understand waiora (Māori perspective on wellbeing).[5] The Treasury also considered Pacific concepts of wellbeing, such as the Fonofale model, which highlights 'family' as the foundation for all Pacific peoples, and 'culture' as the overarching element under which all important aspects to Pacific peoples are created and maintained (Hughes 2021; Thomsen, Tavita and Levi-Teu 2018).

Also taking a broad view of strengths, the OECD (2019a) developed a framework to examine regional strengths (see Figure 3). The basic idea is that each region has a specific set of strengths and weaknesses that makes it different from other regions. While the framework relates to regions within a country, it seems that the framework could usefully be applied at a country level as well.

[5] https://www.treasury.govt.nz/information-and-services/nz-economy/higher-living-standards/he-ara-waiora

Figure 3: Examples of regional strengths

Dimension	Specific strength
Economic	– Existing industrial clusters – Specific skills among the workforce – Specialised supplier base – Large customer base
Geographic	– Resource availability – Availability of cheap renewable energy – Strategic location (e.g. along transport corridors) – Climate – Natural beauty
Institutional	– Well-functioning/flexible institutions – Collaborative culture of working together
Culture	– Language skills – Traditions that can be marketed (e.g. local cuisine) – Entrepreneurial traditions
Knowledge-based	– High-quality research institutions – Research specialisation in valuable niches – Well-functioning co-operation between research institutions and the private sector
Infrastructure	– Transport infrastructure (e.g. ports, airports) – High-speed data connections – Tourism infrastructure

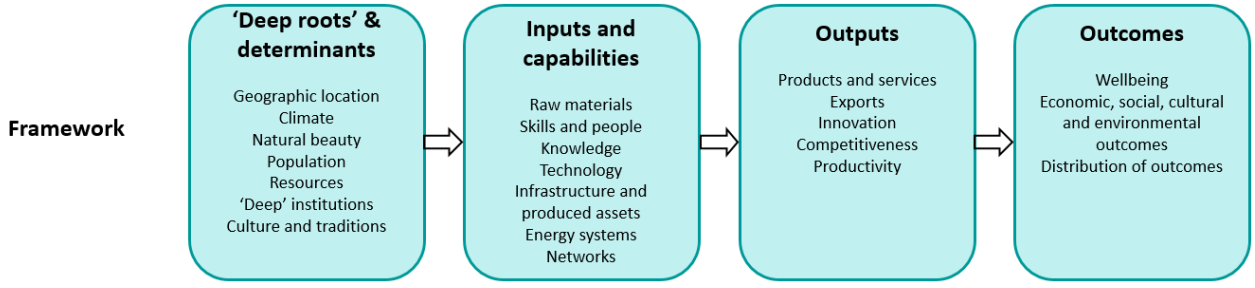
Source: OECD (2019a)

2.3 Overall framework

We drew on the concepts and theories above to develop an overall framework for examining a country's areas of strength – see Figure 4. The underlying determinants on the left-hand side of the framework draw on 'deep roots' theory – they are largely exogenous factors over which a country has little control. These factors shape a country's inputs and capabilities, which in turn shape outputs and outcomes.

Key points are that a country can have strengths and weaknesses all along the chain, and that ultimate outcomes reflect determinants (and choices) further down the chain. The framework is somewhat closed, linear and static, which means it largely ignores international connections and many dynamic aspects of the economy. However, the benefits of the framework include its simplicity and broad view of strengths.

Figure 4: Overall framework for thinking about a country's comparative strengths



Source: Author, based on concepts above

3 What alternative methods are available for assessing areas of strength?

There are many alternative ways of assessing a country's strengths, reflecting the wide-ranging concepts discussed in section 2. The methods are essentially backwards-looking. In New Zealand, revealed comparative advantage is one method that has been used a number of times to examine our export strengths in specific product lines and industries. To complement existing studies, it would be useful to draw on a broader range of methods.

3.1 Overview

Some of the main methods and approaches for assessing a country's comparative economic strengths are discussed in this section, and are covered in more detail in the Appendix.

Note that we selected methods based on their grounding in one of the theories in section 2, and their coverage across the framework in Figure 4.

The methods and approaches can be grouped in various ways:

- **Backwards-looking v forwards-looking.** The methods discussed in this section are based on data which are gathered at regular time intervals, and so can be used to examine historic trends – they are backwards-looking methods. Forwards-looking methods are discussed in section 5.
- **Quantitative v qualitative.** The methods discussed in this section are quantitative ie their outputs are numbers. Some methods discussed in section 5 are qualitative ie their outputs are words.
- **Objective v subjective measures.** Many of the indices and dashboards we identified use a mix of objective and subjective indicators. Objective measures are based on observation, and subjective measures are based on opinion. Relatedly, some methods can be grouped in terms of revealed preferences, such as revealed comparative advantage based on trade patterns and revealed location preferences based on migration patterns, and stated preferences, such as surveys about a person's self-reported wellbeing or a location's attractiveness.
- **Composite indices v dashboards.** The World Economic Forum's Global Competitiveness Index and the Global Innovation Index are composite indices – they combine data on various indicators to arrive at a single performance number or ranking. In contrast, the OECD's Better Life Index presents information from each indicator separately in the form of a dashboard.

3.2 Main methods

3.2.1 Revealed comparative advantage is a prominent method

A commonly used method for assessing a country's economic strengths is the revealed comparative advantage (RCA) index. This measures the share a group of goods or services has in a given country's exports and in the world exports to a selected market. The basic idea is that patterns of exports reveal something about the goods and services in which the country is relatively productive, per comparative advantage theory. A number of RCA studies have been conducted in New Zealand (Baigent forthcoming, Lattimore 2019a and b, Nesbitt 2013, and Ballingall and Briggs 2002).

Economic complexity builds off RCA concepts. Economic complexity uses data on countries' export baskets to infer information about countries' productive capabilities, and is based on the work of Hausmann and Hidalgo (2009 and 2011). Economic complexity is calculated based on measures of diversity and ubiquity, where diversity is how many different kinds of products a country is able to make, and ubiquity is the number of countries that are able to make a product. The 'Atlas of Economic Complexity' examines economic complexity and includes New Zealand.

The same broad approach as used in RCA (ie a country's share in X compared with the world's share in X) can be used to reveal strengths in contexts other than trade. For example, a similar approach can be used to assess scientific strengths based on bibliometrics, a method that uses data on research publications (see for example MBIE 2018b). In a somewhat similar vein, migration patterns can be used to assess revealed preferences about locations (see for example Grimes, Ormsby and Preston 2017).

3.2.2 More novel backwards-looking techniques include nation branding

Among the various methods we identified, nation branding may be one with which some people are less familiar. Nation branding assesses the perceptions of a nation in the mind of international stakeholders, generally via surveys or expert panels. New Zealand is included in some of the main nation brand indices, such as the Anholt Ipsos Nation Brands Index and the Country Brand Index.

3.2.3 The OECD's Better Life Index offers a broad way of comparing strengths

Various indices and scoreboards look beyond purely economic strengths of a country. These indices and scoreboards include some focused on wellbeing. Among these, the OECD's Better Life Index is evaluated as high quality and is widely used (Durand 2015, Social Investment Agency 2018). New Zealand is one of the countries included.

The Social Investment Agency (2018) considered the relevance of the Better Life Index in the New Zealand context. Overall, the Agency found that the Index was highly relevant and generally well regarded. However, the Agency commented that the Index essentially ignores culture. The Agency suggested that two elements of culture appear important in New Zealand – a sense of belonging, and te ao Māori. The Agency argued that issues of cultural identity are particularly salient in a New Zealand context given the country's bicultural origins and its diverse immigrant population.

3.3 Advantages and disadvantages of specific methods

Table 2: Advantages and disadvantages of specific methods for assessing economic strengths

Method	Description	Advantages	Disadvantages
Revealed comparative advantage (RCA)	Measures the share a group of goods or services has in a given country's exports and in the world exports to a selected market	• Has a strong theoretical base ie Ricardian comparative advantage • Relatively simple to construct and intuitive (French 2017) • Conditioned by political, economic, and cultural factors etc, as well as production factors, such as capital, labour and knowledge (Wosiek and Visvizi 2021), and so to some extent reflects a country's fundamental strengths	• Influenced by price distortions and trade barriers/subsidies (Siggel 2006, French 2017) • Sensitive both to the number of product groups and the number of countries in the reference group (Wosiek and Visvizi 2021) • Tends to measure goods rather than services (Wosiek and Visvizi 2021)
Economic complexity	Infers information about countries' productive capabilities from their export baskets, based on measures of 'diversity' and 'ubiquity'	• Intuitively attractive in terms of building on a country's existing capabilities • Offers a quantitative base for progressing industrial policy efforts (Hidalgo 2021) • Can be used to identify diversification opportunities (Hidalgo 2021), so in this sense is forwards-looking	• Tends to exclude services • Excludes non-tradable activities, such as construction, electricity distribution and restaurants • Uses algorithms (Hidalgo 2021), and so is fairly complex and lacks transparency • Based on a number of assumptions that a country's capabilities can be inferred from its export basket
Bibliometrics	Analyses research publications, patents and citations to measure scientific and technological accomplishment	• Transparent and results can be reproduced using the same method • Scalable ie can be analysed at the individual, institutional, national or international level • Can provide a signal of emerging and disruptive technologies, capabilities and niche innovations (Geels and Schot 2007), and in this sense can be an early indicator of future areas of economic strength	• Can be gamed ie exploited by researchers to artificially boost their bibliometric scores • New knowledge generated in a country may not be taken up by businesses in that country, and so may not be a good indicator of economic strengths • Patents are one of many ways in which intellectual property is protected by businesses (Narin, Olivastro and Stevens 1994), and so provide only a partial signal of innovation
Global Competitive-ness Index (and other composite indices)	A composite index of a country's competitiveness based on objective indicators and an international survey of executives	• Provides a comprehensive assessment of competitiveness (Xia, Liang and Zhang 2012) • Broadly based on Porter's concepts (Kuah, et al. 2010)	• Little empirical support ie the Index is not strongly associated with economic performance (Xia, Liang and Zhang 2012) • General problems with composite indices – loss of information, arbitrary weightings and normalisation to arrive at a single figure (Durand 2015), and highly dependent on countries in comparator group (Grimes 2015)

OECD Better Life Index (and other scoreboards)	A dashboard of objective and subjective indicators covering current wellbeing and the resources needed for future wellbeing	• Has a strong theoretical base ie work of Stiglitz, Sen and Fitoussi (2009) • Dashboard approach presents separate information for each indicator, which provides detailed information and the freedom to choose weightings (Durand 2015) • Covers distributions as well as averages (Durand 2015) • Includes subjective wellbeing as well as more objective wellbeing dimensions (Durand 2015) • Strong support from empirical studies ie the dimensions are found to have independent statistically significant effects on life satisfaction (Social Investment Agency 2018)	• Limited coverage eg 'Environment' dimension only includes an indicator on air pollution (Kasparian and Rolland 2012) • Difficult to compare across indicators due to differences in scale (Kasparian and Rolland 2012) • Where differences across countries are minimal, slight differences in performance will result in artificially large contrasts in the scores for an indicator (Kasparian and Rolland 2012)
Revealed preferences about location choices	Econometric approach based on migration (and often wellbeing) data as a way of revealing peoples' location preferences	• Has a strong theoretical base ie spatial equilibrium theory (Grimes, Ormsby and Preston 2017) • Revealed preferences (what people actually do) tend to provide more powerful evidence than stated preferences (what people say they do)	• Data intensive – for example, the wellbeing measures in Stats NZ's General Social Survey tend to lack the granularity needed for this type of analysis
Nation branding	Assesses the perceptions of a nation in the mind of international stakeholders, generally via surveys or expert panels	• Provides an external perspective of a country's strengths • Countries need to 'walk the talk' ie demonstrate the brand values that they promote; nation branding aims to assess this external reputation (Fan 2010)	• Surveys may be inaccurate, biased, and even incorrect if the individuals being surveyed have no or limited experience of the country being assessed (Lahrech, Juusola and Al Ansaari 2020) • Lack of consensus on the definition of 'nation brand' and measurement approaches (Lahrech, Juusola and Al Ansaari 2020)

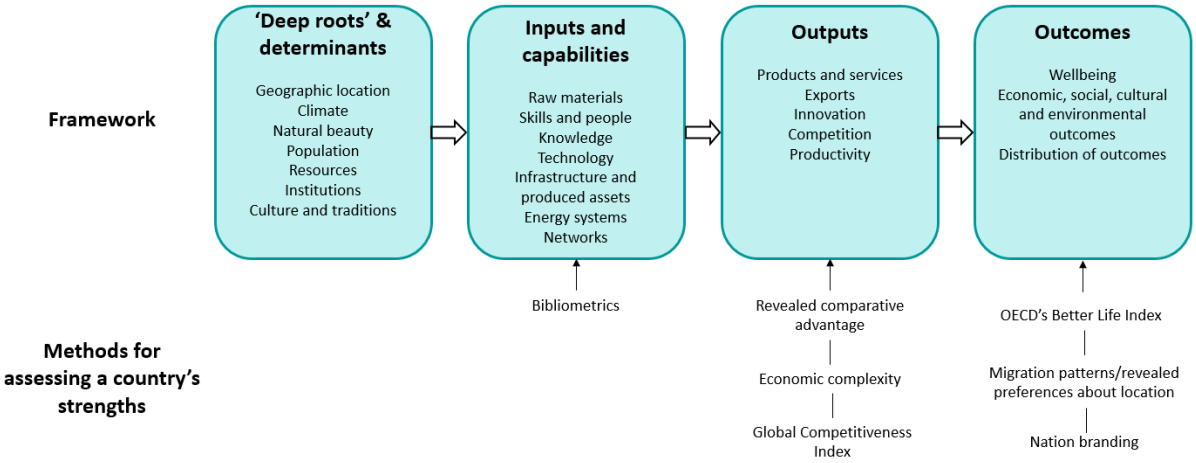
Source: Various per body of the table, also see Appendix

3.4 Conclusions and discussion

Each method has strengths and weaknesses. One way to think about any new analysis that might be conducted about New Zealand's areas of economic strength is in terms of coverage of method types. Using a wide variety of methods enables the findings from one method or study to be triangulated with those of other methods and studies. This might involve complementing existing RCA studies – the main method used to date – with other methods. These other methods might include forwards-looking qualitative ones (discussed in section 5), which would complement the backwards-looking quantitative methods above. Other methods also include ones that draw on mātauranga Māori, which would assist with identifying strengths that are unique to New Zealand.

Another way to think about coverage is in terms of the framework in Figure 4. Figure 5 provides a rough mapping of where each method is focused on that framework. This suggests that the focus tends to be on outputs. In terms of gaps, few methods specifically focus on underlying determinants or capabilities. Drawing on a broader range of evidence, such as studies about New Zealand's economic history, is relevant in this context.

Figure 5: Mapping methods to the framework



Source: Author, based on the studies covered in this report

4 What do we know about New Zealand's areas of strength?

Compared with other countries, New Zealand's current and historic strengths include ones in relation to fundamental institutions, trust, skills, agricultural research and products, and, importantly, wellbeing. Many weaknesses stem, in part, from our small population size and distance from main centres. There is much persistence in many of the strengths and weaknesses.

4.1 Overview

This section compiles evidence from a range of studies and sources to identify New Zealand's key areas of strength and weakness. The evidence generally compares New Zealand's performance on a number of dimensions with that of other countries. The overall aim was to develop a rounded picture of New Zealand's strengths and weaknesses, by broadly populating the framework in Figure 4. A summary of the findings based on the framework is provided in section 4.3.

Note that, because Figure 4 spans a wide territory, the evidence in this section can be characterised as wide and shallow rather than narrow and deep. This means that we do not provide a comprehensive assessment of New Zealand's areas of strength. In particular, we have not picked up every index that compares New Zealand with other countries.[6] Instead, we have focused on indices based on the concepts outlined in section 2, such as the OECD's Better Life Index with its wellbeing focus, and ones that target the main elements of Figure 4.

This section is broadly structured in terms of moving from the left-hand-side of our framework in Figure 4 to the right-hand-side. This means that it starts with evidence about New Zealand's strengths (and weaknesses) in underlying determinants, then moves on to evidence about inputs and capabilities, outputs, and finally outcomes.

[6] Examples include the Ease of Doing Business Index (World Bank), Corruption Index (Transparency International), Prosperity Index (Legatum Institute), Democracy Index (Economist Intelligence Unit), Global Liveability Index (Economist Intelligence Unit), Quality of Living Index (Mercer).

4.2 Findings from individual studies

4.2.1 An economic history lens highlights the role of government, institutions and path dependence in shaping New Zealand's strengths

Few of the methods in section 3 specifically consider strengths in relation to the underlying determinants and 'deep roots' factors part of our framework, so here we consider a broader range of evidence. An economic history lens is particularly relevant in this context, as it can identify patterns of change over time that can provide insights for how we think strategically about the future. The economic history of New Zealand is a large topic and we consider it only very briefly here. Some contributions include Easton (2020), McAloon (2013) and Hendy and Callaghan (2013).

An economic history lens emphasises the role of government and institutions in shaping New Zealand's industrial strengths. For example, in the post-war period the government tried to control imports, so more products would be made locally. While most local manufacturing was small, large factories included farm processing, factories for steel and aluminium production, oil and gas conversion, and timber processing, including pulp and paper. In the 1980s, the government removed taxes on imports, reformed the economy, and New Zealand became one of the most open economies in the world. Arguably, the combination of a period of high protectionism followed by a period of opening up the economy explains some of the strengths we see today in niche manufacturing (MBIE 2018a), as shown in the revealed comparative advantage analysis below. Remnants of the 20th century manufacturing sector have been retained in terms of skills, knowledge and capabilities, and these appear to have shaped some of New Zealand's niche industries currently competing on the world stage.

An economic history lens also highlights the role of path dependence in shaping New Zealand's strengths. In particular, the New Zealand economy has been heavily reliant on agriculture, reflecting a conducive climate and fertile land, and that, for much of the 20th century, New Zealand's main exports were agricultural products to the UK. Hendy and Callaghan (2013) argued that New Zealand should "get off the grass" and break away from our dependence on agriculture, by investing in science and innovation to develop high-tech niches. This investment would build on New Zealand's strengths in education and human capital. However, this proposed shift away from agriculture towards high-tech niches has proven challenging, reflecting not only New Zealand's inherent strengths in agriculture, but also path dependence in some of our institutional arrangements which likely perpetuate this focus.

A key take-out is the need to distinguish between 'deep' institutions that do not change much over time, such as the legal system and broad political system, and other institutions that do, such as those in relation to the innovation system, education system etc. In the short term, government has more control over the latter. For example, it may be possible to change some institutions to break New Zealand's reliance on agriculture, as suggested by Hendy and Callaghan (2013). Careful consideration would need to be given to the feasibility (and desirability) of such a shift, which has often been mooted but has proven hard to do in practice.

4.2.2 An economic history lens also highlights New Zealand's culture, and in particular te ao Māori, as a unique strength

Looking at New Zealand's economic history highlights the role of another 'deep roots' factor – culture – in shaping our economic strengths. Surveys about national identify have found that culture, landscape and diversity define New Zealand for the majority of its citizens, with sport also making a recognised contribution, and Māori culture and activities being an important part of New Zealand's national identity for most New Zealanders (see for example Ministry for Culture and Heritage 2009). Tourism Industry Aotearoa pointed out that Māori culture is not only a unique point of difference in the world, but an integral part of what sets us apart as New Zealanders.[7]

Te Tiriti o Waitangi, New Zealand's founding document, is often considered a strength. Compared with other colonised countries, New Zealand is sometimes viewed as a prototype of Indigenous-settler relations in the Western world (MacDonald 2016). However, an examination of New Zealand's economic history also shows that Māori and Pasifika have experienced enduring inequities (see for example Bell, et al. 2017). New Zealand's colonial history has contributed to institutional racism and continuing health and other inequities for Māori (Came, McCreanor and Manson 2019; Elkington 2020). This raises questions about the effects of New Zealand's 'deep institutions', which, as discussed below, are often assessed as a comparative strength for New Zealand.

Looking ahead, te ao Māori is likely to play an even greater role in New Zealand's economic development, for reasons including (Chapman Tripp 2017):

- the growth and diversification of the Māori economy, partly due to the Treaty settlement process
- increasing adoption of tikanga in the commercial context
- increased clout for Māori in the political sphere, and
- post the landmark Wakatū decision, a progression in indigenous rights law in New Zealand.

4.2.3 Size and distance are assessed as critical weakness for New Zealand

Also taking an economic history lens, there has been much commentary about the role of New Zealand's unique economic geography in shaping our economic performance. In particular, the effects of the small size of New Zealand's population and economy, and our distance from major economic markets, are often highlighted.

For example, Conway (2016) considered the role of size and distance in New Zealand's persistently poor productivity performance compared with other countries. He commented that New Zealand's small domestic markets mean that businesses face weak domestic competition, can struggle to achieve economies of scale and scope, may choose to operate with lower capital intensity compared with businesses serving larger more open markets, and tend to stay small.

[7] https://www.tia.org.nz/news-and-updates/industry-news/tia-makes-formal-commitment-to-maori-tikanga/

In terms of distance, Conway argued that it is well accepted that distance from large global markets works against international connection and negatively impacts an economy's productivity performance. Somewhat counterintuitively, the negative impact of distance on international connection may have *increased* over recent decades as a result of changes in the global economy. Given the importance of tacit knowledge and face-to-face contact, the rewards to proximity may have increased, resulting in knowledge-intensive and high value-added activities increasingly taking place within large cities.

Some studies have tried to measure the role of New Zealand's size and distance in our comparative economic performance. For example, de Serres, Yashiro and Boulhol (2014) examined New Zealand's 'productivity paradox' – that while New Zealand has policy setting that are generally viewed as favourable to productivity, our productivity performance has been poor. The authors used a macroeconomic model of productivity based on a panel data set comprising 20 OECD countries over the period 1981-2010. The study found that size (measured by population) and distance (measured by an index of market and supplier access) accounted for over half of New Zealand's productivity gap relative to the OECD average. Specifically, of the 27 percentage point gap in total factor productivity between New Zealand and the OECD average:

- up to 15 percentage points (ie around half the gap) was estimated to be due to the effects of New Zealand's size and distance on business performance
- between three and 11 percentage points was estimated to be due to low levels of investment in research and development (R&D)
- around three percentage points was estimated to be due to New Zealand's better-than-average integration of low-skilled workers, meaning that more low-productivity workers contribute to the New Zealand economy than is the case for many other countries.

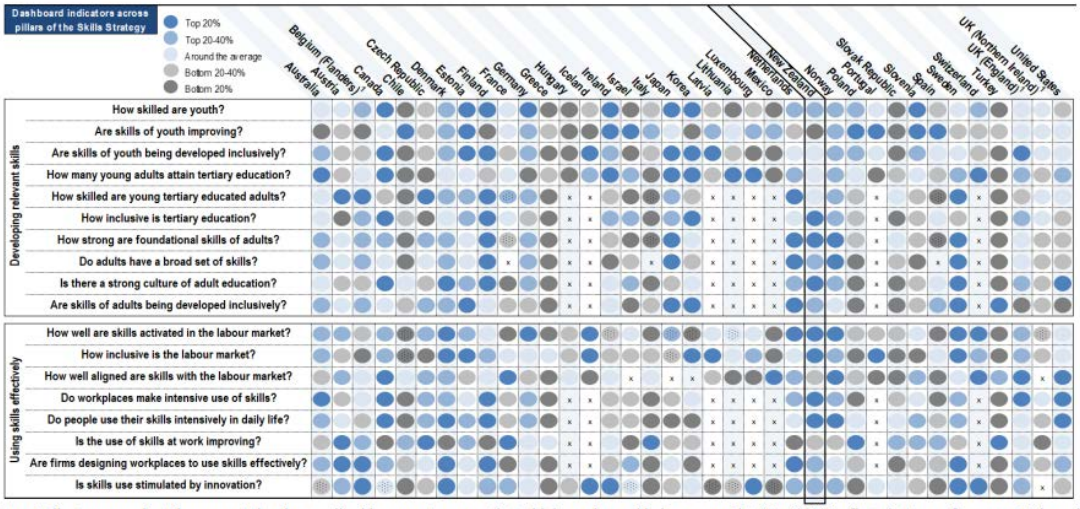
In a somewhat similar vein, Crawford, Fabling, et al. (2007) analysed patterns of national R&D and patenting activity across developed countries, accounting for factors that may impact on small, distant countries. They used data covering 22 developed countries for the period 1981-2001. Their measure of size was country population, and measure of distance was distance of country to USA, Japan, Germany. Once they controlled for the effects of economic size, distance, sectoral composition and business size, they found that New Zealand was not an outlier in its per capita patenting performance, its level of R&D expenditure, nor the private sector share of R&D expenditure. In other words, size and distance accounted for much of New Zealand's comparatively poor peerformance in R&D and patenting.

A key take-out is the importance of recognising the role of size and distance in shaping New Zealand's economic performance, a point discussed throughout this report.

4.2.4 New Zealand has strengths in a number of aspects of skills, although the skills of young New Zealanders have been declining

Turning to the inputs and capabilities part of our framework, we consider New Zealand's comparative performance in skills. The OECD's Skills Strategy (OECD 2019b) provide some comparative analysis of New Zealand's performance in terms of skills. The underlying data sources are mainly the OECD's Programme for International Student Assessment (PISA), which measures 15-year-olds' ability to use their reading, mathematics and science, and the OECD's Programme for the International Assessment of Adult Competencies (PIAAC), which measures adult skills in literacy, numeracy and problem solving in technology rich environments. A summary of the findings for New Zealand from the Skills Strategy is provided in Figure 6.

Figure 6: Summary indicators of New Zealand's skills performance, 2019 or latest



Notes: Indicators are selected, aggregated and normalised in a way to ensure that a higher value and being among the "Top 20%" reflects better performance. Colours in the dashboard represent the quintile position of the country in the ranking, with dark grey indicating performance at the bottom, and dark blue indicating performance at the top of the ranking. The "x" indicates insufficient or no available data for the underlying indicators, and dotted circles indicate missing data for at least one underlying indicator. Only OECD sources have been used (see OECD (2019) for overview).
1. For Belgium (Flanders), United Kingdom (England and Northern Ireland), a combination of regional (PISA and PIAAC) and national data have been used.
Note on Israel: The statistical data for Israel are supplied by and are under the responsibility of relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

OECD (2019b)

In terms of strengths, Figure 6 shows that New Zealand ranks highly (top 20%) in:

- the foundational skills of adults
- the culture of adult education
- the inclusiveness of tertiary education
- the activation of skills in the labour market
- inclusiveness of the labour market
- the intensive use of skills in workplaces
- the intensive use of skills in everyday life.

In terms of weaknesses, key findings include that the average skills of young New Zealanders have been declining over time; New Zealand was in the bottom 20% of countries based on this indicator. Other areas of weakness are the alignment of skills to the labour market, and a decline in the use of skills at work; New Zealand was in the bottom 20-40% for these indicators. The OECD commented that New Zealand has important imbalances between the skills of workers and the skills needs of the labour market – sometimes described as skills mis-matches. The use of skills at work is not improving much over time, suggesting that skills mis-matches are a persistent problem.

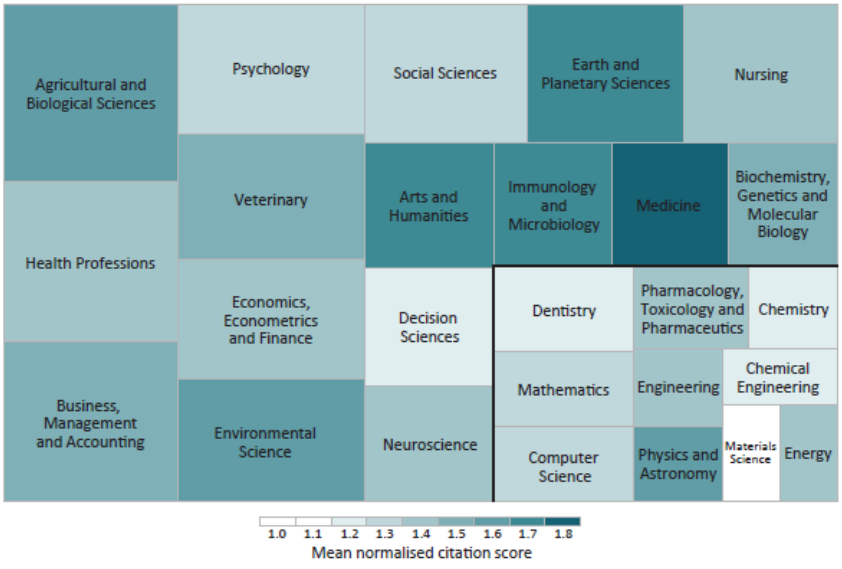
Looking at specific types of skills among adults, New Zealand is among the top few OECD countries in problem solving in technology rich environments, and in literacy skills, and is above average in numeracy (Ministry of Education and MBIE 2o16). This is based on PIAAC data from 2014.

In conclusion, New Zealand has overall strengths in skills. However, persistent skills mis-matches and a decline in the skills of young New Zealanders are areas of concern.

4.2.5 New Zealand's has research strengths in agriculture & biological sciences, but research strengths tend to fluctuate over time

MBIE (2018b) used bibliometric techniques to analyse New Zealand's research specialisations – see Figure 7. The approach is broadly similar to the revealed comparative advantage method described in section 3.2, but instead of export data, the measures draw on data about research publications.

Figure 7: New Zealand's research specialisations, 2011-15
The proportion of NZ's number of research publications in a field relative to the proportion of total global output in that field (size of box), and average citation impact of NZ publications in that field (shading)



MBIE (2018b)

The key take-outs from Figure 7 are that, based on the number of publications, New Zealand had comparative strengths in the fields of: Agriculture and Biological Services; Health Professions; and Business, Management and Accounting.

Jaffe and Preston (2019) assessed the merits of alternative bibliometric methods, including those used by MBIE (2018b). These authors found that results were quite sensitive to the measures used. For example, in absolute terms New Zealand produces a large volume of research in Medicine. But when a comparative advantage approach is used as per MBIE's analysis, Medicine come down the rankings, reflecting that Medicine is a large field globally, and the proportion of New Zealand publications is proportional to the share globally. In contrast, New Zealand's share in Agriculture and Biological Sciences was around 2.5 to 3 times the global share each year. In other words, there was some persistence in our strength in this field over time. On the other hand, New Zealand had a small share of publications in Computer Science.

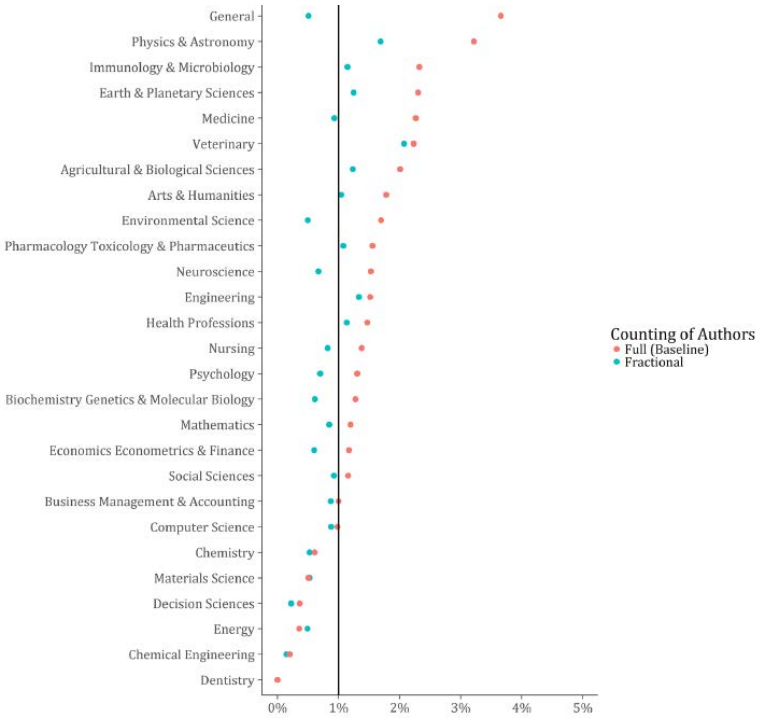
In terms of citations, Jaffe and Preston (2019) found that in most disciplines, New Zealand research was above average in terms of impact, which means that the proportion of publications with above median citations was greater than 50%. But when the authors focused on the upper 10% or upper 1% of the citation distributions, New Zealand's share in most fields was below the world share. This suggests that New Zealand has a healthy proportion of good researchers, but a disproportionately low concentration of international star researchers.

When the authors looked at the fraction of publications in the top 1%, 10%, and 50% over time, they found that the results were not particularly consistent. Comparing 2007 and 2012, they found that for many fields the results were quite different over the two years. The change was positive for some fields and negative for others, so does not appear to reflect a trend holding over New Zealand's overall science system.

Figure 8 provides the fraction of New Zealand publications in the top 1% by citation globally in 2012-14, broken down by field of study. The figure shows that, when the authors corrected for New Zealand's fractional contribution to publications, our strength in the General category disappeared. In contrast, the Veterinary field moved up the rankings when fractional contributions are taken into account.

Overall, the main take-outs are that New Zealand has a persistently strong performance in Agriculture and Biological Sciences. Otherwise, a key implication is that different measures can give quite different pictures of research strengths and weaknesses. The findings also highlight New Zealand's relatively small presence on the world scientific stage, which means that most ideas and innovations are likely to come from overseas research.

Figure 8: New Zealand's fraction of publications in the top 1% globally by citation, 2012-2014
Assignment of authors by field is based on full counting (a publication with New Zealand and other authors is counted as full New Zealand output), and on fractional counting (where the fraction is equal to the fraction of authors who are based in New Zealand)



Source: Jaffe and Preston (2019)

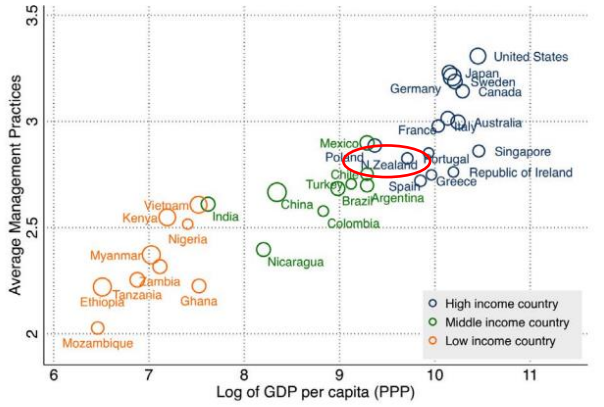
4.2.6 New Zealand is mid-pack in terms of management practices

As noted in section 2.2, management matters to business performance, and therefore to a country's development. We therefore consider management practices here.

The World Management Survey (WMS) provides a systematic measure of management practices (Scur, et al. 2021). The survey is the largest cross-country dataset on this topic, covers over 13,000 businesses across 35 countries including New Zealand, and provides a basis on which to compare countries' management practices. The survey has been undertaken periodically, with the fieldwork spanning a number of years.

Figure 9 shows that management scores track closely with countries' levels of development. New Zealand's middling position reflects our stage of development.

Figure 9: Management and GDP per capita: manufacturing, 2004-14



Note: The y-axis is the country average management score from the World Management Survey (2004-2014). The x-axis is the log of the 2003-2013 average GDP per capita based on PPP from the IMF World Economic Outlook tables. Circle sizes represent median firm size.

Source: Scur, et al. (2021)

Overall, the main take-out is that management practices are not a particular area of strength for New Zealand, nor are they a particular area of weakness.

4.2.7 New Zealand has some persistent weaknesses in innovation

As noted in section 2.2, innovation is a key driver of economic development. New Zealand's performance in innovation is somewhat mixed, and includes a number of weaknesses. New Zealand ranked 26th out of 131 countries in the 2020 Global Innovation Index (see Cornell University, INSEAD, and WIPO 2020). However, this was mainly due to a strong performance in the 'institutions' pillar (fourth) (mainly in terms of indicators for the regulatory and political environment), rather than based on measures of innovation per se.

In terms of areas of strength, New Zealand performs comparatively well in investment in ICT (OECD 2017, Cornell University, INSEAD, and WIPO 2020). New Zealand also has a productive research sector – the number of publications per researcher in New Zealand is around double the OECD average (MBIE 2018b).

Innovation rates among New Zealand firms are around the average for the OECD, but mostly lower than other small, advanced economies (MBIE 2018b). Note that there are challenges in comparing innovation rates across countries, due to differences in the wording and sample population (such as business sizes covered) in innovation surveys.

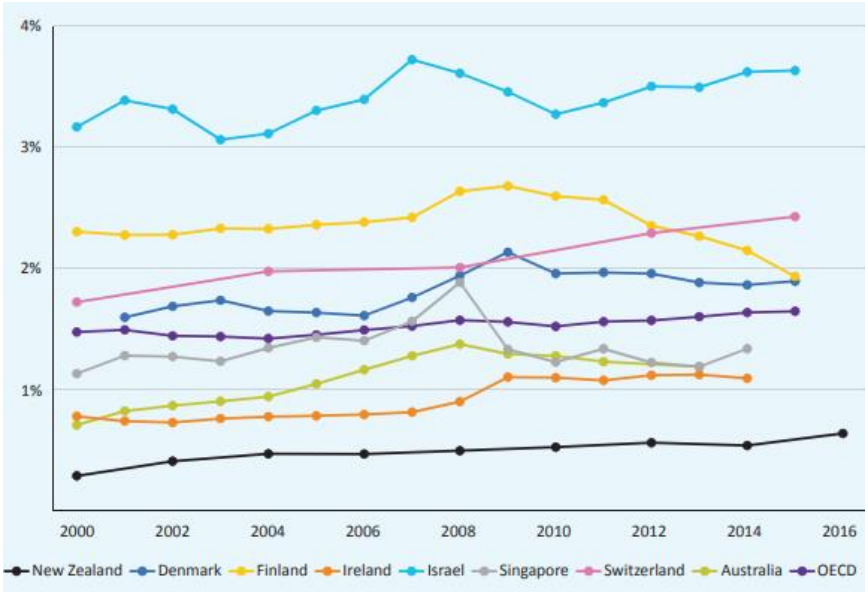
However, New Zealand has persistent weaknesses in:

- **Investment in R&D.** Compared with other OECD countries, New Zealand's public and private expenditure on R&D as a share of GDP is low (OECD 2017). Only around 20% of the shortfall from the OECD average can be ascribed to differences in industry composition (OECD 2016, cited in OECD 2017).
- **Business investment in R&D.** Business expenditure on R&D (BERD) as a share of GDP is among the lowest across OECD countries (OECD 2017). MBIE (2018b) found

that, while New Zealand's BERD as a share of GDP has increased since 2000, New Zealand continued to have the lowest ratio among its peer group – see Figure 10.

- **Collaboration between businesses and universities/research institutions.** There is a limited amount of collaboration between businesses and higher education or research institutions in New Zealand compared with other OECD countries, both in terms of the share of higher education R&D funded by industry and the share of businesses collaborating (OECD 2017). The number of academic papers cited in the patents that are granted to New Zealand businesses is also relatively low in international comparison (Conway 2016).

Figure 10: Business expenditure on R&D as a percent of GDP



Source: MBIE (2018b), based on OECD Main Science and Technology Indicators

Given the vital role that innovation plays in economic growth, these comparative (and persistent) weaknesses seem important ones to address. This point was made by the Productivity Commission in its (2021) inquiry into frontier firms. The Commission found that New Zealand's innovation ecosystems are not currently working well for actual and potential frontier firms, and recommended that the Government develop a clear innovation strategy and take deliberate policy steps to upgrade New Zealand's innovation ecosystems.

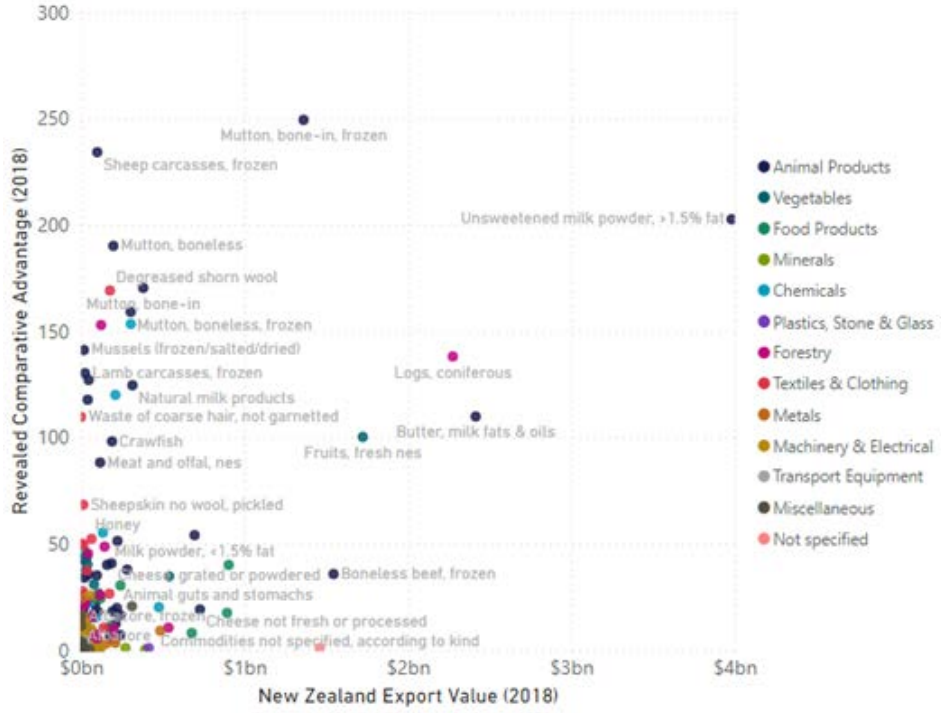
4.2.8 A recent study found New Zealand's persistent product strengths are often directly or indirectly linked to agriculture

Several studies have analysed the products in which New Zealand has a revealed comparative advantage (RCA) (see for example Baigent forthcoming, Lattimore 2019a, Lattimore 2019b, Nesbitt 2013, Ballingall and Briggs 2002). RCA is generally calculated as the ratio of New Zealand's share of exports (in nominal terms) in a product line, against the world's share of exports in the same product line.

The most recent is Baigent (forthcoming), which updated and extended Nesbitt's (2013) approach by analysing exports across a time series (each year from 1995 to 2018), rather than at two points in time. Baigent used UN COMTRADE data maintained by the Harvard Centre for International Development, and disaggregated to the most detailed 6-digit harmonized classification system (HS6) available. The analysis focused predominantly on merchandise (goods) exports.

Baigent found that in 2018, New Zealand's strongest comparative advantages were primarily linked to agricultural production, with HS6 categories of Mutton, bone-in frozen, Sheep carcasses, frozen and Unsweetened milk powder, >1.5% fat, having the highest RCAs – see Figure 11. In the same year, some products stood out as having both high RCAs and high export values, including Unsweetened milk powder, >1.5% fat, Coniferous logs, Butter, milk fats and oils, and Fruits, fresh nes.

Figure 11: Products with comparative advantage (RCA>1) by value (2018)



Source: Baigent (forthcoming)

For product lines without revealed comparative advantage in 2018 (RCA <1), the export value of this group was often linked to extractive industries, including: Gold in unwrought forms (US$414 million), Crude petroleum oils (US$ 393 million) and Liquefied natural gas (US$272 million). The group also contained product lines that were not specified according to kind (US$1.46 billion). Thousands of other product lines were also found within this group, typically exporting at relatively small scales.

Overall, product lines with a 'high' comparative advantage (RCA >4) accounted for 74.9% of New Zealand's merchandise exports (US$ 29.5 billion) in 2018, those with a low-medium comparative advantage (RCA >1 and <4) accounted for 7.9%, and the

remaining 17.3% of exports was made up of product lines with no discernible comparative advantage.

Looking at changes over time, Baigent found that the number of product lines New Zealand exported with revealed comparative advantage (RCA >1) trended upwards from 1995-2006, but has narrowed since 2006 (from 809 product lines in 2006 to 531 product lines in 2018). Baigent distinguished between:

- '**Sustained advantages'** – products that maintained comparative advantage (RCA>1) across the entire time series. From 1995 to 2018, New Zealand sustained comparative advantage across 214 product lines (RCA > 1), representing US$29.1 billion in 2018 – see Table 3. The products tended to be directly or indirectly linked to agricultural production and included a range of dairy, meat, forestry and fruit products, but also chemical derivatives such as Casein, and more processed food commodities such as Wine and Infant formula. Even among the 17 HS6 product lines within the Machinery & electrical grouping, those related to agricultural machinery were prevalent, such as Machines for cleaning, sorting, grading eggs/fruit, Commercial equipment for heating food, and Germination, bee-keeping plants. In 1995, the 214 product lines accounted for 69.8% ($9.2 billion) of New Zealand's overall export value, compared to 73.9% ($29.1 billion) of export value in 2018. This indicates that, for the most part, New Zealand's export growth has been driven by adding scale and/or variety to existing product lines where comparative advantages have already been present, rather than diversifying into new products.
- **'Emerging advantages'** – products that gained or regained comparative advantage from 2008 to 2018 (RCA>1). 217 product lines fitted this definition, representing US$1.8 billion (4.6%) of merchandise export value in 2018. The value of exports within the product lines typically experienced rapid growth since 2008, with compounded annual growth averaging 12%. The leading product lines by export value in 2018 for this group included: Worked fibreboard, >0.8g/mc2 (US$ 197 million), Bovine leather, pre-tanned (US$ 138 million), and Turbo-jet engine, > 25 KN (US$ 119 million). On the surface, the 'emerging advantages' product lines were dispersed across product groupings, with no individual grouping accounting for a significantly outsized share of products or export value. However, under closer examination, individual product lines were often directly or indirectly related to agricultural activity, suggesting the evolution of comparative advantages in New Zealand has continued to follow path-dependent, rather than path-defying, trajectories. For example, within the Machinery and electrical grouping, emerging advantages included Industrial machinery for food/drink prep, Machine parts for food/drink prep, Harvesting machinery, nes, Straw or fodder balers, Machines for cocoa/chocolate manuf, Manure spreaders, fertilizer distributors, Dryers for wood, paper.
- **'Declining' product lines** – products that lost a previously held comparative advantage from 2008 to 2018 (RCA<1). 342 product lines fell into this category, representing US$ 1.4 billion (3.6%) of merchandise export value in 2018. These products tended to fall within the broad product groupings of Machinery and

electrical, Textiles and clothing, Metals, Plastics, stone & glass (the largest of these groupings by export value in 2018), and Chemicals. For some of these product groups (eg Plastics, stone & glass and Chemicals) the loss of comparative advantage has been more a function of being unable to match growth in the world market, rather than the product lines declining in nominal export value.

Table 3: Product lines with sustained RCA > 1 from 1995 to 2018

Industry	Number of Product Lines (HS6)	Export Value ($USD) 1995	Export Value ($USD) 2018
Animal Products	67	$4,039,619,827	$15,390,769,097
Forestry	25	$1,555,908,657	$3,941,151,737
Food Products	24	$354,921,668	$3,496,288,946
Vegetables	31	$1,058,917,316	$2,916,578,369
Chemicals	12	$648,903,661	$1,261,756,589
Metals	8	$443,246,890	$776,469,427
Textiles & Clothing	23	$979,077,417	$543,074,361
Machinery & Electrical	17	$88,666,483	$368,992,795
Miscellaneous	1	$12,374,369	$311,952,549
Transport Equipment	3	$29,371,467	$37,226,526
Plastics, Stone & Glass	1	$7,221,444	$32,280,891
Minerals	2	$11,649,490	$18,816,095
Total	**214**	**$9,229,878,689**	**$29,095,357,382**

Source: Baigent (forthcoming)

Turning to services, Baigent limited his analysis to higher levels of aggregation due to issues around international comparability of data. He found that the importance of services as a share of New Zealand's exports has risen in recent years, accounting for 30.8% of total exports in 2018, up from 27.2% in 2008. Travel services (tourism) accounted for the majority of New Zealand's services exports (61.5% in 2018) and had New Zealand's strongest revealed comparative advantage in service exports, with an RCA value of 2.6 in 2018. The author noted that the analysis likely masks comparative advantages that may be apparent if lower levels of aggregation were possible. One implication is that it is difficult to assess whether or not New Zealand has a comparative advantage in the frequently cited high-tech digital sector (see for example New Zealand Productivity Commission 2021).

In sum, Baigent (forthcoming) found that the products in which New Zealand has a sustained RCA tend to be directly or indirectly linked to agricultural production. Tellingly, products with a sustained RCA accounted for around 70% of New Zealand's overall export value in both 1995 and 2018, suggesting that for the most part New Zealand's export growth has been driven by adding scale and/or variety to existing product lines. New Zealand's emerging advantages are more diverse, but continue to reflect strong ties to New Zealand's core primary industries.

4.2.9 Earlier work found persistent revealed comparative advantages in agriculture, some niche manufactures and tourism

Lattimore (2019a) undertook some RCA analysis using UN COMTRADE data of goods exports (ie services were excluded) at the 2- and 4-digit HS product level in 1989 and 2017 – these years spanned a period of trade liberalisation for New Zealand. Compared with Baigent (forthcoming), Lattimore's analysis was at a more aggregated level and

covered two points in time only. Lattimore also discussed aspects of New Zealand's economic history which likely shaped the patterns he observed.

Lattimore found that in 2017, New Zealand had revealed comparative advantages (RCA>1) in the broad (2-digit level) categories of animal, vegetable, food, wood, and hides and skins products. He also found that New Zealand's comparative advantage in animal, food and wood products had increased from 1989 to 2017.

However, at a more detailed (4-digit) level there had been considerable changes in the RCA values for many products in 2017 compared with 1989. For example, Lattimore found that the export competitiveness of the animal, vegetable and food products had grown in a wide variety of product areas (not just in wine), which the author interpreted as reflecting the current food and health foci. He noted that some ingredients of food exports are sourced from the farm sector, but they are complemented by many imported ingredients. The author also commented that the removal of most import protection unveiled export competitive manufactures in textiles and clothing, machinery, transport equipment and other categories.

Lattimore argued that there are potential areas of comparative advantage right across the detailed product areas. He concluded that the key ingredient to success in our traditional agricultural and horticultural industries is the human capital embedded in the workforce and it has proved very effective for a long time in experimenting with new products; manuka honey is but the latest successful venture.

Nesbitt (2013) used detailed 6-digit HS codes to get an in-depth picture of New Zealand's exports for 2007, and to compare that with Ballingall and Brigg's (2002) findings for 1999. She found that New Zealand's strongest revealed comparative advantage was still largely in processed and unprocessed products from the food and fibre sectors. The more detailed analysis revealed a strong comparative advantage in a number of niche manufactures. The services analysis indicated a comparative advantage in certain services, for example tourism.

Overall, these studies suggest that New Zealand has persistent strengths in agriculture, some niche manufactures, and tourism. While all the studies found that New Zealand has comparative advantages across the product spectrum, Baigent's (forthcoming) more detailed analysis found that, on closer inspection, these products tend to be directly or indirectly related to agriculture.

4.2.10 New Zealand's exports are mainly in low complexity products, such as agriculture and tourism

The 'Atlas of Economic Complexity' stated the following about New Zealand's economic complexity performance, based on data from 2018:[8]

"New Zealand ranks as the 54th most complex country (out of 133 countries) in the Economic Complexity Index (ECI) ranking. Compared to a decade prior, New Zealand's economy has become less complex, worsening three positions in the ECI ranking. New Zealand's worsening complexity has been driven by a lack of diversification of exports.

[8] https://atlas.cid.harvard.edu/countries/166

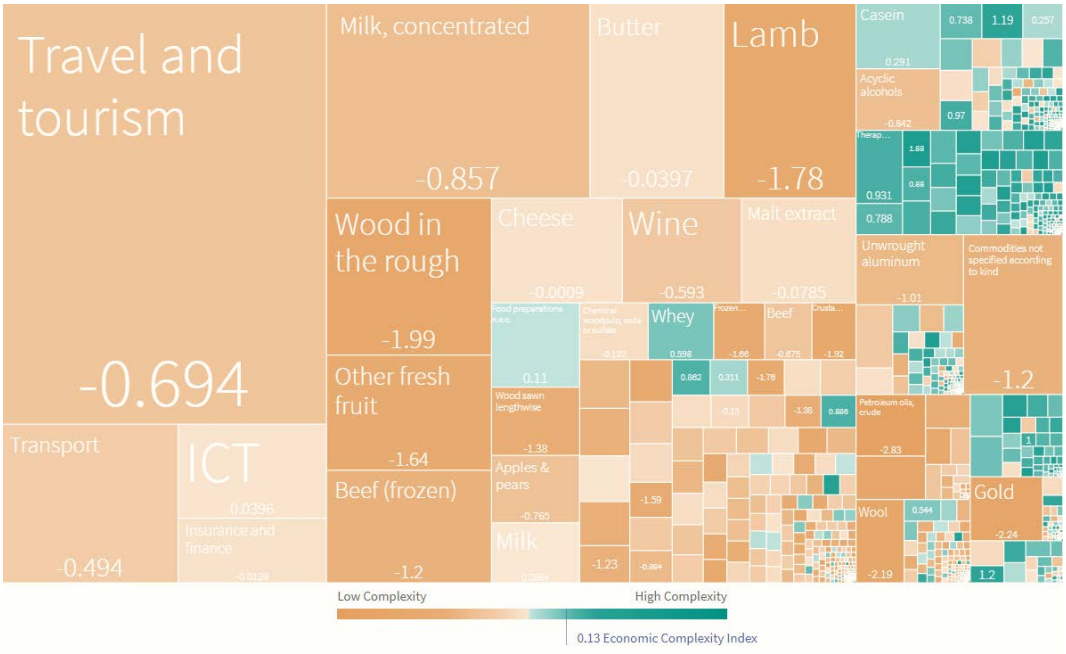
Moving forward, New Zealand is positioned to take advantage of a moderate number of opportunities to diversify its production using its existing knowhow.

New Zealand is slightly less complex than expected for its income level. As a result, its economy is projected to grow slowly. The Growth Lab's 2028 Growth Projections foresee growth in New Zealand of 2.4% annually over the coming decade, ranking in the bottom half of countries globally."

MBIE (2018b) also noted that New Zealand's economic complexity has deteriorated over time, based on its analysis of data from the Atlas over the period 2000-15. MBIE pointed out that a shortcoming of the economic complexity measure is that it is likely to understate complexity in products which is not directly embodied in the products themselves. For instance, New Zealand's comparative advantage by and large is in primary products, which are simple in nature. The differential sophistication of primary production and post-harvest processes between countries would not be captured in economic complexity measures (for example, expertise in animal and plant breeding or automation of food and beverage processing).

Recent data from the Atlas suggest that New Zealand's largest share of goods exports are mainly in low complexity products (agriculture and tourism on the left-hand-side of Figure 12), with some high complexity products (chemicals and machinery on the right-hand-side of Figure 12).

Figure 12: New Zealand's export basket, 2008-2018
Share of New Zealand's gross exports (size of square), product complexity index (number and shading)

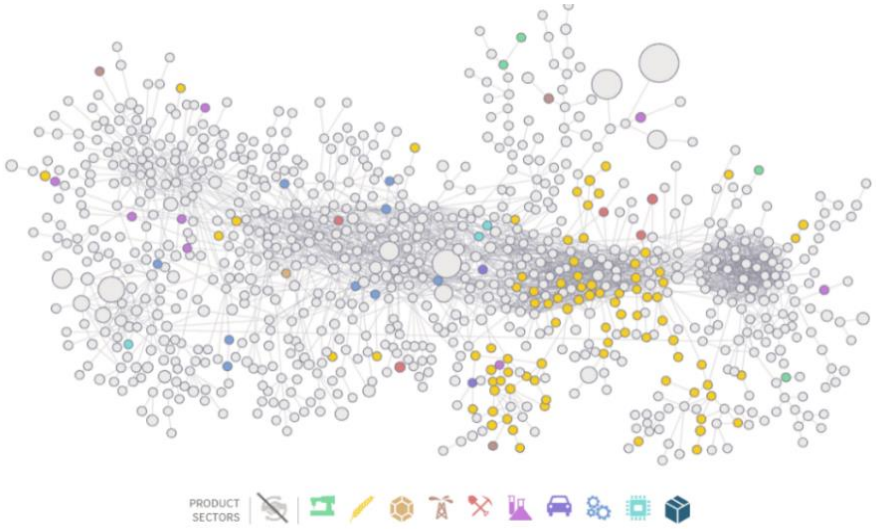


Source: https://atlas.cid.harvard.edu/countries/166/export-complexity

New Zealand's position in 'The Product 'Space' is shown in Figure 13. The Product Space is a visualisation of the connectedness between products based on the similarities of the know-how required to produce them. Products are linked by their proximity to each other, based on the probability of co-export of two products. Figure 13 indicates that New Zealand exports a relatively narrow range of products, mainly in agriculture.

The Atlas commented that, given New Zealand's current exports, some of the sectors with high potential for new diversification are Industrial Machinery and Miscellaneous Chemical products. This is based on distance to existing capabilities in The Product Space. The ideas behind this are discussed further in section 5 and the appendix.

Figure 13: New Zealand in The Product Space, 2018
Products that New Zealand exports (coloured) and products that New Zealand does not (grey)



Source: https://atlas.cid.harvard.edu/countries/166/paths

A key take-out is that, while New Zealand's exports are mainly low complexity, if New Zealand wants to move to higher complexity products, chemicals and industrial machinery have been suggested as areas that might offer some opportunities. However, note the point from Baigent (forthcoming) – that these two products have been areas of declining specialisation for New Zealand.

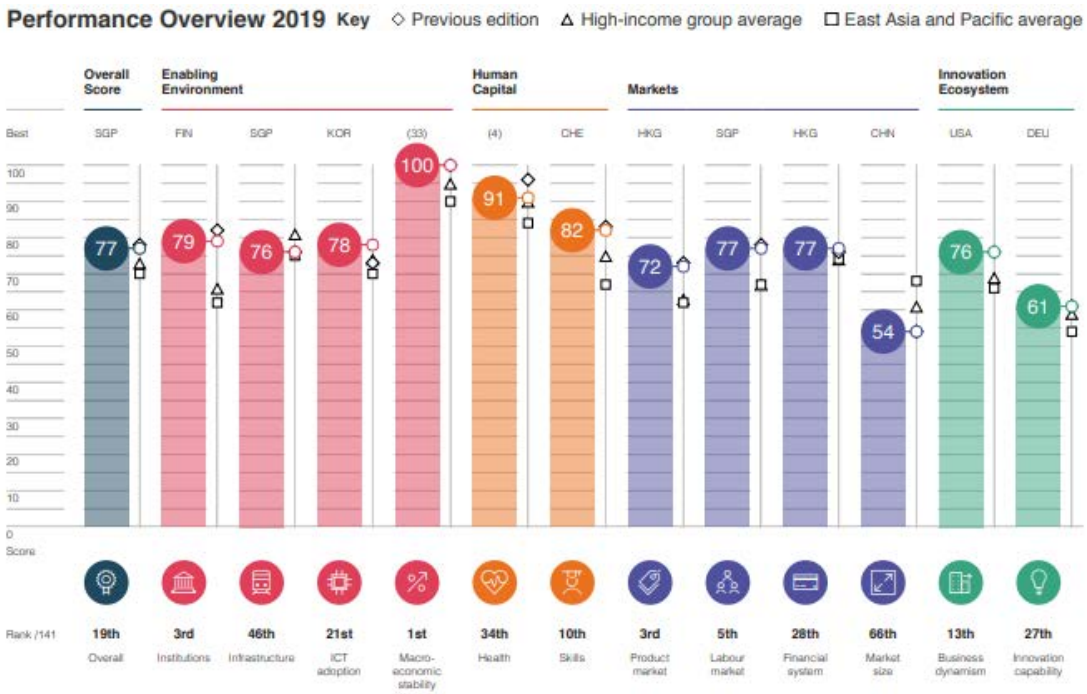
4.2.11 New Zealand has competitiveness strengths in terms of macroeconomic stability and institutions

The World Economic Forum's Global Competitiveness Index (GCI) ranked New Zealand 19th out of 141 countries in 2019 (Schwab 2019). In terms of the 12 'pillars' of competitiveness, New Zealand's strongest rankings were in Macroeconomic Stability (first), Institutions (third), and the Product Market (third, mainly due to indicators of trade openness), and our lowest rankings were in Market Size (66th) and Infrastructure (46th) – see bottom of Figure 14. The findings were broadly similar in terms of New

Zealand's scores for each pillar (the bars in Figure 14), except that on this measure New Zealand scored relatively well in Health and Skills, and poorly in Innovation Capability.

In terms of changes over time, New Zealand's strengths and weaknesses have broadly remained fairly consistent, based on looking at earlier GCI reports and despite some changes in methodology. For example, New Zealand has had consistently strong rankings in institutions, being ranked fourth in 2000, third in 2010 and third in 2019. The other broad patterns have also largely persisted since the early 2000s, with New Zealand ranked consistently highly in terms of indicators health, education and market efficiency/regulations. New Zealand has ranked consistently poorly in terms of market size, innovation and infrastructure. One change is that our macroeconomic stability ranking has increased significantly over time (from 23rd in 2000, 20th in 2010 and first in 2019); this partly reflects changes in the Index's methodology, for example due to the omission of national saving rate, in which New Zealand ranks poorly, in recent years.

Figure 14: New Zealand's performance in the Global Competitiveness Index, 2019
Scores out of 100 (bars) and rankings (number in bold at the bottom)



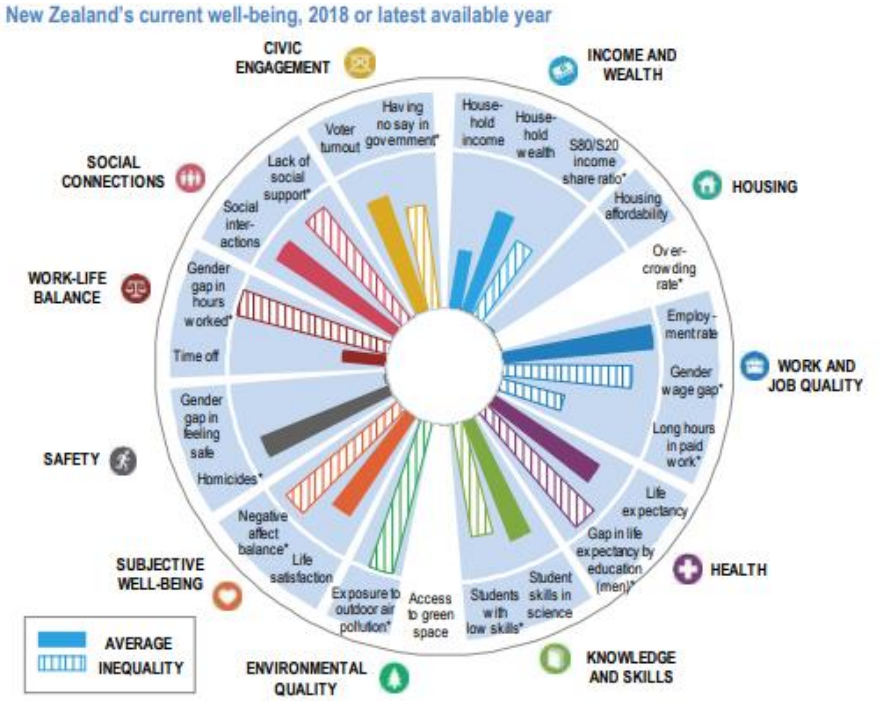
Schwab (2019)

Overall, these findings suggest some persistence in New Zealand's strengths and weaknesses as captured by the GCI. In particular, the findings highlight that while New Zealand has strengths in some 'deep roots' factors like fundamental institutions, we have weaknesses in others such as our small market size. The findings also raise questions about why New Zealand's productivity performance has been persistently poor, given our strengths in a number of competitiveness pillars.

4.2.12 New Zealand performs comparatively well in subjective wellbeing, health, and social connections, based on the Better Life Index

The findings for New Zealand from the OECD's Better Life Index report for 2020 (OECD 2020b) are summarised in Figure 15 below. The OECD does not provide an overall ranking, as it leaves researchers free to weight different dimensions of the Index as they see fit. However, the OECD does note that overall New Zealand performs comparatively well in the Index.

Figure 15: New Zealand's results in the Better Life Index, 2020



Note: This chart shows New Zealand's relative strengths and weaknesses in well-being compared to other OECD countries. Longer bars always indicate better outcomes (i.e. higher wellbeing), whereas shorter bars always indicate worse outcomes (lower well-being) – including for negative indicators, marked with an *, which have been reverse-scored. Inequalities (gaps between top and bottom, differences between groups, people falling under a deprivation threshold) are shaded with stripes, and missing data in white.

New Zealand's resources for future well-being, 2018 or latest available year

Natural Capital	Economic Capital	Human Capital	Social Capital
Greenhouse gas emissions per capita (3) ↗	Produced fixed assets (2) ↗	Educational attainment of young adults (2) ↗	Trust in others (1) ...
Material footprint (2) ↘	Financial net worth of government (1) ↔	Premature mortality (2) ↔	Trust in government (1) ↔
Red List Index of threatened species (3) ↘	Household debt (2) ↔	Labour underutilisation rate (2) ↗	Gender parity in politics (2) ↔

Note: (1)=top-performing OECD tier, (2)=middle-performing OECD tier, (3)=bottom-performing OECD tier. ↗ indicates consistent improvement; ↔ indicates no clear or consistent trend; ↘ indicates consistent deterioration, and "..." indicates insufficient time series to determine trends since 2010. For methodological details, see the Reader's Guide of *How's Life? 2020*.

Source: *OECD (2020b)*

For the current wellbeing measures, New Zealand had comparative strengths in subjective wellbeing, health, social connections, employment rate and exposure to outdoor air pollution. Weaknesses include income and wealth (including income inequality), long hours in paid work, gender gap in feeling safe, and in particular, housing affordability.

For the resource/capital measures, New Zealand performed comparatively well in terms of social capital ie trust in others and in government and financial net worth of government. Performance was comparatively poor in natural capital ie greenhouse gas emissions per capita and threatened species.

Looking back over previous editions of the Index suggests some persistence in the main strengths and weaknesses. For example, in 2015 New Zealand had comparative strengths in subjective wellbeing, health, employment rate, and social connections, but had weaknesses in work/life balance and (especially) income (OECD 2015). The OECD (2020b) noted that since 2010, New Zealand saw comparative improvements in all three work and job quality measures, exposure to outdoor air pollution, life satisfaction, and the gender gap in feeling safe. We saw declines in household wealth, student skills in science, social interactions and voter turnout.

Overall, the finding about New Zealand's comparative strength in subjective wellbeing seems important, given that wellbeing is an ultimate goal of policy. This result is in contrast with our performance in income and some other aspects of material wellbeing, in which New Zealand fares comparatively poorly. Together, these findings raise questions about whether income and material wellbeing should be a central focus of policy, in cases where there is a trade-off between them and other dimensions of wellbeing. The findings also suggest that a typical monetary cost-benefit analysis (that does not account for life satisfaction) will provide an insufficient yardstick to determine whether or not a policy should be adopted (Grimes, Oxley and Tarrant 2012).

4.2.13 New Zealand performs comparatively well on various other indices of wellbeing, especially relative to our GDP performance

New Zealand performs well in various wellbeing indices and scorecards that compare the performance of countries. For example, New Zealand ranked 4th out of 163 countries in the 2020 Social Progress Index which includes measures of health, safety, education, technology and rights; New Zealand ranked very highly in a number of measures including corruption and perceived criminality. [9] New Zealand also ranked highly – 14 out of 190+ countries – in the 2020 UN Human Development Index.[10]

Grimes (2015) reported on some indices and studies of wellbeing that include New Zealand to assess wellbeing relative to other countries. He concluded that New Zealand punches above its weight in many wellbeing measures, compared with its performance based on standard metrics like GDP. When he compared outcomes for New Zealand along several dimensions of the OECD's Better Life Index, he found that average

[9] https://www.socialprogress.org/?code=NZL&tab=2
[10] http://hdr.undp.org/en/countries/profiles/NZL

wellbeing in New Zealand is, in most respects, high relative to other developed countries. However, he found that inequality in wellbeing is also high.

Overall, these findings reinforce that New Zealand performs comparatively well in many measures of wellbeing, although inequality of wellbeing is an area of concern.

4.2.14 Life satisfaction, health and education, work-life balance, climate and access to nature, are among the things valued by New Zealanders

As noted in section 2, peoples' location decisions say something about what they value in a country. By the same token, what matters to the citizens of a country (and new migrants) can indicate something about the strengths of a country from a people lens, assuming that people are able to 'vote with their feet'.

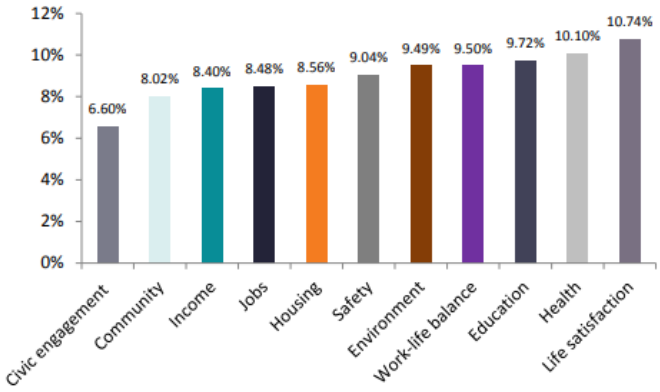
Arthur Grimes has undertaken a number of studies based on a revealed preference approach, by examining migration and population patterns and trends. This includes work in Australia (see Grimes, Ormsby and Preston 2017), using a large dataset of subjective wellbeing measures; this level of granularity is not currently available in Stats NZ's General Social Survey.

In a New Zealand study, Grimes, Apatov, et al. (2014) found that four dominant factors have impacted positively on urban growth: nearby land-use capability, human capital, sunshine hours and proximity to the country's dominant city, Auckland. The authors concluded that these findings reflect insights from spatial equilibrium – that growing cities have preferred attributes relative to other cities, which may include natural characteristics such as climate, social amenities and transport infrastructure. While this analysis is at the regional level, it tentatively implies that these factors may be important to the country level too.

Stated preference approaches (such as surveys) about location decisions can also tell us something about what citizens value in a country. Tabor, Milfont and Ward (2015) used a qualitative approach to understand the migration decisions of 26 recently arrived skilled migrants to New Zealand from the UK, Ireland, India, and South Africa. The authors found that New Zealand's appeal to the migrants included: the pace of life and work/life balance; the environment, scenery, and access to nature; the perception of being welcomed.

The Social Investment Agency (2018) considered what matters for New Zealanders in terms of various aspects of wellbeing. The OECD's Better Life Index allows users – anyone who accesses the data on their website – to weight different dimensions of the framework based on what matters to them. Results from New Zealand users' priorities are shown in Figure 16. This suggests that life satisfaction, health and education were the highest weighted factors, while civic engagement was the lowest. These findings for New Zealand are similar to those in other OECD countries, based on a study by Balestra, Boarini and Tosetto (2018), although the order varied slightly (health, education and life satisfaction for the latter).

Figure 16: What New Zealanders value from the OECD's Better Life Index, 2011-16
New Zealand users' weightings of different dimensions of the Better Life Index framework



The Social Investment Agency (2018)

Overall, these findings highlight some 'hard' factors (such as health and education) and 'soft' factors (such as life satisfaction and access to nature) that likely contribute to New Zealand's comparatively high levels of subjective wellbeing, given these factors are some of the things that New Zealanders value and in which we have comparative strengths.

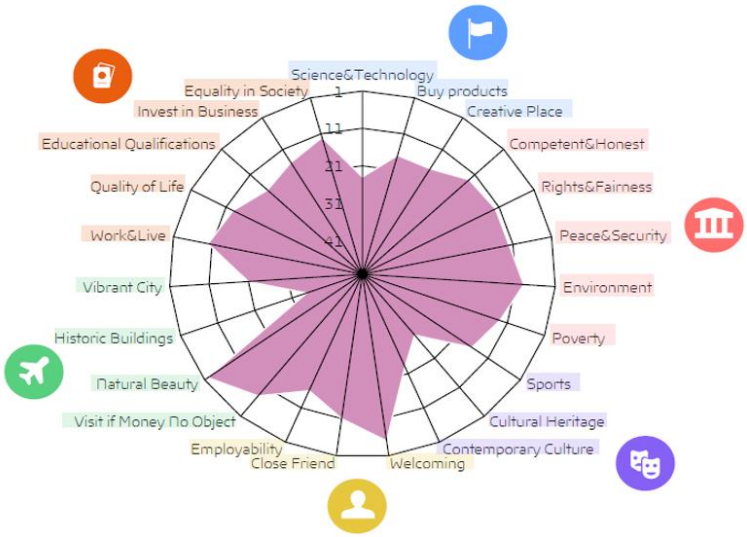
4.2.15 New Zealand has strengths in natural beauty, welcoming others, and the environment, based on how other countries see us

The Ipsos Nation Brand Index, a cross-country survey about respondents' perceptions of other countries, found that New Zealand has brand strengths in natural beauty and welcoming others – see Figure 17. Areas of comparative weakness were historic buildings, cultural heritage,[11] and science and technology. These findings are based on an unpublished (2020) report by New Zealand Story.

In terms of changes over time, New Zealand Story (2020) found that New Zealand's international reputation is improving. This is mainly based on annual data from the RepTrak Country Brand Index, which showed an improving trend over the period 2011-20. New Zealand Story commented that improvements in ranking around the economy, brand and products suggest the foundation of New Zealand's reputation has broadened significantly.

[11] Cultural aspects are assessed by "perceptions of a country's heritage, its contemporary cultural "vibes" from music, films, art and literature, as well as the country's excellence in sports. Various cultural activities are presented to the respondents to gauge their strongest images of a country's cultural "product"". See https://www.ipsos.com/sites/default/files/ct/news/documents/2020-10/ipsoske_nation_brand_index_survey_findings_press_release_30th_october_2020.pdf

Figure 17: New Zealand's nation brand, 2020
New Zealand's rankings in the Ipsos Nation Brand Index 2020



Ipsos Nation Brand Index (2020), based on unpublished analysis by New Zealand Story

Similar findings are found in The Place Brand Observer Experience, which uses an international panel of around 50 place brand professionals to assess the nation brand of different countries. The questions posed to the panellists include: To your mind, what does Brand New Zealand stand for today? Which associations come to your mind linked to New Zealand's country brand positioning? In the 2021 survey,[12] a majority of the panel respondents pointed out New Zealand's greenery, cleanliness, high standard of living, respect for nature, coastline, volcanoes. Apart from geographical characteristics, other aspects that the panel associated New Zealand with are the 100% Pure New Zealand campaign, the All Blacks rugby team, the Lord of the Rings feature film trilogy, its multicultural society, and the Māori culture.

Recently, the panel focused on New Zealand's deft handling and strong leadership skills in crisis situations like COVID-19 and the Christchurch mosque attacks. While a majority of the panellists felt that Brand New Zealand has a very strong emphasis on its unspoiled nature and greenery, the combined positive depictions of New Zealand owing to strong leadership reinforce the brand image of the country, linked to pre-existing brand values like reliability and trustworthiness.

Overall, it is important to note (as outlined in section 3.3) that this method suffers from a number of limitations, including that respondents may lack detailed knowledge about the relevant countries. However, nation branding does help assess strengths and weaknesses in New Zealand's external reputation. Our reputation may be a factor in overseas peoples' migration and investment decisions etc, and thus in New Zealand's access to talent and foreign investment.

[12] https://placebrandobserver.com/brand-new-zealand-reputation-strengths-development-opportunities/

4.3 Conclusions and discussion

Figure 18 provides a helicopter view of New Zealand's current and historic strengths and weaknesses, based on the findings above and framed around the framework in Figure 4. Looking across the table reveals that New Zealand has strengths and weaknesses in each part of the framework – underlying determinants, inputs, outputs and outcomes. While we ultimately care about outcomes, it is also useful to consider some of the strengths and weaknesses further back in the chain that likely contribute to New Zealand's comparative outcome performance.

The important role of path dependence in New Zealand's economic development is highlighted in the table. What occurred in the past has tended to persist over time, as suggested by the persistence in many of the strengths and weaknesses. It is likely that New Zealand is not alone in this strong path dependence, given the role of 'deep roots' factors in shaping countries' economic trajectories as discussed in section 2.

Figure 18: Summary of New Zealand's comparative economic strengths and weaknesses

Framework	'Deep roots' factors & determinants	Inputs and capabilities	Outputs	Outcomes
New Zealand's current strengths	Fundamental institutions Social capital and trust Climate conducive to agriculture Natural environment and natural beauty	Education and skills Research impact overall Research in agriculture & biological sciences ICT infrastructure	Products directly or indirectly related to agriculture, niche manufactures and tourism	Subjective wellbeing Wellbeing overall (esp compared to GDP) Employment rate Health Social connections
New Zealand's current weaknesses	Small population size Distance from major centres	Skills mis-matches Investment in R&D, especially business R&D Some aspects of infrastructure eg roading, shipping connections	Exports are mainly low complexity eg agriculture and tourism Low trade intensity Collaboration between businesses and research organisations Productivity	Income and wealth Income inequality Housing affordability Time off work GHG emissions per capita Threatened species
Persistence over time	Persistent strengths in fundamental institutions, social capital and trust Persistent weaknesses in size/distance	Persistent strengths in education and skills, and agricultural research Persistent weaknesses in skills mis-matches, and investment in infrastructure and R&D	Persistent strengths in agricultural products Persistent weaknesses in trade intensity, collaboration between businesses and research organisations, and productivity	Persistent strengths in subjective wellbeing, health, employment rate, and social connections Persistent weaknesses in time off work and (especially) income

Source: Author, based on various studies

The analysis also highlights that care needs to be taken when making international comparisons. It is important to consider an appropriate set of comparator countries, and to dig beneath headline figures in indices and scoreboards to identify the underlying measures that are driving performance. For example, some measures of environmental outcomes (such as from nation branding and some aggregate measures) can paint a fairly rosy picture of New Zealand's environmental performance, whereas others (based on per capita measures) do not. It is also important to weigh up different types of evidence. For example, New Zealand's fundamental institutions are often lauded in international comparisons, but other evidence suggests that these largely Western institutions contribute to institutional racism.

5 What are the implications for future strengths?

Backwards-looking analyses suggest that prospective economic strengths for New Zealand might include industrial machinery and chemical products. Futures techniques take a much broader view than this industry lens and are concerned with exploring possible futures as well as a *desired* future and how to achieve that future. Given the strong path dependence in New Zealand's economic development to date, any shift in the trajectory of strengths would require concerted efforts or be the result of disruptive external events.

5.1 Insights from backwards-looking methods

5.1.1 Backwards-looking analyses highlight path dependence in New Zealand's strengths

Section 4 has identified various strengths and weaknesses of New Zealand's economy, many of which have persisted over time. A logical next question is: are these trends likely to continue in future?

This report has highlighted the role of path dependence in the development of New Zealand's economic strengths. When path dependence occurs, history matters. Choices made on the basis of previous conditions can persist long after those conditions change. This is because there are strong forces and vested interests focused on maintaining the status quo (Geels and Schot 2007). These forces include some over which government has control, such as regulations. Path dependence suggests that many of New Zealand's current strengths are likely to be important in the future.

5.1.2 An industry lens is often used when considering prospective strengths based on historic ones

Often, when a country's potential *future* areas of economic strength are being assessed based on analyses of historic data, the focus is on specific industries and products. One such approach is Harvard's Atlas of Economic Complexity which essentially uses the idea of current export patterns providing a potential signal of future patterns. For each country, the Atlas' authors identify some sectors which they assess have high potential for new diversification as indicated in 'The Product Space'. The Product Space links products by their proximity to each other based on the probability of co-export of pairs of products across countries. Hidalgo (2021) argued that, at a minimum, this approach can say something about how realistic a potential future sectoral strength might be.

In 2018, the Atlas' authors assessed that some of the sectors with high potential for new diversification in New Zealand were Industrial Machinery and Miscellaneous Chemical products.[13]

5.1.3 However, predicting 'successful' industries at a detailed level is challenging

In practice, it is difficult to pick in advance industries and products with high future potential. The challenges involved in 'picking winners' is one of the reasons mainstream economics tends to be agnostic about the areas in which a country specialises. This is particularly true at a more granular level, as the specific product lines that eventually prove to be hits are typically highly uncertain and unpredictable Hausmann and Rodrik (2003).

For example, Hausmann and Rodrik (2003) considered the information technology sector in India, a shining example of technological success in a low-income country in terms of export growth. Yet India is a country that would hardly have been expected to have a comparative advantage in a technology-intensive sector, with (at the time) low rankings in terms of conventional indicators of IT penetration, and a largely unskilled workforce. After the fact, it is not difficult to list some of the features that accounted for this success: the time-zone difference that allows the processing to be done in Bangalore before the West Coast of the US is back at work in the morning, the linkages with the Indian diaspora in Silicon Valley, the facility with the English language, and the establishment of the Indian Institutes of Technology.

An oft-cited example of an emerging strength in New Zealand is the space industry.[14] Like the example above in India, at first blush the space industry seems unlikely to have taken off in New Zealand. But with the benefit of hindsight, some of the reasons for this success – New Zealand's geographic location and time zone, strong institutions, small size/nimbleness – become apparent. The broad analysis in section 4 has highlighted some of these underlying factors.

Hausmann and Rodrick (2003) argued that uncertainties about which industries are likely to take off implies that government should support "economic development as self-discovery". These authors suggested a flexible, experimental approach to economic development that encourages and rewards a search for new areas of strength which are likely to build on existing ones.

[13] https://atlas.cid.harvard.edu/countries/166.

[14] See for example Deloitte Access Economics (2019); https://www.nzstory.govt.nz/stories/kiwi-space-innovators/; https://www.nzte.govt.nz/page/advanced-transportation.

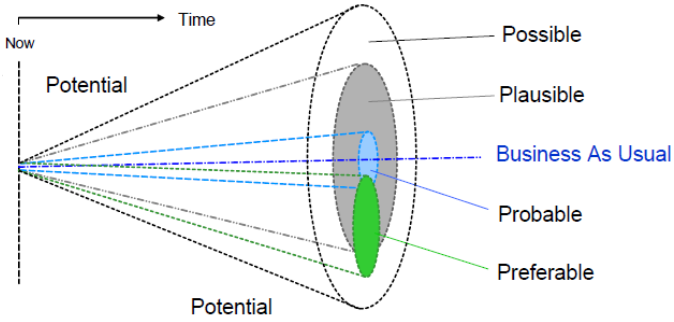
5.2 Insights from future-focused methods

5.2.1 Foresight aims to help prepare for – and influence – the future

Foresight (or futures thinking, strategic foresight and futures studies) provides some strategic tools to systematically look ahead and help prepare for, and influence, the future (Cuhls 2003). Because the future is uncertain, foresight practitioners think about a range of alternative futures – possible futures, plausible futures, probable futures, and preferable futures (Voros 2005).

These different futures are depicted in Figure 19. The diagram shows that the further ahead we attempt to look, the greater the range of possibilities ie the wider the cone.

Figure 19: The Futures Cone



Source: Voros 2005, adapted from Hancock and Bezold 1994

As indicated in the futures cone, foresight encompasses techniques that are *exploratory,* identifying what the future could possibly or plausibly look like, as well as those that are *normative,* describing a preferred future and what might be needed to achieve that future. Normative techniques include visioning that tend to be more explicit about desired futures than is typical for the methods discussed in the preceding sub-section.

5.2.2 Foresight offers wide-ranging techniques and tools

Popper (2008) identified more than 30 foresight techniques. He found, based on an analysis of over 2,000 foresight exercises across the world, that qualitative techniques dominate those used in foresight studies. The three most heavily used techniques were scenarios, expert panels and literature reviews about global trends etc.

This focus on qualitative techniques reflects that when thinking about the future it is important to think creatively, and so foresight studies typically involve a blend of evidence and imagination (Hajkowicz, Cook and Littleboy 2012). These creative processes can broaden the span of decision-makers' thinking about the future including in areas of deep uncertainty, in relation to disruptive change, and in relation to emerging trends for which few established quantitative data sources are available (Wilkinson 2017).

5.2.3 Relevant foresight techniques include SWOT analysis and Delphi

We assessed two long-established foresight techniques as particularly relevant to examining a country's future strengths – SWOT analysis (an analysis of strengths, weaknesses, opportunities and threats) and Delphi (which seeks to reach consensus among experts to identify and prioritise strategically important issues). In New Zealand, Delphi has been used in specific sectors like high value manufacturing (see Ruwhiu, Walton and O'Kane 2019) and the transport sector (see Stephenson, et al. 2017). The Ministry of Transport applied the Delphi technique to consider how to transition road freight in New Zealand to alternative green fuels.[15] We did not find any assesments of New Zealand's economic strengths based on SWOT analyses.

These two techniques are discussed further in the appendix.

5.2.4 Foresight techniques could help identify 'possible' and 'preferred' futures, and hence areas of focus for government's efforts

Foresight methods could identify possible or preferred futures, and the capabilities and strengths that would enable or be consistent with them. These techniques could then support strategy about areas of focus for government's economic development policy as discussed in section 1, in order to shift from the current trajectory to the preferred one.

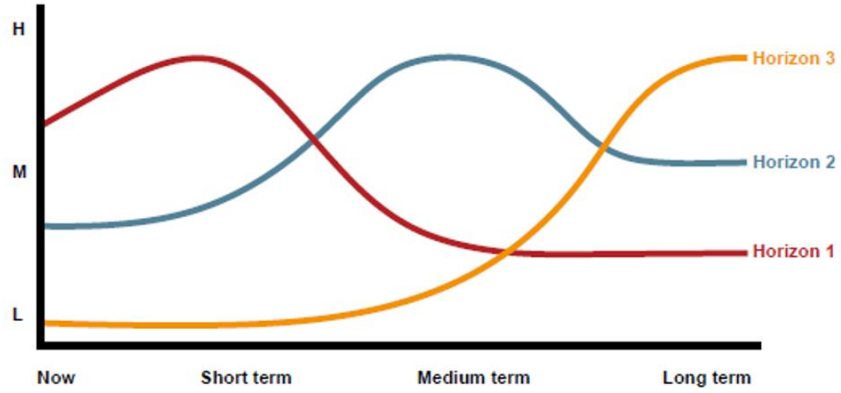
A shift towards strengths for a possible or preferred future might involve consideration of factors such as:

- global 'megatrends' such as technological developments, shifting global power dynamics, and demographic change, that will shape the future world economy
- New Zealand-specific trends such as our growing ethnic diversity, that will shape the New Zealand economy in particular
- global opportunities and New Zealand's desired position in world markets
- big societal challenges like climate change and inequality that need to be addressed
- Te Tiriti o Waitangi and other important commitments
- desired outcomes, frameworks for assessing those outcomes such as the LSF and He Ara Waiora, and what sort of society New Zealanders want in the future.

A range of foresight tools are relevant when examining the factors above. One example is the Three Horizons Model, depicted in Figure 20. In the diagram, the present and the near future is identified as Horizon 1 (H1). H1 trends are strategically important now, are visible and well understood, but will become less important over time. H3 is a vision of the future that will become dominant in the long term. H2 bridges H1 and H3, and includes innovations and other development that support the desired shift to H3. This framework could be used to identify the preferred future (H3) and any new capabilities and strengths that might be needed (H2) to support the transition.

[15] https://dpmc.govt.nz/our-programmes/policy-project/policy-methods-toolbox/futures-thinking

Figure 20: The Three Horizons Model



Source: Sharpe 2013

Another potentially relevant technique is scenarios, a prominent foresight technique which aims to describe alternative ways in which the external environment might develop in the future. Scenarios tend to be developed through a combination of workshops and desk research. This approach could be used to help assess what types of capabilities and strengths are needed under various scenarios. By exploring different conditions, each scenario can then inform the analysis and choice about policy and strategy.

5.3 Implications – bringing the two together

5.3.1 The two approaches are complementary

The discussion above has highlighted two broad – and complementary – ways in which to view the development of New Zealand's future economic strengths.

The first approach is a pragmatic one – to largely work with the grain of existing strengths. This view emphasises the role of the past in shaping the future, such as the importance of path dependence. This view recognises that the future context will differ from the present one, but sees the factors shaping the future context as largely exogenous or outside our control and also not having significant disruptive influence.

This approach might involve building on strengths in which New Zealand has performed persistently well over time, as the persistence of these strengths suggest they are underpinned by some enduring factors. By the same token, addressing persistent weaknesses is likely to prove challenging.

Having due regard for the underlying determinants on the left-hand side of Figure 18 seems particularly important for this approach, as these determinants are unlikely to change considerably over time. They include factors like New Zealand's small population size and our isolation. Size and distance were part of the rationale for Skilling's (2020) suggestion that New Zealand should focus on 'weightless' sectors such

as digital, creative, and other knowledge-based services, where distance from market is much less of a barrier.

The second approach emphasises that the future context may differ considerably from the present one due to the influence of external factors and their complex interactions. This approach draws on ideas from foresight and transitions thinking (see for example Geels and Schot 2007). Te ao Māori aligns with much transitions thinking, as te ao Māori highlights the interconnectedness and interrelationship of all living and non-living things and the importance of an inter-generational lens.

Innovation plays a critical role in the second approach in terms of developing new strengths that can support pathways to a preferred future. Innovation can disrupt existing regimes and systems (Geels and Schot 2007) and thus help break previous path dependencies. Policy can shape this process to some extent. As well as increasing the *amount* of innovation in the economy, there is a strong rationale for policy influencing the *direction* of innovation towards a low emissions economy for example (Stern and Valero 2021). The aim would be to build on niche innovations that emerge in H1 and take hold in H2, in order to shift to H3. This approach might involve a strong and co-ordinated package of policies to achieve the desired shift, as there is path dependence in the innovation system itself (Stern and Valero 2021).

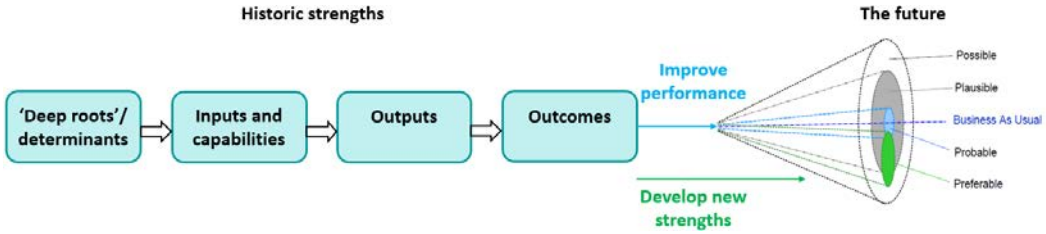
The second approach sees a more active role for government in shaping New Zealand's future strengths, as it emphasises that government has a role in anticipating and navigating through to enable the transition towards a desired future. This approach also takes a broader view of economic development policy than the industry lens which is often used in the first approach. One example of this broader view is Mazzucato's (2021) mission-based approach to innovation policy. Taking her inspiration from the 'moonshot' programmes which successfully coordinated public and private sectors on a large scale, Mazzucato called for the same level of boldness and experimentation to be applied to global challenges like climate change and poverty. Presumably a range of New Zealand's existing strengths – in relation to our fundamental institutions, trust, education etc – would be valuable when developing such a mission.

5.3.2 The two approaches can be brought together to identify gaps

One way to use the two approaches above is to think of them in terms of a gap analysis. In other words, what is the gap between New Zealand's probable future strengths based on historic trends (first approach), and the strengths that would be needed for a desired future (second approach)?

This type of gap analysis could inform any new strengths that New Zealand might need to develop to transition to a desired future. The analysis could also potentially identify improvements all along the framework in Figure 4. A shift might be needed in areas in which New Zealand has been historically weak (such as R&D and some aspects of infrastructure), middling (such as management capability) or strong (such as education). The basic idea is depicted in Figure 21 below.

Figure 21: Preparing for the future



Source: Author

Undertaking such a gap analysis, and selecting any areas of focus for government's efforts in order to address the gap, would likely require strong social processes that draw on and combine various expertise, support legitimacy of decisions, and honour commitments such as Te Tiriti o Waitangi. Crawford (2021) made a similar point about selecting areas of focus for innovation policy, and emphasised the need for strong social processes and governance mechanisms.

5.3.3 Illustrative example: regenerative agriculture

Purely by way of example, overlaying New Zealand's persistent strengths in agricultural research and agricultural products with external trends like climate change and changing consumer preferences highlights potential opportunities in areas like regenerative agriculture. Regenerative agriculture aims to support environmental and other goals by improving, rather than degrading, land. It includes managed grazing to build soil fertility by carefully controlling timing of grazing and resting of pastureland, and regenerative cropland (a set of techniques on arable land that reduces emissions associated with different crop types as well as increase soil carbon capture) (Ellen MacArthur Foundation 2019).

This example recognises that, historically, New Zealand has been a largely biologically-based economy. As noted in section 4, despite many calls for a more diverse economy, shifting New Zealand's exports away from agriculture has proven hard to do in practice. This example also reflects New Zealand's ambitious climate goals, and that New Zealand's emissions profile is unusual in that much of our emissions are due to biogenic methane arising from livestock (Climate Change Commission 2021).

This simple example is only illustrative, but it does show how the findings from this present report might be combined with other evidence to identify the strengths New Zealand needs for the future.

6 Conclusions

Often analyses of a country's economic strengths focus on specific products or industries in which the country has comparative export strengths. In this regard, New Zealand has persistent strengths in products directly or indirectly related to agriculture, and in some niche manufactures and tourism, suggesting that we have ongoing capabilities in these areas.

One of the benefits of the expansive purview of strengths used in this report is that it looks beyond a purely industry lens, reflecting that modern economic development policy has tended to shift away from an industry focus towards addressing societal challenges. Importantly, this wide view finds that New Zealand has comparative strengths in overall wellbeing, and identifies a range of other strengths that likely contribute to that performance. However, this broad purview also finds comparative weaknesses in outcomes such as income and wealth, inequality, and the environment, suggesting important challenges in these areas.

The largely backwards-looking analysis in this report points to what might be realistic in terms of New Zealand's future strengths. New Zealand has many persistent strengths, such as in relation to fundamental institutions, social capital/trust, health, education and employment rate, as well as agricultural research and products discussed above. The persistence of these strengths over time highlights the role of path dependence in shaping New Zealand's economic development, and implies that working with the grain of existing strengths is pragmatic.

When thinking about the future, as well as what is pragmatic it is also important to consider what is desirable in order to prepare for a preferred future. This might involve New Zealand developing some new strengths to help transition to that preferred future. If so, technology and innovation provide a possible way of supporting the transition. However, given the powerful path dependence described above, achieving any desired shift in direction would require concerted effort.

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Appendix A: Methods in detail

Revealed comparative advantage

Theory/background

Comparative advantage is a classic concept within the theories of international trade (Wosiek and Visvizi 2021). David Ricardo's seminal theory of 1817 predicts that locations benefit when they trade in the goods in which they have a comparative advantage ie those produced with a higher relative productivity within that location (Hausmann, Hidalgo and Stock, et al. 2014). Comparative advantage posits that countries should specialise in a certain class of products for export, but import the rest – even if the country holds an absolute advantage in all products.

The product cycle theory developed by Vernon (1966, 1979) attributes comparative advantage in the production of new products to sources that may change over the life cycle of the products (Siggel 2006). In the early stages of the cycle, comparative advantage is based on the first-come advantage of the country in which the product was developed. The cost advantage shifts to lower cost countries, where their advantage is likely to come from factor abundance. In further stages, scale economies and learning effects may become the source of comparative advantage.

Method

A commonly used measure of comparative advantage is the revealed comparative advantage (RCA) index. This assesses the share a group of goods or services has in a given country's exports and in the world exports to a selected market (Wosiek and Visvizi 2021). The Balassa index is an early and commonly used version, which is calculated as the ratio of two shares: the numerator is the share of a country's exports of the good/service of interest in its total exports, and the denominator is the share of world exports of the same good/service in total world exports. Values of the RCA index lower than 1 indicate that an economy has no comparative advantages, values between 1 and 4 show a weak to moderate comparative advantage, and those over 4 signify a strong comparative advantage.

Numerous empirical studies explore modifications of the main index. For example, French (2017) developed some measures that he argued overcome one of the main limitations of the Balassa Index – that the index is affected by subsidies and other trade distortions – and which get closer to a country's fundamental comparative advantage.

Economic complexity measures

Theory/background

Economic complexity measures essentially infer information about countries' productive capabilities from their export baskets. Measures of economic complexity were developed by Hidalgo and Hausmann (2009, 2011) in two highly cited papers which gave a central role to the complexity of a country's economy in its economic development.

The basic idea is that some of the activities that arise from specialisation cannot be imported, such as property rights, regulation, infrastructure, specific labour skills, etc., and so countries need to have them locally available to produce. The productivity of a country resides in the diversity of its available non-tradable 'capabilities' and therefore, cross-country differences in income can be explained by differences in economic complexity, as measured by the diversity of capabilities present in a country and their interactions.

The authors used an analogy of thinking of each capability as a building block or Lego piece. In this analogy, a product is equivalent to a Lego model, and a country is equivalent to a bucket of Legos. Countries will be able to make products for which they have all of the necessary capabilities, just like a child is able to produce a Lego model if the child's bucket contains all of the necessary Lego pieces. Using this analogy, the question of economic complexity is equivalent to asking whether we can infer properties such as the diversity and exclusivity of the Lego pieces inside a child's bucket by looking only at the models that a group of children, each with a different bucket of Legos, can make. Countries with more capabilities might be expected to be more diversified and produce less ubiquitous products.

Importantly, the authors argued that the productive structure of countries evolves by spreading to 'nearby' products in The Product Space. The proximity between products in the The Product Space is related to the similarity of the requisite capabilities that go into a product, because countries tend to jump into products that require capabilities that are similar to those required by the products they already export.

Method

Two main measures of complexity have been developed based on Hidalgo and Hausmann's (2009 and 2011) work.

The first measure is the 'economic complexity index' (ECI), which is a ranking of countries based on the diversity and complexity of their export basket. Economic complexity is calculated from equations for diversity and ubiquity, where diversity is how many different kinds of products a country is able to make, and ubiquity is the number of countries that are able to make a product.

The second measure is the 'product complexity index' (PCI), which is a ranking of products based on how many countries can produce the product and the economic

complexity of those countries. PCI is derived from equations for diversity and ubiquity, as above.

Both these measures are based on international trade data – mainly goods exports, although services exports are included in some measures. The data in the 'Atlas of Economic Complexity' are from UN COMTRADE (1992), based on Harmonise System (HS) categories broken down to 1-, 2-, 4-, and 6-digit detail levels.

By way of example, medical imaging devices are made in few places, and the countries that are able to make them, such as the United States or Germany, also export a large number of other products. This infers that medical imaging devices are complex because few countries make them and those that do tend to be diverse. Medical imaging devices therefore have a high PCI ranking. In contrast, raw diamonds have a much lower PCI ranking. While these products are extracted in very few places, making their ubiquity quite low, the countries that export them – principally Sierra Leone and Botswana – export few other products. This indicates that, unlike medical imaging devices, something other than large volumes of knowledge makes diamonds rare.

By the same token, the first impression about the complexity of a country that is given by its product diversity can be improved by also looking at the ubiquity of the products that it makes.

Global competitiveness index

Theory/background

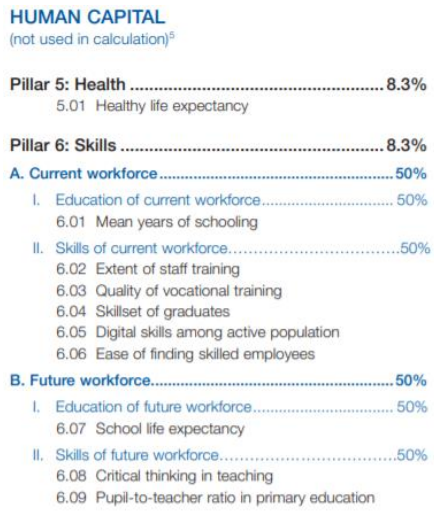
Since 2005, the World Economic Forum has based its competitiveness analysis on the Global Competitiveness Index (GCI), a comprehensive index capturing both microeconomic and macroeconomic foundations of national competitiveness across twelve 'competitiveness pillars'. The index is largely attributable to the work of Michael Porter who co-directed the Global Competitiveness Report (until 2009) and who led the Institute for Strategy and Competitiveness at the Harvard Business School (Kuah, et al. 2010).

Method

The index combines objective information on countries with an international survey of executives (Schwab 2019). A composite index is created based on successive aggregations of scores, from the indicator level (the most disaggregated level) to the overall score (the highest level). At every aggregation level, each aggregated measure is computed by taking the average of the scores of its components. The overall score is the average of the scores of the 12 pillars. For individual indicators, prior to aggregation, raw values are transformed into a progress score ranging from 0 to 100, with 100 being the ideal state.

By way of example, 'Human capital' comprises two pillars – 'Health' and 'Skills' – with the following indicators and weightings.

Figure 22: Indicators and weightings in 'Human Capital'



Source: Schwab (2019)

Bibliometrics

Theory/background

Bibliometrics uses counts of publications, patents and citations to measure scientific and technological accomplishment (Narin, Olivastro and Stevens 1994). This can be used as indicators of the research output of researchers, research institutions or geographic/political areas (Jaffe and Preston 2019).

There are three main tenets to bibliometrics (Narin, Olivastro and Stevens 1994):

- counts of publications and publications provide valid indicators of R&D activity in the subject areas of those patents or publications, and the institutions from which they originate
- the number of times those patents or publications are cited in subsequent patents or publications provides valid indicators of the impact or importance of the cited patents or publications
- the citations from publications to publications, from patents to patents, and from patents to articles provide indicators of the intellectual linkages between the organisations that are producing the patents and publications, and knowledge linkage between their subject areas.

There are a number of ways in which bibliometrics can theoretically help in examining a country's areas of strength. As Jaffe and Preston (2019) noted, many countries and international organisations such as the OECD use bibliometric measures to shed light on the strength or success of research in various contexts. For example, there is knowledge for knowledge's sake – arguably, a country's strengths in specific scientific fields is valuable in its own right. In addition, there is the role that knowledge plays as

an input to economic and other activities. This relies on the knowledge being picked up and used by businesses, government agencies and other end users. In this sense, knowledge can potentially be used to help identify *future* areas of economic strength for a country, as it can provide a signal of emerging and disruptive technologies, capabilities and niche innovations (Geels and Schot 2007).

Method

The two main bibliometric measures are the total number of publications in a field (a measure of quantity) and the number of citations received by a publication (a proxy for its impact) (Jaffe and Preston 2019).

All citation-based measures are constructed relative to the citation performance of all publications from the same year, discipline, and publication type. This prevents the measures from being distorted by differences in the opportunity each publication has had to be cited: earlier publications have had more time to be cited; different disciplines have different citation practices; and different publication types cover work of different nature which may attract more or less citations. Therefore, citation measures tend to be based on Mean Normalised Citation Scores (MNCs).

Jaffe and Preston (2019) considered key measurement issues in bibliometrics for New Zealand which included:

- Many New Zealand papers have both New Zealand and foreign authors, and these foreign-co-authored papers are on average more highly cited than purely domestic papers. As a result, measures of average impact tend to turn out lower when fractional counting of authors is used instead of full counting.
- Whether such papers are viewed as a full or partial New Zealand output has significant consequences for inference regarding the fraction of New Zealand's publications in top percentiles. Fractional counting is preferred but not often used.
- The assignment of papers to specific fields is imperfect. It is generally based on the main fields covered by the journal in which papers were published. But some papers – and researchers – span several fields.

OECD Better Life Index

Theory/background

A number of frameworks and indices aim to assess the wellbeing of citizens within a country. The OECD's Better Life Index is among the most prominent wellbeing frameworks, and is the one on which Treasury's Living Standards Framework is based.

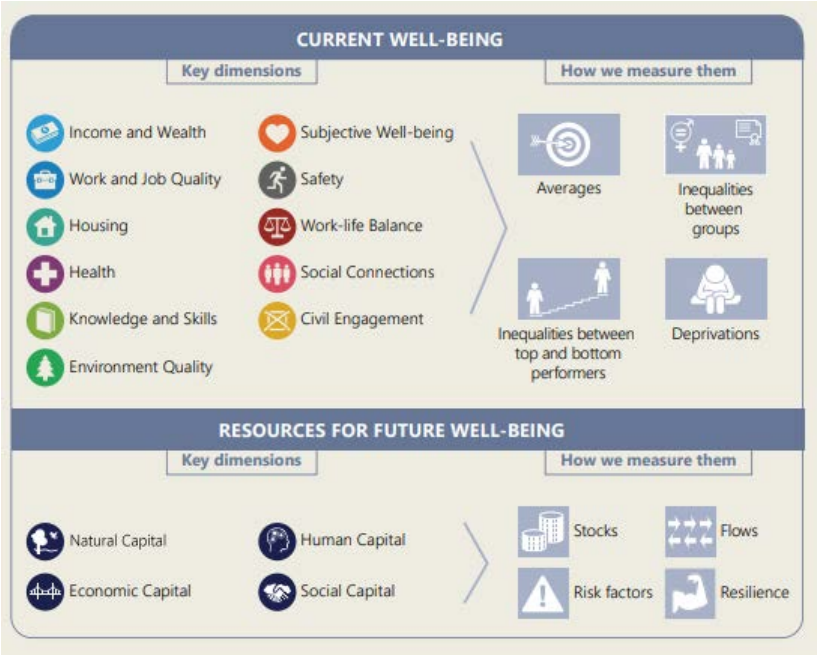
The OECD well-being framework may be regarded as being rooted in the capabilities approach proposed by Sen (1985, cited in Durand 2015). This approach is based on a multidimensional definition of well-being where both what people do and are (eg having a good job, being in good health, expressing their political voice) – that is, their 'functioning' – and people's freedom to choose within different sets of functionings—

that is, their capabilities—matter in themselves. The capabilities approach differs from traditional 'welfarist approaches', which focus solely on the 'utility' (ie the net balance of pleasure over pain) that each individual draws from their experiences and circumstances, and where the specific aspects shaping utility are valuable only as means to a higher utility.

Stiglitz, Sen and Fitoussi (2009) argued that countries should move away from over-reliance on GDP when assessing the nation's health. Instead, they should develop a broader dashboard of indicators that uses objective and subjective measures of wellbeing and includes such things as the distribution of well-being.

The Better Life Index uses a dashboard approach and distinguishes between current wellbeing and the resources needed for future wellbeing – see Figure 23. Current well-being data focus on living conditions at the individual, household and community levels, and describe how people experience their lives 'here and now' (OECD 2020a). These data are complemented by statistics on the resources needed to sustain well-being in the future: specifically, via 'capitals', countries' investments in (or depletions of) these capitals, and risk and resilience factors that will shape future changes in wellbeing. Separate reporting of current wellbeing and its sustainability helps to assess whether maximising the former comes at the cost of compromising the latter (or vice versa), which can inform intertemporal trade-offs in policy design and indicate the intergenerational outlook of a country's wellbeing.

Figure 23: The OECD's Better Life Index framework



Source: *OECD (2020a)*

Method

The Better Life Index is not actually an index, but a dashboard of headline indicators (Durand 2015). The indicators are mainly objective measures of the relevant dimension, but also include subjective (ie self-reported) wellbeing. As well as averages, the distribution of current wellbeing is taken into account by looking at three types of inequality: gaps between population groups (eg between men and women, old and young people); gaps between those at the top and those at the bottom of the achievement scale in each dimension (eg the income of the richest 20% of individuals compared to that of the poorest 20%); and deprivations (ie the share of the population falling below a given threshold of achievement, such as a minimum level of skills or health) (OECD 2020a).

By way of example, the headline indicators include:

- Household income - household net adjusted disposable income, USD at 2017 PPPs, per capita
- Household wealth - median net wealth, USD at 2016 PPPs 6
- 80/20 income share ratio -the household income for the top 20%, divided by the household income for the bottom 20%
- Housing affordability - share of disposable income remaining after housing costs
- Over-crowding rate - share of households living in overcrowded conditions
- Employment rate - employed people aged 25-64, as a share of the population of the same age
- Gender wage gap - difference between male and female median wages expressed as a share of male wages
- Long hours in paid work -share of employees usually working 50+ hours per week.

Other indices and dashboards of wellbeing etc

There are many other wellbeing frameworks and measurement approaches. The Social Investment Agency (2018) provided a useful review of some of the main indices and approaches and their relevance to New Zealand.

For example, the Social Progress Index aims to measure "how well a society provides its people with the things they really care about".[16] It is based on a framework that covers three dimensions – basic human needs, foundations of wellbeing and opportunity. The analysis includes an assessment of a country's strengths and weaknesses relative to its economic peers – the 15 countries closest in GDP PPP per capita.

The UN's Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being

[16] https://www.socialprogress.org/framework

knowledgeable and have a decent standard of living.[17] The HDI is the geometric mean of normalised indices for each of the three dimensions.

Migration – revealed preferences

Theory/background

Spatial equilibrium theory posits that positive attributes in one location, like access to amenities or high wages, are offset by negative attributes, like high house prices (Glaesar 2008). For example, if local amenities in a location decline, there will be out-migration from the location. To restore spatial equilibrium, the migration mechanism must eventually induce either an offsetting rise in local incomes or a reduction in local living costs.

One insight is that locations that are growing and attract more people must have preferred attributes (wages, amenities etc) relative to other cities (Grimes, Apatov, et al. 2014). Put another way, peoples' location decisions reveal something about the attractiveness of a location.

Method

Studies that use migration and population patterns and trends as a way of revealing peoples' location preferences tend to use models that predict which factors determine whether an individual is likely to leave or migrate to a particular location (see for example Grimes, Ormsby and Preston (2017).

Nation branding

Theory/background

A brand can be defined as 'a multidimensional assortment of functional, emotional, relational and strategic elements that collectively generate a unique set of associations in the public mind' (Fan 2010).

Nation branding is a relatively new concept, and its origins can be traced to four different sources, namely, country of origin, place or destination branding, and public diplomacy (Fan 2010). Every country has a unique name and image in the mind of people both inside and outside the country, so a nation does have brands. A nation brand is the total sum of all perceptions of a nation in the mind of international stakeholders which may contain some of the following elements: people, place, culture/language, history, food, fashion, famous faces (celebrities), global brands etc.

[17] http://hdr.undp.org/en/content/human-development-index-hdi

Key insights about nation branding are that (Fan 2010):

- a nation's 'brand' exists, with or without any conscious efforts in nation branding, as each country has a current image to its international audience, be it strong or weak, clear or vague
- unlike commercial brands, many elements in nation brand construct are not in the control of those engaged in nation branding management, and are difficult to change in the short term
- nation brand and national identity are two related but distinct constructs - nation identity is the collective understanding by a nation's people of the country.

Method

The Anholt Ipsos Nation Brands Index (NBI, formerly Anholt-GfK Nation Brands Index) and the Country Brand Index (CBI) are the most notable and well-established survey-based nation brand indices (Lahrech, Juusola and Al Ansaari 2020).

The NBI draws on over 20,000 interviews online in 20 panel countries – including New Zealand – with adults aged 18 or over.[18] Data are weighted to reflect key demographic characteristics including age, gender, and education of the online population in that country. This survey covers six dimensions: 1) exports (the public's image of a country's products and services), 2) governance (public opinion about national government competency and fairness, as well as its commitment to global issues), 3) investment and immigration (the power to attract people to live, work, or study in each country, and how people perceive a country's quality of life and business environment), 4) culture (global perceptions of each nation's heritage and appreciation for its contemporary culture), 5) people (the population's reputation for competence, openness, friendliness, and other qualities such as tolerance—defined as a set of qualities that are important for a country's human resources), and 6) tourism (the level of interest in visiting a country and the draw of natural and man-made tourist attractions) (Lahrech, Juusola and Al Ansaari 2020).

The CBI, on the other hand, approaches country brands from two angles; the supply side of the country brand (what the country can offer) and the demand side (what the actual or potential tourists, foreign investors, residents, or citizens of the respective country expect of the country). The index assesses country brands through five key dimensions: value system, quality of life, good for business, heritage and culture, and tourism, and the general survey comprises 30 attributes, such as history, culture, infrastructure, tourist attractions, business environment, technological advancements, and environmental protection. Compared to the NBI, which offers past-oriented perceptions of country brands, the purpose of the CBI is to offer more future-oriented information for country brand managers. Whereas the NBI is purely based on a consumer survey, the CBI employs a wider range of data sources (Lahrech, Juusola and Al Ansaari 2020). New Zealand is one of the countries covered.

[18] https://www.ipsos.com/sites/default/files/ct/news/documents/2020-10/ipsoske_nation_brand_index_survey_findings_press_release_30th_october_2020.pdf

SWOT analysis

Theory/background

The SWOT framework is a strategic analytical tool, credited to Albert Humphrey, who developed the approach at the Stanford Research Institute (SRI) back in the 1960s/70s.

SWOT can be used for a number of purposes which include describing what the future might be like, and identifying internal priorities and challenges (Government Office for Science 2017)

Method

SWOT analysis is an analysis of strengths, weaknesses, opportunities and threats. Strengths and weaknesses are internal factors that need to be taken account of when developing policy or strategy. Opportunities and threats are external factors that need to be considered (Government Office for Science 2017).

SWOT analysis is typically done via a workshop/group discussion. Participants are those involved in developing policy or strategy.

SWOT analysis is simple and easy to use and has wide applicability. However, it can over-simplify a situation eg forces attributes to be a strength or weakness when they may be both.

Delphi

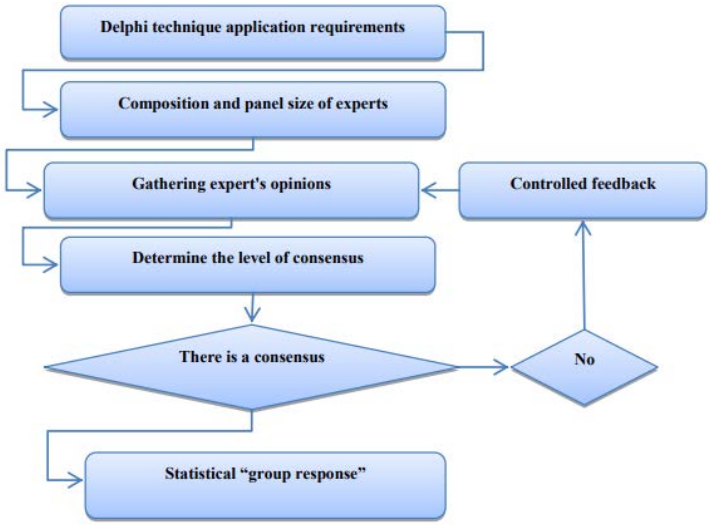
Theory/background

The Delphi technique was introduced in the late 1950s by the US RAND Corporation, for the scientific study of experts' opinions on military defense project. It became highly popular in the mid-1990s including in economic development. Its four features are usually unchanged including anonymity, iteration, controlled feedback, and statistical-group response (Habibi, Sarafrazi and Izadyar 2014).

The technique involves gathering opinion from a wide group of subject experts, in order to prioritise issues of strategic importance, and to refine thinking on the future (Government Office for Science 2017).

Habibi, Sarafrazi and Izadyar (2014) commented that the Delphi technique lacks theoretical underpinnings. These authors reviewed numerous Delphi studies and suggested that the framework in Figure 24 captures the common elements.

Figure 24: Delphi framework



Source: *Habibi, Sarafrazi and Izadyar (2014)*

Method

The Delphi process involves working with an expert panel over several rounds of data collection to identify and prioritise strategically important issues (Government Office for Science 2017). Responses are anonymous; participants can know who else is involved, but not what they have said. Anonymity ensures that opinions are heard independently without bias and can help to avoid groupthink.

Data are collected in writing via mail or e-mail, in an online conference or by using specialist software.

After each round of data collection, each expert is provided with a summary of the previous round. Participants review and revise their judgements, and their reasons for them after reading those of their peers. The aim is to reach consensus on the topic.

Delphi is suited to situations where there is incomplete knowledge about a phenomena, and for exploring areas in which there is some controversy, debate or a lack of clarity (Fink-Hafner, et al. 2019). This seems relevant for gaining consensus among experts on New Zealand's areas of strength. However, Delphi can be prone to various cognitive biases eg framing, anchoring, desirability bias, and the bandwagon effect (Winkler and Moser 2016).

New Zealand Government