



Agribusiness and Economics Research Unit

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Credence Attributes and New Zealand Country of Origin: A Review

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Abstract

On 12 September 2017, the Ministry of Business, Innovation and Employment announced that a research programme entitled Unlocking Export Prosperity from the Agri-food Values of Aotearoa New Zealand had been selected for funding from the Endeavour Fund. The programme has been launched with four reviews written for a general audience on relevant existing knowledge, including this report on distinctive credence attributes of New Zealand agri-food exports. It focuses on five research programmes that have published work on the distinctive credence attributes of New Zealand agri-food exports. This begins with private sector initiatives, paying particular attention to the collaboration in the movement known as Te Hono, followed by public sector initiatives, particularly the New Zealand Story. The remainder of the report then draws on three long-term research programmes: Maximising Export Returns; the Our Land and Water National Science Challenge; and the New Zealand Sustainability Dashboard.

Keywords

Value Chains; Sustainability; Credence Attributes.

ANZSRC Fields of Research

Agricultural Economics (140201); International Economics and International Finance (140210); Pricing (incl. Consumer Value Estimation) (150507).

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Chapter 1

Introduction

On 12 September 2017, the Ministry of Business, Innovation and Employment announced that 27 proposals to the Endeavour Fund for science research programmes had been selected for funding over the next five years. One of the successful proposals was for a research programme entitled *Unlocking Export Prosperity from the Agri-food Values of Aotearoa New Zealand*. This brings together researchers from the Agribusiness and Economics Research Unit (AERU) at Lincoln University, from Plant and Food Research, from the Ngāi Tahu Research Centre at the University of Canterbury, and from The Leadership Lab in Christchurch.

The research aims to provide new knowledge on how local enterprises can achieve higher returns by ensuring global consumers understand the distinctive qualities of the physical, credence and cultural attributes of agri-food products that are “Made in New Zealand”. An introduction to the research programme is provided by Saunders *et al.* (2017). The programme has been launched with four separate reviews written for a general audience of existing knowledge on the following subjects:

- (1) distinctive physical attributes of New Zealand agri-food exports;
- (2) distinctive credence attributes of New Zealand agri-food exports;
- (3) distinctive cultural attributes of New Zealand agri-food exports; and
- (4) distinctive features of values-based leadership in New Zealand agri-food exporting enterprises.

This report addresses the second of these subjects. It focuses on five research programmes that have published work on the distinctive credence attributes of New Zealand agri-food exports. This begins with private sector initiatives, paying particular attention to the collaboration in the movement known as Te Hono, followed by public sector initiatives, particularly the New Zealand Story. The remainder of the report then draws on three long-term research programmes: Maximising Export Returns; the Our Land and Water National Science Challenge; and the New Zealand Sustainability Dashboard.

Each of these sources is considered in the five chapters that follow. This introduction concludes with a discussion and definition of credence attributes in the context of creating a national profile for agri-food quality, drawing on a report prepared for the High Value Nutrition National Science Challenge by Miller *et al.* (2016a).

The source of all value for a market product comes from the preferences and incomes of the product’s final consumers at the end of what may be a lengthy global value chain (Macharia *et al.*, 2013; Sausman *et al.*, 2015; Dalziel *et al.*, 2018). There is evidence that value chains focused on understanding and responding to consumer values do better than others (Grunert *et al.*, 2005; Crittenden *et al.*, 2011; Liao *et al.*, 2011; Tukamuhabwa *et al.*, 2011; Saunders *et al.*, 2016b, section 3.3). These consumer values are more than economic value – purchasing decisions can be influenced by a range of social, cultural or environmental values (see, for example, Holbrook, 1999).

An obvious contribution to consumer value are the physical qualities of the product itself, which in the case of food and beverage products include freshness, taste, texture and flavour. Another important contribution comes from qualities that cannot be seen or experienced at the point of purchase. These attributes are known as *credence attributes*.

Examples of credence attributes include food safety, environmental stewardship, animal welfare, social responsibility, cultural authenticity, fair trade, functional foods, organic production, GM-free, water footprint, biodiversity and local foods (Saunders *et al*, 2016b, p. 18). Sellers typically make claims about the credence attributes of their products on labels, perhaps reinforced by developing brands or trademarks that are trusted by consumers as assurance that claims are authentic.

A key factor that may contribute to consumer trust is the country-of-origin of the food or beverage being purchased. Indeed, country-of-origin labelling (COOL) is mandatory for at least some food products in the major countries importing from New Zealand such as the United States, China, the European Union and Australia (Miller *et al*, 2016a).

A number of studies have observed that COOL can support product differentiation (Carter *et al*, 2006) and so create a competitive advantage that is not easily copied (Baker and Ballington, 2002; FutureBrand, 2014 and 2015). In particular, country-of-origin may be used by consumers as a cue for judging attributes such as quality (Claret *et al*, 2012; Berry *et al*, 2015; Insch *et al*, 2015) and food safety (Cicia *et al*, 2011; Lim *et al*, 2014; Ortega *et al*, 2014; Lewis and Grebitus, 2016).

Futurebrand (2014, p. 30) notes that “brand-driven consumption is increasing exponentially worldwide with the explosion of new middle class consumers in the BRIC markets (Brazil, Russia, India, China) and other developing nations”, so that “it is arguable that Country of Origin brands will start to contribute significantly to national reputation and overall country brand strength.” The *Unlocking Export Prosperity* research programme is based on that hypothesis. The remainder of this report summarises published research on the value of New Zealand credence attributes, beginning with its prominence in the vision of private sector agri-food exporters such as the members of Te Hono.

Chapter 2

Private Sector Initiatives to Profile Credence Attributes

The private sector in New Zealand has recognised that there are commercial threats and opportunities associated with international consumer attitudes to credence attributes such as environmentally sustainable production practices. In the early 1990s, for example, the term “food miles” emerged in the UK as part of an argument that consumers should shop locally and buy local produce (Barclay, 2012, p. 1). This posed a threat to New Zealand agri-food exports to Britain, until research led by Caroline Saunders demonstrated that total greenhouse gas emissions for key food products sold in the UK were many times lower when sourced from New Zealand than from local suppliers (Saunders *et al*, 2006; Saunders and Barber, 2008; Barclay, 2012, pp. 2-3).

The New Zealand wine industry is an example of an entire land-based sector that promotes its sustainability credentials to create export value. In the year from 1 July 2016 to 30 June 2017, wine exports from New Zealand reached \$1.66 billion, making it the country’s fifth largest export good (New Zealand Winegrowers, 2017a, pp. 2-3). The sector maintains a commitment to quality over quantity to protect New Zealand’s reputation as a premium producer of wine, including a commitment to sustainability leadership that is explained in the following terms (New Zealand Winegrowers, 2017b, p. 1):

For us, sustainability means delivering excellent wine to consumers in a way that enables the natural environment, the businesses and the communities involved, to thrive.

We’ve identified seven ‘pillars’ as our key areas of focus: biodiversity; soil, water and air; energy; chemicals; by-products; people; and business. We then provide guidance and support for each to our members.

In fact, central to our sustainability policy, is a commitment to keep improving as new research is undertaken and new technologies are developed. We’re actively involved in both of these areas, with an ongoing leadership role in industry research and development projects. As a result we’re helping to raise the global bar for sustainability.

Under New Zealand Winegrowers’ Sustainability Policy, wine must be made from 100% certified grapes in fully certified winemaking facilities and certification must be through an independently audited programme – either Sustainable Winegrowing New Zealand or one of the recognised organic or biodynamic certifications.

The New Zealand wine industry’s sustainability strategy to create value began in 1994, when the New Zealand Grapegrower Council and the Wine Institute of New Zealand commissioned David Jordan to evaluate options for integrated production systems in New Zealand (Sautier *et al*, 2015; Dalziel *et al*, 2017, chapter 2). In 2002, the industry launched the Sustainable Winegrowing New Zealand label, which has developed standards and audit programmes to provide consumers with information about the sustainability practices of New Zealand vineyards and wineries. By 2016, 98% of the country’s vineyard producing area was certified by Sustainable Winegrowing New Zealand facilitating the publication of the first *Sustainability Report* by New Zealand Winegrowers (2017c).

Another exemplar of a New Zealand exporter creating a high-value product for international consumers is Zespri, “acknowledged as the global leader in the supply and marketing of branded premium kiwifruit” (New Zealand Government, 2012, p. 19; see also Dalziel *et al*, 2017, chapter 3). An important part of the Zespri brand is its commitment to sustainability (Zespri, 2016), which it defines as follows (Zespri, 2017, p. 1).

Sustainability: Growing a Healthier Tomorrow

We are here for the long term, and make choices that enrich our environment.

We work in a way that enables personal growth, with access to learning and development opportunities for all of our people.

Good health and wellness is at our core and we encourage each other to thrive.

Zespri communicates its sustainability performance to stakeholders (Zespri, 2016, p. 2). Its sustainability brochure, for example, describes specific actions being actioned under five headings (Zespri, 2016):

- Soil and Water (including pest and disease management)
- Waste management and reduction
- Managing carbon and greenhouse gas emissions
- Supporting employment and backing worker welfare
- Investing in communities and building capability

Fonterra is New Zealand’s largest businesses, and the world’s largest processor and exporter of dairy products (Fonterra, 2017, p. 6). In 2017, it published its first *Sustainability Report*. It described Fonterra’s approach to sustainability in the following terms (*idem*, p. 14):

Our Approach

A sustainable future for our Co-operative is part of our core strategy – it’s how we create long-term value for future generations.

We consider the long term challenges and shifts we face as a global food producer to ensure we are acting and planning today with a long-term view, managing the risks and identifying the opportunities to deliver a sustainable business.

To summarise our approach we have organised our priorities into three main pillars:

- **Nutrition** – improving health and wellbeing through the products and services we deliver
- **Environment** – achieving a healthy environment for farming and society
- **Community** delivering prosperity for our farmers and wider communities.

The above examples illustrate that credence attributes such as environmental sustainability, human nutrition and community responsibility are important elements of efforts by New Zealand businesses to create high value brands.

There is a wider movement in the New Zealand primary sector focused on creating value in this way. Te Hono involves “220 Chief Executives and leaders who have a deep-seated passion and desire to develop and innovate for transformational change in the New Zealand primary sector and agribusiness” (Te Hono, 2017a). Its vision is: “Transforming the primary sector to realise the opportunity for Aotearoa, New Zealand to be recognised for our natural environment and products, as world leaders in innovation” (Te Hono, 2017b).

Te Hono was launched by the CEO of the New Zealand Merino Company, John Brakenridge, in 2012 (Brakenridge, 2016). In its own words, “Te Hono is a journey that is unlocking the potential that exists for New Zealand to be recognised as world leaders in innovation, reputation and trust” (Te Hono, 2015, p. 2). Success is defined as ‘sustainable value delivered over the long term by increasing margin and capturing value across the entire value chain, not just volume or commodity price’ (idem, 2015, p. 5).

An essential element of Te Hono is the Te Hono Stanford Bootcamp, which is a week-long, intensive programme held at Stanford University in California (Te Hono, 2018). There have been six Bootcamps, annually from 2012 to 2017. Invitations are extended to those who normally hold Chief Executive or other senior positions and are predominantly primary sector exporters. Te Hono describes the 2017 Bootcamp as follows (Te Hono, 2018):

The focus of the 2017 Bootcamp was how might we make Aotearoa New Zealand the global exemplar – environmentally, economically and socially. The programme was a springboard for driving significant change, with alumni collaborating to develop and accelerate nine projects that will create a quantum shift for New Zealand’s primary sector. Through a mixture of transformational leadership insights, Stanford Graduate School of Business faculty teachings and facilitated project development, the cohort created business plans that will achieve international momentum, drive economic prosperity and enhance the reputation of New Zealand.

The 2015 Bootcamp agreed that New Zealand agri-food exports should attract a premium of 20 percent for their sustainability and other attributes (Holborow, 2015). This was reinforced in a presentation by David Teece, who is one of New Zealand’s most pre-eminent economists as a result of his seminal research on the capability theory of the firm (see Teece, 1982, 2017a and 2017b). Teece (2015, slide 5) proposed that to improve New Zealand’s current competitive advantage, businesses need to develop *dynamic capabilities*, which he has defined elsewhere as follows (Teece, 2017a, p. 698):

For applied purposes, dynamic capabilities can usefully be broken down into three primary clusters of activities: (1) identification, development, co-development and assessment of technological opportunities in relationship to customer needs (*sensing*); (2) mobilization of resources to address needs and opportunities, and to capture value from doing so (*seizing*); and (3) continued renewal (*transforming*).

In that context, Teece (2015, slide 8) noted that there doesn’t appear to be a single strong New Zealand brand, other than New Zealand itself. He observed that a brand is not simply a label, but “is a story, and a customer relationship/experience built on trust that is sufficiently valuable to support a 20-30% price premium.”

Trade modelling by the AERU indicates that a 20 per cent premium for dairy and meat exports to ten trading partners would add \$2.1 billion to our annual export receipts (Saunders *et al*, 2016a, Table 5-7, p. 79). Analysis commissioned by the Our Land and Water National Science Challenge showed that capturing willingness-to-pay in five markets for improved credence attributes of four agri-food exports would add in the order of 2 percent to NZ producer returns (Dalziel *et al*, 2018, Table 2, p. 498).

Chapter 3

Public Sector Initiatives and the New Zealand Story

The Ministry for Primary Industries (MPI) conducts a range of activities to support New Zealand's primary sector and provides a gateway to New Zealand's government for the primary industries and for overseas regulators of primary and food products (MPI, 2017a, p. 5). The Ministry's purpose is "Growing and Protecting New Zealand" with an ambition that "New Zealand is the most trusted source of high value natural products in the world" (MPI, 2017b). The phrase "most trusted" immediately draws attention to the importance of the credence attributes of New Zealand agri-food exports, so called because the attributes must be taken on trust by the consumer.

The MPI strategy identifies four outcomes that the Ministry is working towards (MPI, 2017b):

Growth

New Zealand's food and primary sector grows the value of its exports.

MPI must enable New Zealand's social and economic success – the primary sector makes up over 75 percent of New Zealand's merchandise exports.

Sustainability

New Zealand's natural resources are sustainable, in the primary sector.

The primary industries are the largest user of New Zealand's natural resources, and MPI is an important regulator and advisor on their sustainable use.

Protection

New Zealand is protected from biological risk and our products are safe for all consumers.

New Zealand's prosperity depends on protecting our unique environment and way of life, and New Zealand's reputation for integrity – our products are what we say they are.

Participation

New Zealanders participate in the success of the primary industries.

The primary sector is part of New Zealand's social fabric – it can only succeed with the participation of New Zealanders.

These outcomes are all connected to the credence attributes of agri-food exports: the focus of growth is on value (not volume for its own sake); the use of natural resources must be sustainable; prosperity depends on New Zealand's reputation for integrity; and the primary sector is part of New Zealand's social fabric.

In keeping with that strategy, MPI has developed a *Primary Sector Science Roadmap (Te Ao Tūroa)*, outlining future science needs and opportunities for New Zealand's primary sector. The process of

development identified four areas where the demands of science are critical and rapidly changing (MPI, 2017c, p. 11):

- Sustaining, protecting and adapting our natural resources;
- Growing productivity and profitability with environmental, social and cultural acceptability;
- High-value products for consumers; and
- Integrating primary, production systems, people, communities and values.

These areas are inter-related, but the goal of providing high-value products for consumers (most of whom are in international markets) is at the heart of the *Unlocking Export Prosperity* research programme that commissioned this present report. Using language that echoes the vision of Te Hono described in the previous chapter, the Roadmap explains the opportunity from producing high-value products for consumers (MPI, 2017c, p. 16):

Shifting the balance of our primary production from commodity to high-value products with high marginal return will increase the diversity and complexity of New Zealand's exports. This shift is important for productivity growth and our ability to adapt to the changes and opportunities in global markets. While not a new direction, significant change and innovation will be required if we are to achieve business growth objectives for the sector.

The first of eight key themes emphasised in the Roadmap is called "Adding value". This theme can be promoted in many ways, but a relevant paragraph highlights the role of research in enhancing and maximising value from New Zealand products (*idem*, p. 22):

More research is needed to enhance and maximise the value from our existing products for New Zealand producers and manufacturers. Research into Knowledge Intensive Business Services includes optimal business models to increase returns, collaborative market-oriented value chains, and social science research into factors inhibiting value capture from the market. Enhancing value from existing products needs to focus on uniquely New Zealand attributes and factors that are embodied in what we produce, such as the cultural, social and environmental integrity in which the products are produced; in other words our Aotearoa New Zealand story.

The New Zealand Government launched an initiative in 2013 to help develop New Zealand's International marketing brand, called the New Zealand Story (<https://www.nzstory.govt.nz/>). Its website explains (<https://www.nzstory.govt.nz/about-us/our-story/>):

The NZ Story Group has been set up to enhance New Zealand's reputation beyond natural beauty. In a competitive global economy, reputation matters. And it's important for a country like ours, with an economy that relies on the strengths of its exports, to continue to grow and diversify. The more we can do to ensure we're all telling a broad, compelling and aspirational story about NZ, that's grounded in our values and resonates with the world, the greater chance we have of attracting people to all that we offer. Put simply, we need to make New Zealand famous for more good things.

The New Zealand Story Group is connected to Education New Zealand, the Ministry of Foreign Affairs and Trade, the Ministry for Primary Industries, New Zealand Trade and Enterprise and Tourism New Zealand. The story is grounded in three values (idem):

Kaitiaki

Care of people and place (our role as guardians). We are guardians of people, place and planet. This care extends to everything we do and everything we create. We are considered as a progressive nation yet we seek not to damage what is precious.

Integrity

From a good place (our foundation). We do what we say we will do, and we do the right thing, because it's the right thing to do. This deeply ingrained value delivers the trust behind our good reputation.

Ingenuity

Challenging the status quo with original and bold solutions. With our spirit of exploration, adventure and creativity, we turn ideas into reality and solve what others do not. Our fresh perspective to problem-solving and making things happen is valued by others.

The New Zealand Story provides resources for exporters, including reports offering market insights in different international markets, professional royalty-free images, videos, presentations and infographics. The New Zealand Story Group is also the custodian of the New Zealand FernMark (<http://www.fernmark.nzstory.govt.nz/>), which is available for businesses that demonstrate they meet minimum requirements for products being made, grown or designed in New Zealand.

Initiatives such as the New Zealand Story are important because countries are competing for leadership in this space (Dalziel *et al*, 2017, p. 2). Origin Green, for example, was created by the Irish Food Board (<https://www.origingreen.ie/>). It describes itself as “Ireland’s food and drink sustainability programme” (ibid) and promotes itself as “the only sustainability programme in the world that operates on a national scale, uniting government, the private sector and food producers” (Irish Food Board, 2017). The website explains the ambition (<https://www.origingreen.ie/what-is-origin-green/about-origin-green/>):

The overall ambition of the Origin Green programme is that farms and food manufacturing businesses throughout Ireland sign up to the sustainability agenda, making measurable commitments to producing in a sustainable manner, with progress independently assessed and verified.

Realising that no one country, sector or individual business can solely lead the move towards global sustainable production, we are committed to working with both domestic and international partners to improve performance through collaboration.

The Origin Green programme is being used to promote Irish food and drink products in international markets. In May 2018, for example, there were large Origin Green stands at the SIAL China Food and Beverage Exhibition and at the Private Label Manufacturers Association International Trade Show in Amsterdam. On both occasions, Origin Green was promoted in the following way (<http://www.origingreen.com/en/news-and-updates/sial-china-2018/> and <http://www.origingreen.com/en/news-and-updates/plma-2018/>):

All of the exhibitors on the Ireland stand are members of Origin Green, Ireland's national sustainability programme. Origin Green enables Irish food and drink suppliers to incorporate sustainability into all areas of the supply chain. From farm to fork, it provides essential and verified proof that the food and drink you source is sustainably produced.

Working with Origin Green members enhances your commitment to sustainability within your own business while protecting the world's scarce resources for generations to come.

This is a simple Country of Origin message for Irish food and beverage exports. There is potential for a strong message to be developed for New Zealand using science to verify credence attribute claims. This was proposed in the MPI's *Primary Sector Science Roadmap* which calls on science to support "a coherent Aotearoa New Zealand primary sector story, emphasising key product attributes based on provenance (such as cultural values, food safety, health benefits and quality) and is highly marketable" (MPI, 2017c, p. 19).

Chapter 4

Maximising Export Returns

In 2012, the Agribusiness and Economics Research Unit (AERU) initiated research to explore how international consumers of agri-food products interpret and value credence attribute claims of their purchases. This began with pilot surveys of consumers in India, China and the United Kingdom, which found that consumers in China and India reported a higher value for the credence attributes (especially environmental quality and animal welfare) of food and beverages than in Britain (Tait *et al*, 2016a).

Based on that evidence, the AERU submitted a proposal to the Biological Industries portfolio of the 2013 MBIE Science Investment Round for a three-year research programme to test three scientific hypotheses:

- **Hypothesis 1:** Middle-class consumers in different international markets are willing to pay premiums for products acknowledged as having particular credence attributes, with different markets having different understandings and valuations of these credence attributes.
- **Hypothesis 2:** Given Hypothesis 1, using tailored credence attributes in different international markets can generate high levels of increased market returns to New Zealand producers and the New Zealand value chain.
- **Hypothesis 3:** Given Hypothesis 1 and Hypothesis 2, New Zealand businesses in the biological industries can use modern technologies and can develop key messages that will communicate credence attributes to consumers and gatekeepers in key international markets to capture increased market returns.

The proposal was accepted for funding, and the research programme known as *Maximising Export Returns* took place from 1 October 2013 to 30 September 2016. The hypotheses were tested with original research in five important markets for New Zealand agri-food exports: China, India, Indonesia, Japan and the United Kingdom. In each market, the AERU undertook a panel survey of 1,000 middle to high income consumers. Respondents were screened out of the study if they did not go grocery shopping at least once a month or if they reported that they were not aware of New Zealand (for further details, see Guenther *et al*, 2015).

The surveys collected data on a range of relevant credence attributes and included a choice experiment to estimate consumer values of certain food attributes in dairy products, meat products, fruit and vegetables, and wine. The final section of each survey collected data on the participant's use of communications technologies to find information about, or to purchase, food and beverage products. The analysis of the surveys was supplemented with key informant interviews with managers involved with importing New Zealand food and beverage products in Asia and Europe, reported separately in Lees and Saunders (2015).

All result from the programme were published in six research reports: Miller *et al*. (2014); Lees and Saunders (2015); Saunders *et al*. (2015a); Guenther *et al*. (2015); Driver *et al*. (2015); and J. Saunders (2016). These reports can be accessed for download without charge at www.lincoln.ac.nz/aeru/mer. Selected results from the research were also published in academic journals, including: Saunders *et al*.

(2015b); Tait *et al.* (2015); Guenther *et al.* (2016); Tait *et al.* (2016b); Miller *et al.* (2017); and Dalziel *et al.* (2018). Quantitative data from the surveys can be accessed through an on-line data portal using a dashboard platform developed by Dapresy (<http://dapresy.com/>). This data portal is also accessed through the AERU website at www.lincoln.ac.nz/aeru/mer.

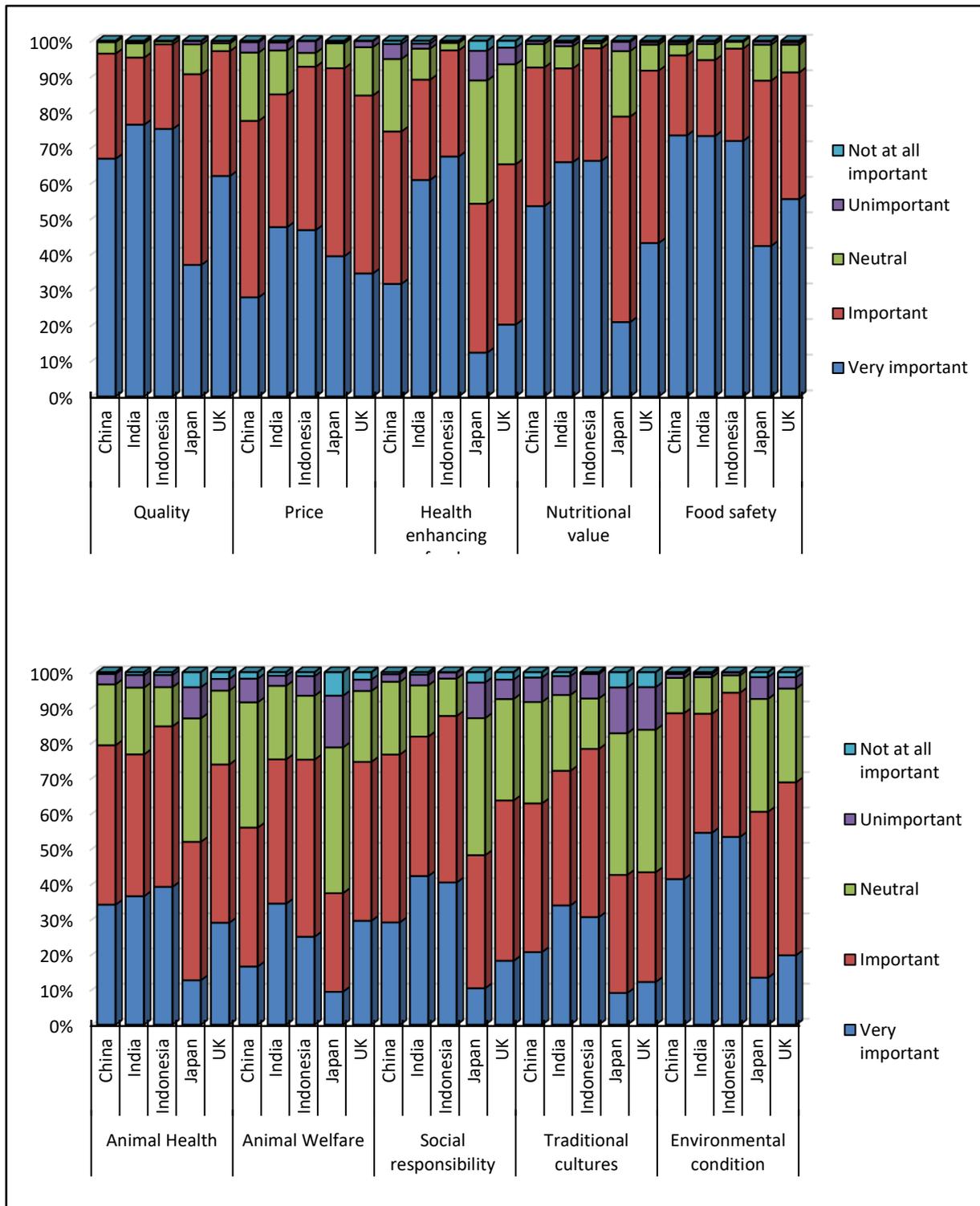
A feature of the portal is that it allows the user to define the data base that will be accessed, using classifications based on gender, age groups, household make-up and highest level of education (Driver *et al.*, 2018). The data are for the five countries included in the original study, extended with a later study by Miller *et al.* (2016b) of New Zealand consumers using the same methodology. The user can choose which of the six countries to explore, with comparisons automatically shown with the other five countries. The publication also allows the user to access data on how consumers in the five overseas countries are using digital technology in their purchasing decisions and how they view New Zealand. The flexibility provided by the Dapresy portal means that users are not reliant on having to commission further work by the research team to answer their own specific questions about specific markets.

The consumer surveys were undertaken in China, India, Indonesia, Japan and the United Kingdom between March and April 2015. Based on a five-point Likert scale varying from 'very important' to 'not important at all', participants were asked to rate the importance of ten key attributes when shopping for food and beverages:

- quality,
- price,
- animal health,
- animal welfare,
- environmental condition,
- health enhancing foods,
- food safety,
- social responsibility,
- nutritional value, and
- traditional cultures.

The results from this question are shown in Figure 1 on the following page. They confirm that quality and food safety are the most important attributes, but also indicate that the other credence attributes are important, with some differences in how these are ranked in different markets. Further, the data revealed that consumers in China, India and Indonesia rated credence attributes more highly than consumers in Japan and the United Kingdom, which also confirmed the preliminary findings in the pilot study of Tait *et al.* (2016a).

Figure 1: Importance of attributes when shopping for food and beverages



Source: Guenther *et al.* (2015), Figures 3-1 and 3-2.

The study selected six of the attributes in Figure 1 for further examination: food safety, environmental condition, animal welfare and health, human health enhancing foods, social responsibility and the role of traditional cultures. The results can be accessed through the data portal mentioned above. To illustrate, Figure 2 presents the results for food safety. The survey respondents were asked to rate on a five-point scale the importance of each of the following factors underpinning food safety in the supply chain:

- hygiene standards,
- rates of contamination,
- reduced use of pesticides,
- environmental condition,
- freshness,
- animal health,
- animal welfare,
- labelling of “use by date”,
- traceability to origin,
- trust in supply chain,
- GM-free food; and
- tamper-proof packaging.

Figure 2: Importance of factors in relation to food safety

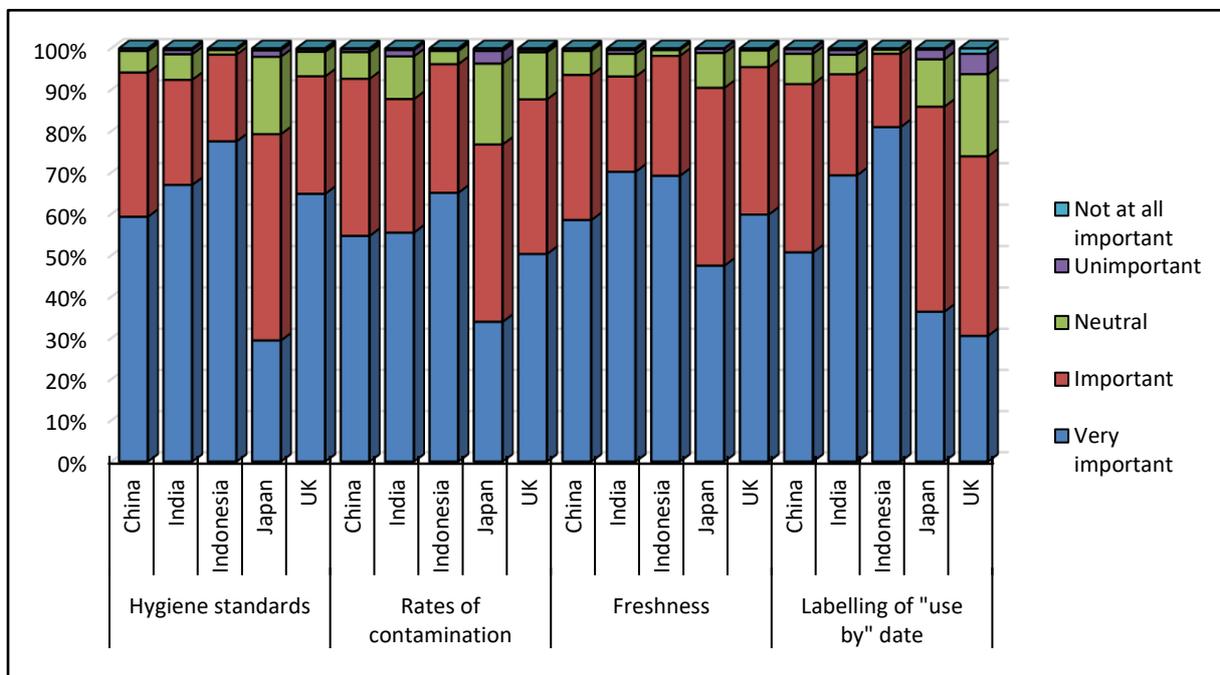
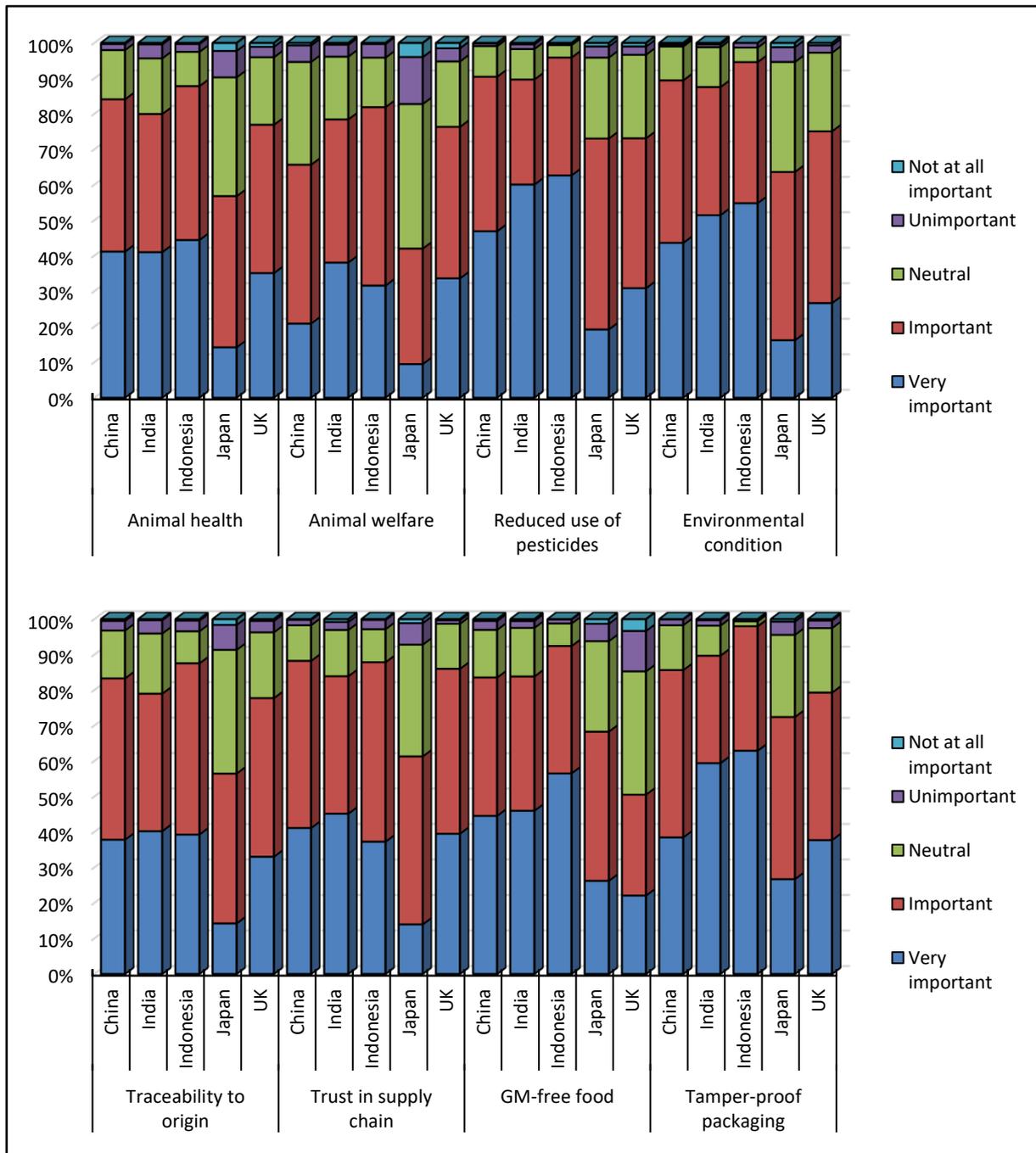


Figure continued on following page.

Figure 2 (Continued): Importance of factors in relation to food safety



Source: Guenther *et al.* (2015), Figures 4-1, 4-2 and 4-3.

The data in Figure 2 again illustrate that consumers in China, India and Indonesia are more likely to give higher importance to credence attributes than consumers from Japan and the United Kingdom. Further, the contribution of credence attributes to judgements about food safety varied in different markets. Cross-country comparisons showed that for Chinese participants hygiene standards were rated the most important factor associated with food safety, followed by freshness and rates of contamination. Indian participants indicated the labelling of a product's "use by date" to be the most important factor, followed by the product's freshness and hygiene standards. Similarly, Indonesian participants prioritised the labelling of a product's "use by date", followed by hygiene standards and freshness. For Japanese and United Kingdom participants freshness was the most important, followed by hygiene standards.

Respondents were asked to indicate on a five-point Likert ranging from 'strongly' to 'not at all' how much they associate certain factors with New Zealand:

- open spaces and wilderness,
- clean water,
- clean environment,
- natural farming methods,
- quality products,
- food safety,
- integrity, and
- innovativeness.

Overall, respondents across all countries rated each of these factors relatively highly, with no apparent differences shown between the developed and developing countries. While Chinese, Indonesian and UK respondents associated New Zealand most with a clean environment, Indians and Japanese respondents associated the country strongest with quality products and open spaces and wilderness, respectively. All countries indicated the lowest association with New Zealand as an innovative country.

The research included a choice experiment to assess willingness-to-pay for attributes of different types of food and beverages using used the seven-step approach summarised by Bennet and Adamowicz (2001, p. 74). The results were then provided as inputs into the Lincoln Trade and Environment Model (LTEM) to determine the implications for New Zealand producer returns. LTEM is a multi-country, multi-commodity, partial equilibrium trade model. It is based on the VORSIM model created by Roningen (1997), extended by the AERU to focus on New Zealand's main trading partners, exported products and domestic agricultural policies (Saunders and Çağatay, 2004; Kaye-Blake et al, 2008).

LTEM covers 23 commodities and 21 countries, the European Union and the rest of the world. The model allows the analyst to project a baseline scenario to 2024 based on current policies, and then to determine differences that would result in an alternate scenario. In Dalziel *et al.* (2018), a scenario was constructed on the assumption that all imported products (that is, not just from New Zealand) into the five analysed international markets (China, India, Indonesia, Japan and UK) captured the premiums identified in the choice experiments.

The results are shown in Table 1. The figure in each cell provides the model's estimate of the percentage change in New Zealand producer returns for each product if all imports of the relevant

product to the five countries achieve the premium estimated by the choice model, assuming that the standard of the attribute is increased from 'minimum' to 'improved'. This is positive in every case except one (see Dalziel *et al*, 2018, for further details and discussion).

Table 1: Modelled increase in New Zealand producer returns for improved accreditation for five credence attributes, percentage change from baseline in 2024

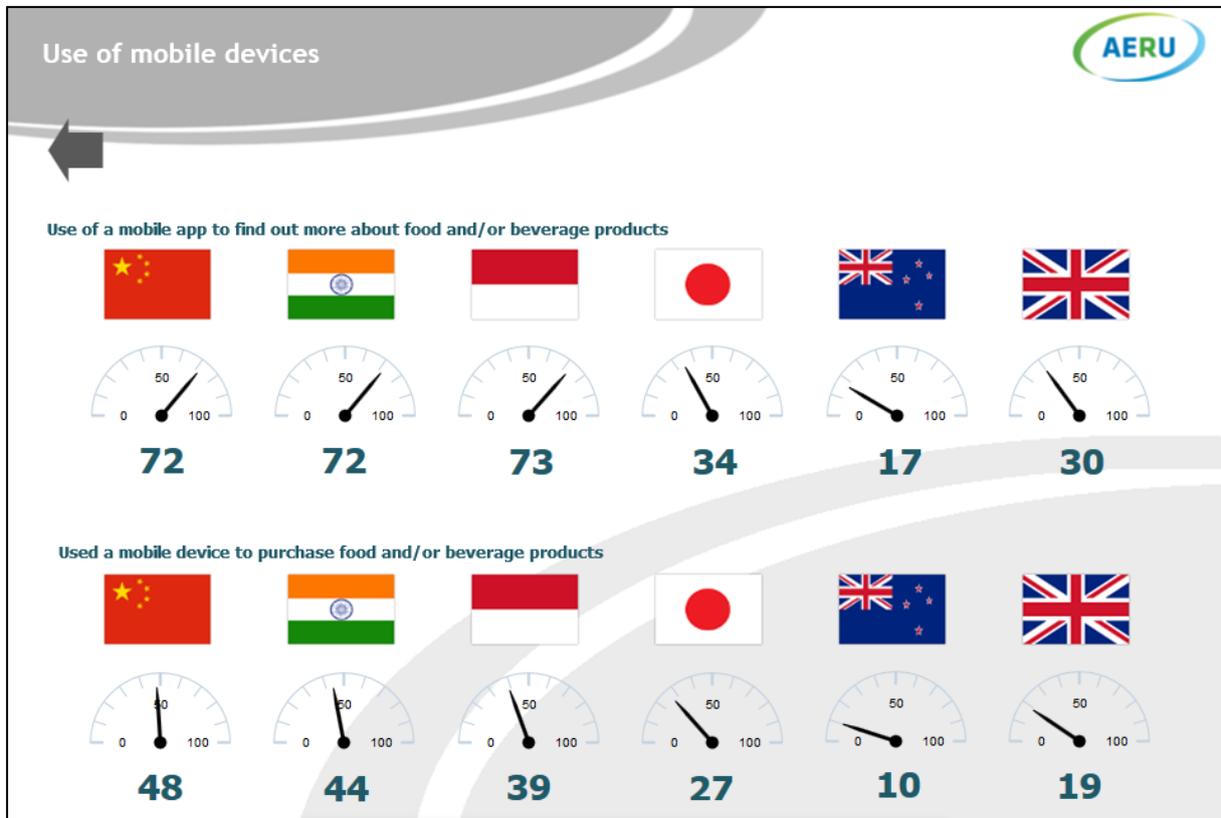
	Health Enhancing	Environment Condition	Animal Welfare	Food Safety	Social Responsibility
Wheat	0.4%	0.4%	0.5%	0.4%	0.5%
Other Grains	0.7%	0.9%	1.1%	0.9%	1.1%
Maize	0.7%	0.9%	1.1%	0.9%	1.1%
Cereals	0.6%	0.7%	0.8%	0.7%	0.9%
Beef	2.3%	3.6%	5.0%	4.7%	5.6%
Pig Meat	4.8%	3.3%	4.2%	2.3%	3.0%
Sheep	4.9%	2.7%	9.3%	10.7%	9.3%
Poultry	2.9%	3.7%	5.8%	5.7%	6.0%
Raw Milk	0.3%	0.6%	0.8%	0.6%	0.6%
Butter	0.6%	1.3%	4.2%	3.4%	1.1%
Cheese	3.5%	7.3%	4.3%	3.1%	7.6%
Whole Milk Powder	0.0%	0.4%	2.3%	1.3%	-0.1%
Skim Milk Powder	2.1%	6.4%	5.6%	4.1%	3.3%
Apples	4.3%	0.6%	4.1%	2.1%	5.2%
Kiwifruit	2.4%	0.6%	4.4%	0.9%	3.3%
Wine	15.3%	4.4%	10.2%	1.9%	15.3%
Total Agriculture	1.1%	1.5%	2.6%	2.1%	2.1%

Note: In the survey it was made clear that animal welfare includes biodiversity. Total Agriculture is the aggregate of all 23 modelled commodities, some of which are not presented individually.

Source: Dalziel *et al*. (2018), Table 2.

One of the important outputs from the *Maximising Export Returns* research programme is the insights it provided on how consumers in Asia are using information technology to access information about food and beverage products, as well as to purchase those products. Figure 3 is a snapshot from the MER data portal (accessed through www.lincoln.ac.nz/aeru/mer) that illustrates this point. Compared to survey respondents in New Zealand and the United Kingdom, respondents from China, India, Indonesia and Japan are far more likely to use their smart phones for these purposes (see also Driver *et al*, 2015).

Figure 3: Percentage of respondents who use a mobile app to find information about, or to purchase, food or beverage products in six selected countries



Source: MER data portal, accessed 14 June 2018 through www.lincoln.ac.nz/aeru/mer.

Chapter 5

Our Land and Water National Science Challenge

In August 2012, the New Zealand Cabinet agreed to establish National Science with the goal of applying science for the benefit of New Zealand (National Science Challenges Panel, 2013, p. 1). Eleven Challenges were created, including *Our Land and Water: Toitū te Whenua Toiora te Wai* (abbreviated in this chapter as OLW). The vision of this Challenge is: “New Zealand is world-renowned for integrated and successful land-based primary production systems, supported by healthy land and water and capable people” (see www.ourlandandwater.nz). Its mission is “to enhance primary sector production and productivity while maintaining and improving our land and water quality for future generations”.

The OLW research strategy is organised around three major themes, the first of which is called Greater Value from Global Markets (OLW Directorate, 2016, pp 5-6): “Value chain research that enables New Zealand communities, individuals and iwi to enhance and share economic value from products, services and market segments that are aligned with and validated against stakeholder environmental, social and cultural values”.

At the centre of the three themes, there is a work programme known as The Nexus operating to maintain integration within the Challenge and to ensure the mission is achieved. In June 2016, The Nexus called for proposals to address some priority research questions, including the following: *How can value chains better share value (economic, environmental, social and cultural) from consumer to producer and incentivise land use practices that relieve tensions between national and international drivers?* A consortium of nine researchers from two universities, PwC New Zealand and three private consultancies undertook the research on that question, presenting the results in Saunders *et al.* (2016b).

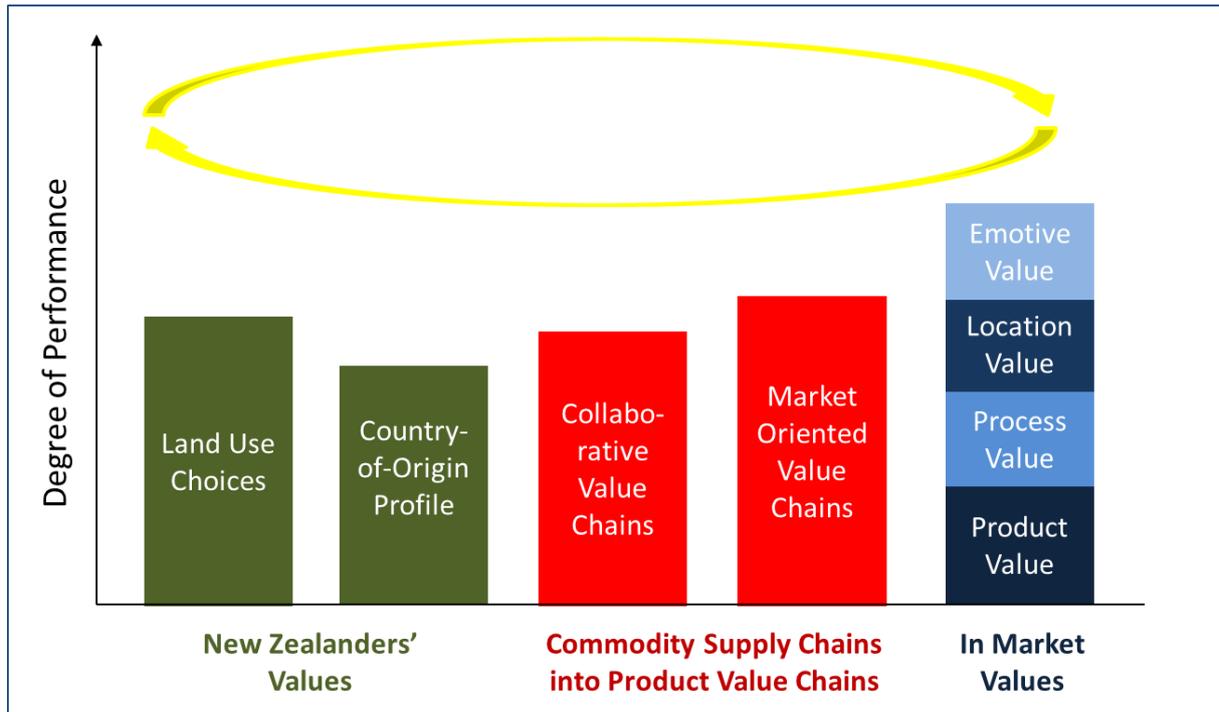
Figure 4 is reproduced from that report. It is model of how collaborative and market-oriented value chains can bring together New Zealanders’ values with in-market values. The in-market values can be categorised into four sources of value: product value, process value, location value and emotional value (see Dagevos and van Ophem, 2013). The first value is the traditional product value, which includes sensory properties such as freshness, taste, texture and flavour as well as price.

The second value, process value, focuses on the food or beverage is produced, including attention to consumer ethical concerns (Lusk and Briggeman, 2009) such as health risks, ecosystem degradation and animal welfare (Weather *et al.*, 2003) as well as debates about “free-range livestock product, environmental pollution, genetic modification, chemicals, food miles and fair trade issues” (Dagevos and van Ophem, 2013, p. 1477). This is the component of in-market value where credence attributes are most significant.

Location value is defined as the setting and atmosphere of where a product is purchased or consumed. This can include the scenic opportunities, physical landscape, venue environment and the ambiance of the place of consumption, which could include the home, restaurants, fast food and off licence premises.

The final category is emotional value. The original definition was limited to the consumer’s emotive response to the immediate service-scape and experience of consumption (King and Meiselman, 2010), but now extends to the emotive response to any ‘story’ associated with a purchased product’s brand or image, including the product’s country-of-origin profile (Saunders *et al*, 2016a).

Figure 4: Stylised performance of agribusiness value chains



Source: Saunders *et al*. (2016b), Figure 3.

On the left-hand-side of Figure 4 are the land use choices and country-of-origin profile, both of which reflect New Zealanders’ values. There is no suggestion in Saunders *et al*. (2016b) that New Zealanders’ values should change to meet in-market values; rather, the proposal is that where the two sets of values align, there are opportunities to create and capture value by communicating the value attributes to final consumers. This requires turning commodity supply chains into product value chains.

Supply chains that focus on creating value to differentiated consumers are market oriented value chains (Grunert *et al*, 2005; Crittenden *et al*, 2011; Liao *et al*, 2011; Trienekens, 2011; Tukamuhabwa *et al*., 2011; Fearne *et al*. 2012; Trienekens *et al*, 2012). Creating and capturing value requires communication in both directions along the value chain (Saunders *et al*, 2016b, p. 40). Market intelligence about what is valued by final consumers must be gathered and disseminated along the value chain to support customer-focused decisions about production, value-adding processes and marketing. The relevant qualities created by the production, processing and distribution systems in the value chain must be communicated to, and trusted by, final consumers in order for that added value to be captured.

The research by Saunders *et al.* (2016b) drew on a Canadian study by the Value Chain Management Centre (2012) to distinguish four types of value chains: fragmented; cooperative; coordinated; and collaborative. It provided evidence that consumer value is best created and captured in collaborative value chains. These require participating companies to engage in longer-term strategic arrangements for mutually beneficial outcomes. These arrangements require attention to be given to governance of a value chain, which can range from spot/cash market arrangements to full vertical integration (Peterson *et al.*, 2001).

Based on the above analysis, which was validated at a national workshop of OLW stakeholders on 29 September 2016, the OLW Directorate invited proposals for a larger research programme centred on five key elements:

- Value and credence attributes;
- Country of origin;
- Market oriented value chains and communication;
- Collaborative value chains; and
- Land use choices.

A transdisciplinary research consortium was created from three universities, two Crown research institutes, two private sector research groups and two consultancies to undertake integrated research covering the all five elements. At the time of preparing this report, the consortium had completed the first phase of its research programme, which had resulted in seven publications: Driver *et al.* (2018); McIntyre *et al.* (2018); PWC (2018); and Tait *et al.* (2018a, 2018b, 2018c, 2018d).

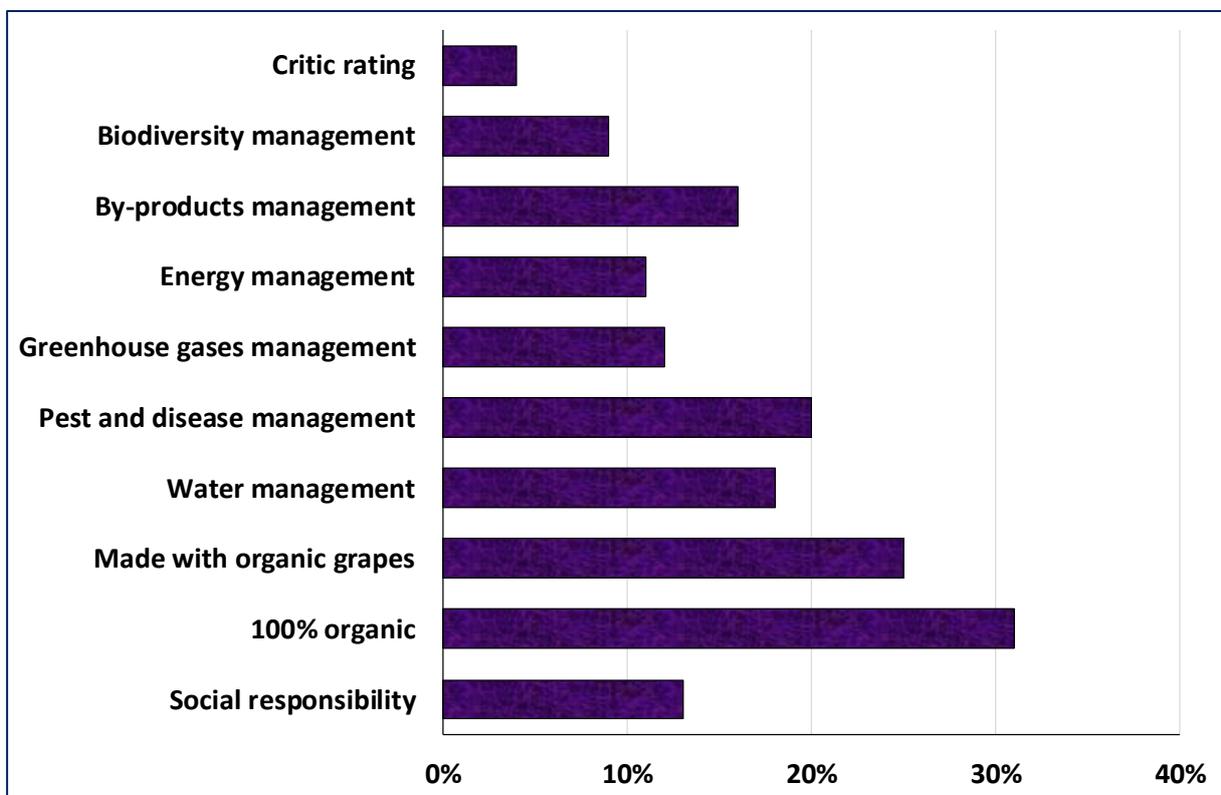
The research presented in the reports by Tait *et al.* involved choice experiments in four key markets: wine and beef in California; and kiwifruit and yoghurt in Shanghai. Choice experiments have been extensively used to value consumer preferences for food product attributes (Tait *et al.*, 2015, 2016a, 2016b; Miller *et al.*, 2017). Each study involved a structured and self-administered online survey of 800 consumers recruited from a panel database of consumers provided by an international market research company.

The method involved simulating the context in which consumers normally make choices among a set of competing alternatives. This was achieved through an experiment in which attributes were systematically and independently varied to produce multiple choice scenarios. Survey participants were then asked to indicate their preferred alternative in each scenario, with the observed levels of attributes in the chosen and non-chosen alternatives modelled in a probabilistic econometric framework. The resulting model outputs were then used to estimate consumer willingness to pay for the attributes of interest for each of the four products.

The surveys produced a wealth of material that can be found in the four reports by Tait *et al.* (2018a, 2018b, 2018c, 2018d). This includes, for example, further insights in consumer awareness of New Zealand food and beverage products, and well as consumer attitudes towards use of modern technologies for obtaining information about food and beverage purchases. Nevertheless, the core result for the *Unlocking Export Prosperity* research is the evidence it found that consumers are willing to pay a premium for certain credence attributes, and New Zealand does enjoy a high reputation in these four specific markets.

This result can be illustrated using the example of sauvignon blanc consumers in California. The analysis revealed that consumers were willing to pay a premium of nearly 40 per cent for wine quality as reflected in critic rating, but similar premiums were found for pest and disease management, for water management and for organic production. The study also found that Californian consumers were willing to pay a premium for wine produced in the United States (a preference for home country of origin is common in the literature; see, for example, Miller *et al*, 2014, p. 94), but New Zealand sauvignon blanc enjoys a comparable premium, considerably higher than for sauvignon blanc produced in Chile, France or South Africa (Tait *et al*, 2018d, p. 42, Figure 4-4).

Figure 5: Willingness-to-pay for attributes of sauvignon blanc as percentage of average bottle price, California 2017



Source: Tait *et al*. (2018d, p. 41), Table 4.2.

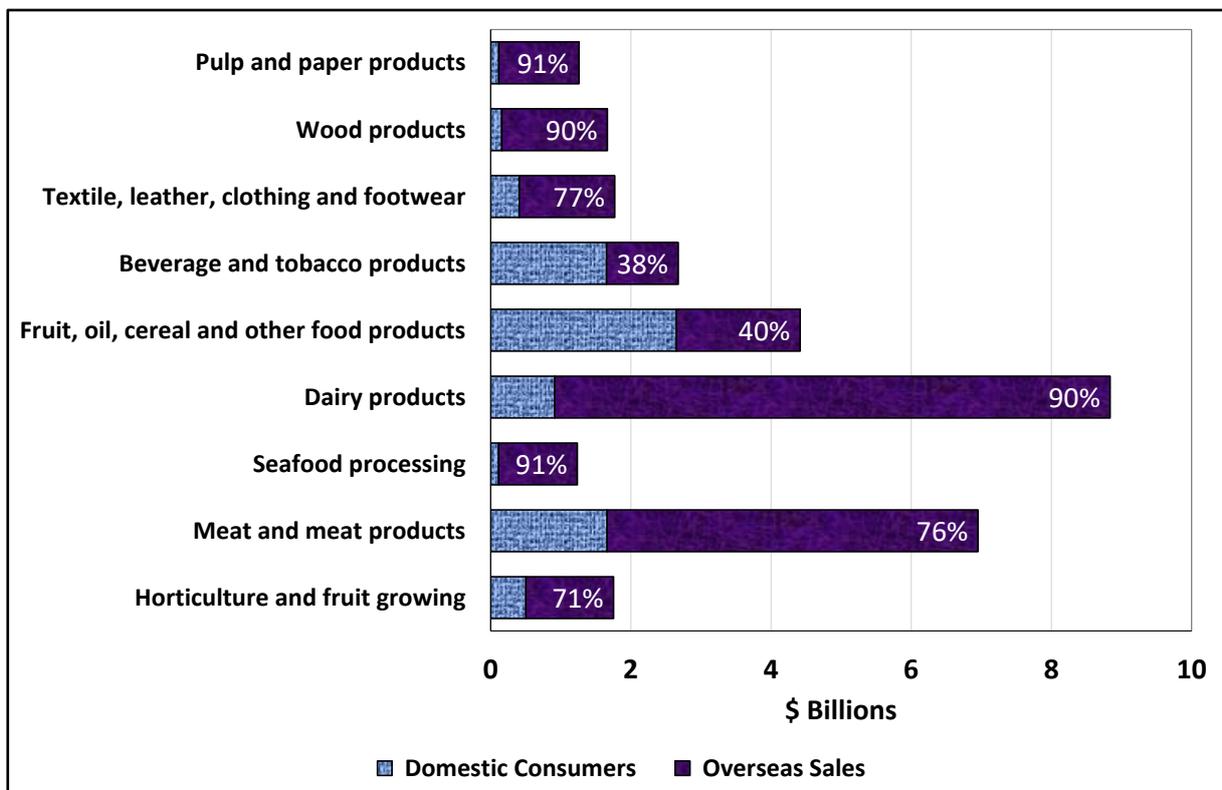
Chapter 6

The New Zealand Sustainability Dashboard

The New Zealand Sustainability Dashboard (hereafter NZSD) was a research programme that took place from October 2012 to September 2018, funded by the Ministry of Business, Innovation and Employment and several industry partners (Dalziel *et al*, 2017). The purpose of the research set out at its beginning was “to establish a flexible and broad sustainability assessment and reporting framework that is applicable to all New Zealand primary industry sectors for the development, operation, refinement and efficient regular reporting of sustainability Key Performance Indicators” (Manhire *et al*, 2012, p. 1).

A feature of New Zealand’s primary sector industries is that the domestic market is small and the world’s high income markets are distant (Treasury, 2014, Figure 8, p. 16; Dalziel and Saunders, 2018, Section 5). Figure 6, for example, illustrates that the largest primary sector industry, dairy products, exports 90 per cent of final sales. For six other industries, the share of exports is above 70 per cent.

Figure 6: Value of New Zealand agri-food final sales and share that is exported, 2006/07



Source: Saunders *et al*. (2016a, p. 20), based on Statistics New Zealand (2012).

Consequently, the NZSD recognised that New Zealand producers face additional challenges in communicating their sustainability attributes (Dalziel et al, 2017, pp. 2-3; see also Dalziel *et al*, 2018). At the industry level, a Sustainability Dashboard is an integrated system for collecting sustainability data on a consistent basis from individual enterprises, and using that data to provide information efficiently to consumers and other industry stakeholders.

The NZSD was created using international examples of best practice (see especially FAO, 2014) to produce a structured framework within which tailored dashboards can be designed for land-based industries or groups (Hunt *et al*, 2013; NZSD, 2015). It adopted a sustainability goal for New Zealand's production landscapes expressed in two paragraphs, with the second drawing on the Vision Mātauranga themes within the programme summarised in NZSD (2014) (NZSD, 2015, p. 1):

Sustainability is a product of good governance that supports and maintains profitable enterprise while encouraging and protecting the environmental integrity of ecosystems and the social well-being of communities.

Sustainability is to maintain and enhance the mauri (life supporting capacity, vibrancy, and abundance) of ngā taonga katoa (all things valued and treasured).

The framework is constructed on four sustainability pillars, each with an overarching goal (*idem*, p. 3).

Good Governance – Ensures sound decision-making and implementation.

Good governance facilitates an active participation of all stakeholders. It ensures the legitimacy or the rights of an enterprise to operate and it determines how rigorous sustainability management is incorporated into the operation and culture of an enterprise. Hence good governance will contribute to growth and financial stability by underpinning market confidence, financial market integrity and economic efficiency.

Economic Resilience – Sustains an economy through change and shocks.

To be economically resilient an enterprise's financial well-being is maintained, its vulnerability minimised, the products it produces are of good quality, accompanied by adequate information, and efficiently produced, and it creates value in the local community.

Agro-environmental Integrity – Sustains natural capital, enhances natural heritage values and meets global environmental obligations.

Agro-environmental integrity is defined as the state which sustains the full potential of land and its natural capital, ecosystem processes and services to efficiently and indefinitely produce healthy, high quality food and fibre while enhancing natural heritage values and meeting global environmental change obligations.

Social Well-being – Ensures livelihood opportunities and respects social and cultural principles of all society.

Social well-being is achieved when the respect for rights of equal access to employment and participation in the value-chain and of safe and healthy working environments and the development of supportive communities facilitate the pursuit of the livelihood aspirations of all members of society.

Within each pillar, there is a structured hierarchy of five levels; see Figure 7. The overarching goal for each pillar is supported by outcomes that must be produced if that goal is to be achieved. Thus, there are four outcomes for agro-environmental integrity (NZSD, 2015, p. 6): (1) natural capital is maintained; (2) resilience is secured for future use; (3) contributions are made to national ‘natural heritage’ goals; and (4) global environmental change obligations are met.

Figure 7: Outline of the New Zealand Sustainability Dashboard Framework



Source: NZSD (2015, p. 2).

Each outcome is in turn supported by specific objectives. Thus, the outcome of maintaining natural capital is supported by three objectives: maintaining ecosystem processes; reducing agricultural pest threats; and limiting environmental pollutants.

The final two levels – indicators and measures – determine what data are required to track progress towards and objective. An indicator defines conceptually what will be monitored; for example, an important indicator for maintaining ecosystem services might be ‘soil health’. A measure is the precise statistic used, such as the percentage of soil sites recorded by regional councils as within-target for acidity, organic reserves, fertility and physical status (Ministry for the Environment & Statistics New Zealand, 2015, p. 84).

The NZSD research team used the framework in Figure 8 to design tailored dashboards for particular land-based industries and group of enterprises (see four case studies in Dalziel *et al*, 2017). The partnership between Sustainable Winegrowing New Zealand and the NZSD, for example, was selected as a finalist in the category of *Communicating for Change* at the NZI Sustainable Business Network

Awards 2017 (<https://sustainable.org.nz/2017-awards-finalists/>), which is a category that recognises organisations that are communicating sustainability effectively to inspire change. It received a Commendation award in the category.

The impetus for an industry-level sustainability dashboard often comes from external demands for sustainability reporting (Dalziel et al, 2017, p. 47). The wine industry's sustainable production programme, for example, goes back to 1994, recognising that international consumer perceptions could be enhanced and the risks of barriers to international trade could be reduced by implementing the Sustainable Winegrowing New Zealand programme. Similarly, the KiwiGreen programme for kiwifruit was an integrated pest management system introduced in 1992 with the aim of producing fruit with minimal or no chemical residues ensuring safe fruit for consumers.

Further, an industry dashboard can profile the industry to domestic and international markets that value the sustainability credentials of their purchases. New Zealand Winegrowers, for example, published its first Sustainability Report in early 2017 (New Zealand Winegrowers, 2017c). Fonterra (2017) has also produced a substantial Sustainability Report on its activities. Sustainability is one of seven values highlighted by Zespri in its international marketing, which includes the maintenance of a dedicated webpage to "Sustainability the Zespri Way" (www.zespri.com/storyofzespri/sustainability).

These and other examples illustrate that New Zealand primary sector producers are able to create and capture value by profiling the sustainability attributes of their products on international consumers.

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