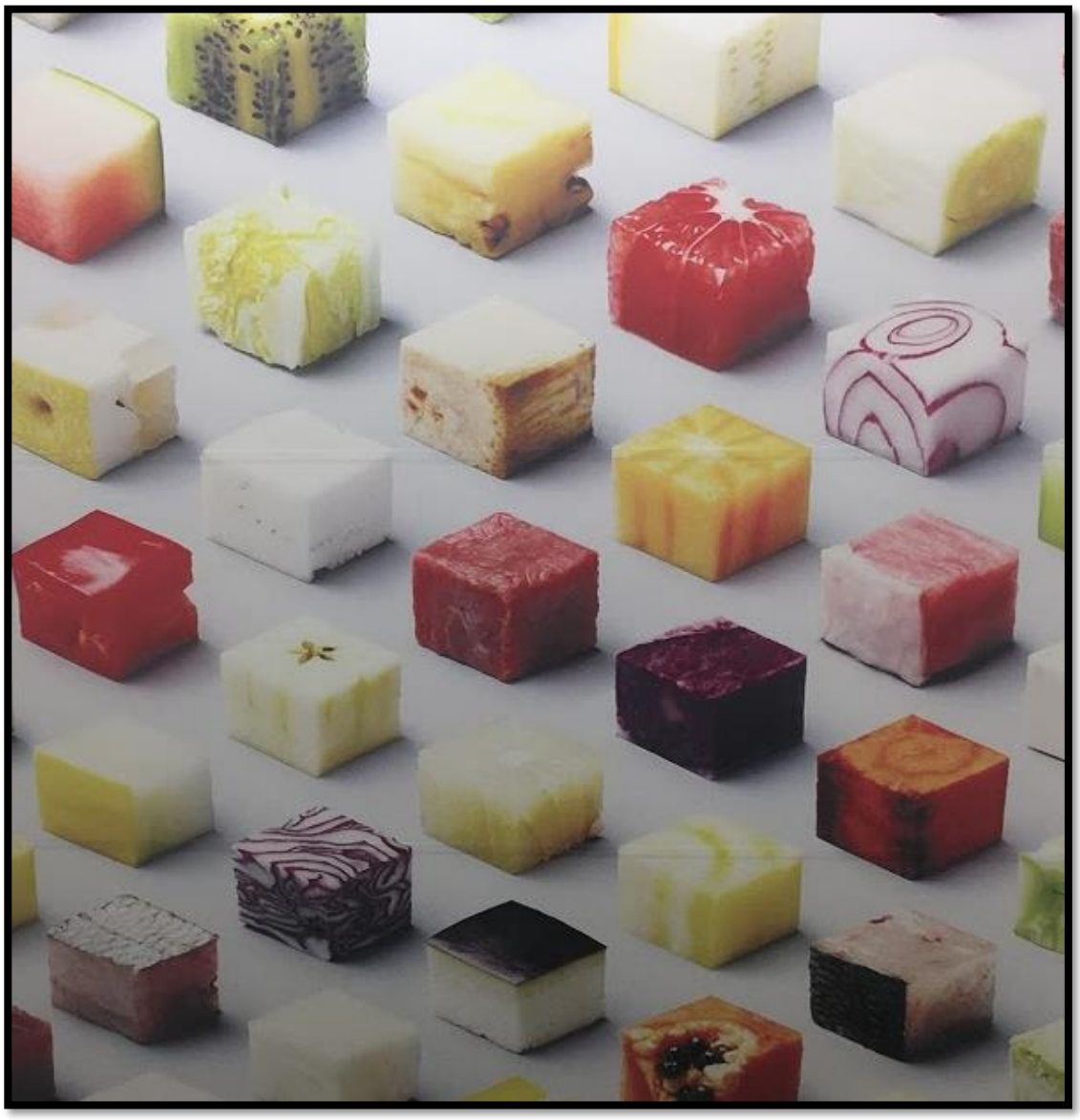
NUFFIELD
NEW ZEALAND
FARMING SCHOLARSHIPS

Global vision, leadership and innovation

Exporting Aotearoa – New Zealand:

A new business model for nutrition- and health-focused export companies



ANDY ELLIOT

Nuffield Scholar

March 2019

Sponsors

I wish to acknowledge and thank the following individuals and organisations for their support over my scholarship period.

NZRLT Partners/Sponsors

Strategic Partners

Programme Partners

Media and Service Partners

Disclaimer

The purpose of the research report is to identify, critically analyse, and provide recommendations to a challenge or opportunity currently confronting the New Zealand agri-food sector.

Scholars are encouraged to present their report findings in a style and structure that ensures accessibility and uptake by their target audience.

This publication has been produced by the scholar in good faith on the basis of information available at the date of publication, without any independent verification.

On occasions, data, information, and sources may be hidden or protected to ensure confidentially and that individuals and organisations cannot be identified.

Readers are responsible for assessing the relevance and accuracy of the content of this publication. Nuffield New Zealand or the scholar will not be liable for any loss, damage, cost or expense incurred or arising by reason of any person using or relying on the information in this publication.

Scholar contact details may be obtained through Nuffield New Zealand for media, speaking, research purposes.

In submitting this report, the Scholar has agreed to Nuffield New Zealand publishing this material in its submitted form.

Nuffield New Zealand
PO Box 85084
Lincoln 7647
admin@ruralleaders.co.nz
+64 21 139 6881

Author

Andy Elliot

andydelliot@gmail.com

+64 212 444 333

Acknowledgements

The journey I have undertaken to get here has been incredible, challenging, and life changing. I feel honoured to have received this opportunity and to be a part of an inspirational Nuffield community. The Nuffield Scholarship had been on my radar for ten years, but I always felt the timing, or my experience wasn't quite right. I must thank Julian Raine for giving me the final push and the added reality check of telling me "you're running out of runway, Andy, and better put your best foot forward." My advice to others is there is never a perfect time for something like this and you should just go for it and embrace the chaos.

Thank you to the Nuffield Board for your belief and support throughout this last 18 months; getting that phone call from Juliet MacLean was extremely humbling. Thank you to Anne Hindson and Lisa Rogers for all your help and to Julian for not letting me put too much pressure on myself to lock in a topic until it felt right.

I couldn't have done this without the support of my life partner Bec McEwan; thank you for all your sacrifices and unbelievable patience. Thank you also to the rest of my whanau: my boys Ben, Luca and Zac. Big thanks also to my parents Faye and Graeme and in-laws, Joan and Nev, and cuzzie Nath; your support has been amazing in what has been the craziest of years. Thank you to everyone else who has also helped make life easier in my absence.

To the other 2018 Nuffield Scholars, Kate Scott, Turi McFarlane, Simon Cook and Solis Norton, thank you for all your support and for all the laughs and shared experiences, it has been great getting to know you and we'll be reliving these experiences and more over the years to come. To those I shared my Global Focus Programme with, thank you for your perspectives and knowledge, it was a blast and it's been great learning from you. I thoroughly enjoyed my time travelling with you all.

To everyone that took the time to meet with me, to share your knowledge or host me, thank you. This is the part that I enjoyed the most, the generosity of people, whether it be a meeting, a meal or accommodation, you are what makes this whole experience so memorable and your generosity is what I will remember and cherish the most. Hopefully I can pay this forward as you all have.

I would also like to acknowledge my employer Wakatū Incorporation, particularly Miriana Stephens, who has been encouraging and supportive throughout this journey. I'm really looking forward to putting all this into practice as we push forward with our nutrition and wellness solutions export business -Auora into Asia.

Foreword – by Nadine Porter, 2017 Nuffield Scholar

Firstly I want to say WELL DONE. This is a CRITICAL piece of work and possibly the most important and visionary Nuffield report I have read to date.

I think you have made a compelling sales pitch and have followed it up evidentially and most importantly with a blueprint for change.

This has me excited again about the possibilities of what can be achieved by Nuffield and I personally believe this kind of forward thinking should be what the scholarship is all about.

John Penno said to me before I left on my scholarship that if we weren't going out and challenging the status quo heavily, then 'what the hell' was the point of doing it! And I think you've nailed it.

I think it was important to state that New Zealand is behind on trends and you are absolutely correct because that is the battle we face with trying to bring any systemic or business mindset change. For me, your report raises the same questions I had a year ago - how is it, when we are spending money in many industries sending people offshore to report on trends etc, that this information does not appear to be filtering back in the form of what you are presenting?

I really hope your report is taken up and is utilised.

Again, well done Andy. You give me faith in the Nuffield process.

All the best

Nadine

Table of Contents

“Reaching people with an authentic, emotional story behind a product that is made in a sustainable and transparent way from healthy communities. This could be the key to making nutritious foods, extracts, ingredients and formulated offerings the backbone of our Aotearoa-New Zealand export future.” Andy Elliot

Executive Summary

The challenge that Aotearoa-New Zealand faces is finding balance between retaining and restoring our environment, whilst achieving social and economic benefit. This is not just our challenge; it is a response to a global call for better outcomes for our planet and us.

This report is targeted at businesses and industries within New Zealand who export, or who aspire to export. Businesses who are struggling to work out how to change their production model and increase their margins. Businesses who want to change their production methods but are unsure how to justify the change or cost.

My report is a thought-piece; it is about a different approach to our export potential, what we aspire to be in the future. It approaches a market demand first that is focused on the customer and the problem. The focus is neither on production nor on the environment; they are simply components of the solution. I want this to start the conversations of why we can't continue to walk down the same path …

There is urgency and risk for us all and the rate of change is unprecedented. My approach to this has been to explore how Aotearoa food producers can gain more export value, connect with their consumers in-market, and provide solutions to the problems we face, all at the same time?

If New Zealand producers and exporters **became the health and nutrition solution providers to the world**, this would fuel our aspirations for export growth, help us gain new customers, and drive change to our production systems and environment. **The problem is the health and nutrition of the world's consumers.**

The business model of developing products and pushing them into market is not working. If we don't know what our consumers want, then how can we presume to design a product for them. In New Zealand the food products we produce, and design, are largely for ourselves, our culture and our needs and wants. We then transition these domestic offerings to our export markets. The markets are not the same.
The proposed solution is to change the priorities of our business models to first identifying an opportunity or problem, then finding a customer to work with. The product can then be designed as a solution to a problem, and we remove the risk of the unknown.

When approaching an export market, we should design where our business is going to end up, rather than treat it like a progression of steps that need to be dealt with as they are encountered.

> *"By unbundling and changing our business model, our products and customer mix, we create a pathway for our businesses to be more adaptive and more profitable. It then becomes a natural progression to align farming practices that enhance the products' value. The backfill of sustainability is safer and far more palatable to the producer if it is market and customer led." Andy Elliot*

The environment, our diets, our health and the burgeoning challenge to sustain a world's population. This is our horizon for market growth and to provide differentiation from other countries. It will help all New Zealand identify with what it means to be sustainable or to demonstrate Kaitiakitanga.

This strategy will enable better utilization of waste: in fact that's probably one of the best places to start with this strategy. By developing nutritional formats and supplements, we create opportunities for new varieties and different production methods to become established.
When the consumer-focused breeding attributes like taste, shape, and colour that our whole food offerings require are no longer our only value propositions, it becomes easier to change our growing practices.

This will allow faster growth in organics and into more regenerative farming methods. The transition will be due to our markets, our customers and the consumers requesting this change: it will be market pull. Discerning customers shopping for health and nutrition products want transparency. That means full disclosure of how the product was produced and its environmental impact. Regenerative agriculture and sustainable aquaculture will become the new wealth creators of our natural products export sectors. The environmental credentials that we are all leveraging currently will become enhanced.

An estimated compound annual growth rate (CAGR) of 9%[1] is predicted for nutraceuticals over the next eight years.
The natural products sector, a sector is already worth NZ$1.4B.[2] This makes it a 4% contributor to our 2018 total Food and Beverage export value. This value is derived from approximately 1-2% of our total agri-food production.

Our current starting point in 2012 was a goal to double the export earnings from the primary industries by 2025.[3] This would have seen the value grow from around NZ$33 billion to somewhere in the vicinity of NZ$66 billion. On current projections we will not achieve this.

- **Currently just over 1% of our primary industry production is earning $1.4B, from largely commodity-scale sales; if this could move to 5%, it would represent growth to $4.3B.**

- **The real step change is if we were able to shift this from these largely commoditised transactions to branded consumer retail-ready products; if this happened, it would not be unrealistic to expect this value to grow from $4.3B to over $20B.**

We cannot get there unless something changes; that something is how we approach our markets and customers and our aspirations for future value creation.
Alternative proteins, stem cell production and the enormous investment that is occurring in a handful of companies internationally should be a major wakeup call. It should be our catalyst to embrace this change with our own products and formulations that showcase the best of everything that New Zealand produces. **This environment is an opportunity, not a threat.**

This opportunity will also pave the way for identification of new novel compounds from our existing production and supply base and for the development of new sectors focused entirely on nutrition for health and wellness. Through my research and case studies, some key factors in this customer focused ingredient space have emerged:

- Potential customers and existing customers can undertake innovation for you.
- Relationship with customer is the new pathway to market and expansion vehicle for growth.
- Relationships are everything in diversifying into ingredients and into health markets.
- There should be no waste; everything has a value when nutrition is the framework.
- Breeding and science can play backfill if consumer demand is established.
- Health and nutrition consumers demand transparency and quality.
- Providing solutions to customers' problems is far safer than supplying wants.

In summary, this opportunity for health, nutrition, function and ingredients is not new, it has always been here. New Zealand is simply not reaching anywhere near its potential in this space. This report explores some of those reasons why not, and expands on the potential opportunity we have to grow real value.

This report concludes by providing a step-by-step description of a business model that could be used to approach this opportunity. It is not a definitive solution, but rather serves as a guide to what the approach might look like for high value export return. It should be adapted and configured to a problem, and a subsequent solution developed.

The business model is called a Horizontal Service Model, because it allows growth in both directions to occur simultaneously

1 The Global Problem and Opportunity

1.1 This is a Global challenge

There are complex global challenges that ultimately can only be dealt with at a local level. We should be aiming to be part of the solution in our export growth agenda.

> "Diets inextricably link human health and environmental sustainability. The scientific targets for healthy diets and sustainable food systems are integrated into a common framework, the safe operating space for food systems, so that win-win diets (i.e., healthy and environmentally sustainable) can be identified. We propose that this framework is universal for all food cultures and production systems in the world, with a high potential of local adaptation and scalability."[4]

The EAT-Lancet report (2019) is an attempt to link the survival of the planet with a diet that will keep people healthy. It has been written with expert input from people representing many countries. The backdrop is that the way we have been producing our food during these last 50 or so years is completely unsustainable; it is also not providing us with the nutrition that we need to be healthy. It has reached a tipping point. Unhealthy people and an unhealthy planet.

The report beautifully highlights the urgency for us to link our health, not just with our food, but with a healthy planet. The key messages from this report should be on the radar of all food producers:

- The global burden of non-communicable diseases is predicted to worsen.
- Transformation to healthy diets by 2050 will require substantial dietary shifts, including a greater than 50% reduction in global consumption of unhealthy foods, such as red meat and sugars, and a greater than 100% increase in consumption of healthy foods.
- Sustainable food production for about 10 billion people should use no additional land, safeguard existing biodiversity, reduce consumptive water use and manage water responsibly, substantially reduce nitrogen and phosphorus pollution, produce zero carbon dioxide emissions, and cause no further increases in methane and nitrous oxide emissions.
- Achieving healthy diets from sustainable food systems for everyone will require substantial shifts towards healthy dietary patterns, large reductions in food losses and waste, and major improvements in food production practices.

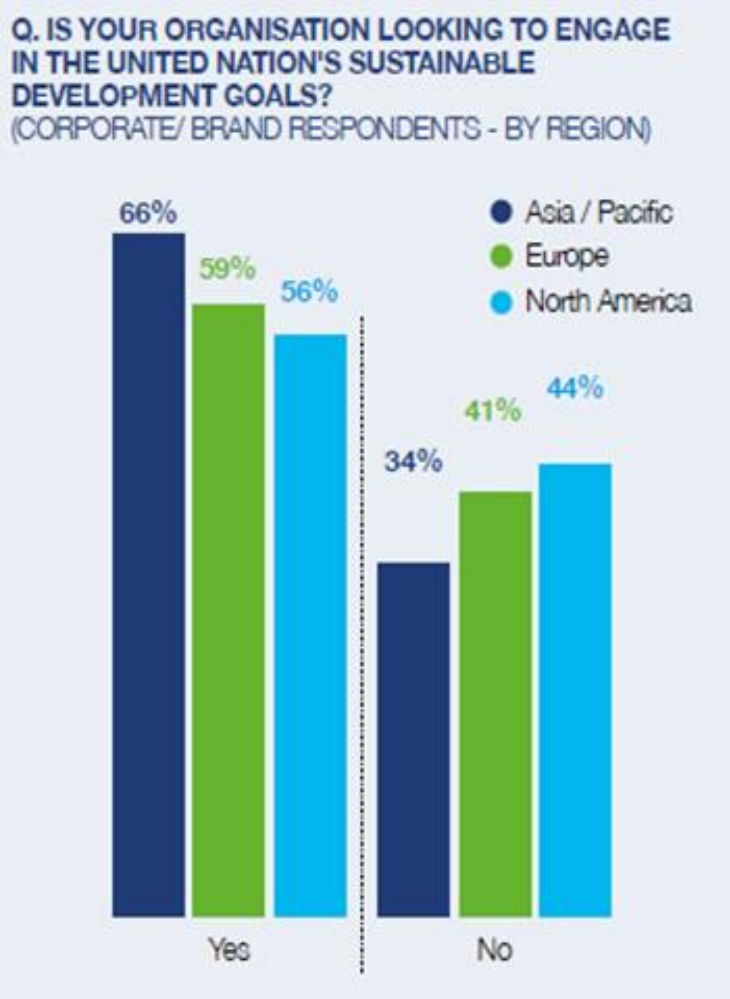
These messages link with the 17 United Nation Sustainability Goals (see table) and the likelihood that the world's population will be 10 billion people by 2050. A healthy diet from sustainable food systems is intertwined with all UN Sustainable Development Goals.

Figure 1. United Nations, Sustainable Development Goals, FAO website

> "Emerging challenges, such as climate change, environmental sustainability and rapid technological shifts, are transforming food systems … the prevalence of overweight, obesity and related non-communicable diseases are increasing, while undernutrition and micronutrient deficiencies persist." [5]

It might seem a stretch to read this and then believe that a change in diet to be more focused on nutrition and sustainable practices will save the world. But this change is already in motion.

To change our food production systems for diet and planet there needs to be a lot more urgency. A quick skim through the annual reports of several big food exporters from New Zealand found that very few had openly referenced the UN Sustainable Development Goals that they were aligned to (*pers. comm. from Simon Hunter, KPMG; it was approx. 8% in 2018.*)



By contrast we see them commonly referenced in businesses all over the world. One of the world's largest food companies, Nestlé, is working towards "*zero environmental impact*". This company can achieve that only by driving change and partnering with their suppliers and agricultural producers.

"we have lots of suppliers … in that sense we can impact agriculture because what we ask for, the farmers should give us" CEO of zone EMEA Marco Settembri, Nestlé.

Why do we not think that this is not important in New Zealand? This call to action is driving change in consumer habits and consumer purchasing decisions (see Fig. 2). There is influence from the consumers who have the money to purchase whatever food products they like. **These are the consumers that New Zealand exporters are targeting, and the consumers who are demanding change.**

Figure 2. Responsible Business Trends Report 2017

New Zealand is heavily invested in what I would describe as the food fashion Industry; that is we make products that look good, taste good, and have a unique provenance, backstory or brand. The products are very safe in terms of food safety and quality and we rely heavily on leverage from marketing and our country - our New Zealand Story. There is nothing wrong with all this, but could it be better?

If we expanded our customer target to include not just the world's wealthy, but those that are environmentally conscientious, health focused and want a transparent, sustainable and safe product, then what we produce and how we produce it will also change.

"When addressed coherently, human nutrition becomes the champion of sustainable food systems, climate change mitigation and biodiversity conservation through sustainable use, and the agricultural sector serves as an equal partner with health in halting the epidemics of obesity and diet-related chronic diseases"[6] Nadine Porter, 2018

1.2 Aotearoa - New Zealand

There is paradox within much of New Zealand's export offerings: they consist of small branded products, produced locally then vying for success in the international market. There is some success at scale; however, it is difficult for new entrants to succeed because they do not know their customers or markets.

The service model that is developed in New Zealand of customer relationships and attention to detail regarding product placement and turnover is not repeated in the international market because of costs and logistics.

Our back drop of commodity production has created this situation. Product push and a low-value return of being a farm gate supplier to a co-op forces business to innovate. Everywhere you look, businesses are moving further up the value chain to produce their own products and own brands.

Unfortunately, the market for these products in New Zealand is limited because of our population size, and not everyone can continue to grow and expand. First movers get the opportunity to continually differentiate ahead of others, but the larger they become, the more difficult it is to maintain this advantage. By crowding the market or category, there is pressure on sales return and that business requires a new strategy, a new horizon which starts to focus around what the export opportunities for that business are.

This new horizon and market proposition is not the same as in New Zealand. Change within our own markets is easy to adapt to; we adjust to consumer trends because we are amongst the change, we see it happening, and it is crucial to the survival of our brand and product to do so.

The main reason for this predictability is unfortunately that these are not our trends, but rather the trends that have already been occurring in international markets.

The New Zealand market often follows these international cycles or trends 1-2 years after they occur. We have not been the first movers, or the trend setters of the future of food. If this hypothesis is correct, how then could we all expect to be successful entering into international markets, from a New Zealand platform? My simplistic view is it's a bit like entering a fashion show with a version of last year's winner: it's just not the best strategy.

If we focus on where our business is going to end up first, rather than treat it like a progression of steps into export, this requires an understanding of what our products offer the consumer.

We must be in market, working closely with our customers and consumers. This aspiration is not easy and as a result we are often forced to put trust and faith into the ability of others to carry our future success. This occurs through using distribution networks and people already in market, by leveraging their existing customer relationships.

A typical New Zealand business heading into export is often looking for a strategic partner, a business partner that can provide the pieces that we have not already developed. This might be scale, sales channels, distribution channels to retail, or online direct to customer platforms. ***Why can't we start our businesses with this goal, find our partners first, and allow them to invest from the start?***

In 2018 the CEO of New Zealand-owned company Zespri Group Limited, Dan Matheson, has based himself in market, in Singapore because that is where he needs to be, to be in touch with what is happening in market.

> "Executives sometimes prefer to invest in their existing businesses because those investments seem less risky than trying to create entirely new businesses. But our understanding of the business model journey allows us to see that, over the long term, the greatest innovation risk a company can take is to decide *not* to create new businesses that decouple the company's future

> from that of its current business units. The challenge is great — but so are the potential rewards."[7]

Understanding our consumers and what is driving their decisions to purchase is the key to success in export. We must be on top of what is occurring in our target markets.

2 Healthy People / Healthy Planet

What are global consumers asking for and what are the emerging opportunities that address their needs?

2.1 Global growth of Functional Foods

In 2015 in *Nutraceutical and Functional Food Processing Technology, First Edition,* an Expert Panel, defined "functional foods" as foods and food components that provide a health benefit beyond basic nutrition."[8]

They include conventional foods; fortified, enriched or enhanced foods; and dietary supplements. These substances provide essential nutrients often beyond quantities necessary for normal maintenance, growth, and development, and/or other biologically active components that impart health benefits or desirable physiological effects.

The role of foods is shifting from substances consumed merely to combat hunger or to provide basic nutrition for normal function, to substances that can potentially promote health and wellness.

This shift is towards solutions that reduce the risk of disease. These foods are frequently referred to as nutraceuticals and/or functional foods and can have various reported bioactive functions (e.g., immunomodulators, anti-oxidative, and anti-microbials).

> The growth in this market is providing opportunity for product innovations and formats. It is building on and leveraging consumer acceptance of healthy-living lifestyles through *a shift from pharmaceutically derived supplements to one of natural products. The demand is for products that slow the progression of illness and disability before these ailments become irreversible and become costly to quality of life.* ***People wants to be healthy and live longer.***

This is building a demand for the prevention of these illnesses, a building of health resilience. Identification of new novel compounds from our existing production and supply base is part of this opportunity.

There are many different opportunities in this space for New Zealand; two that stand out for me as having unrealised potential are organic/regenerative production and the utilisation of our native flora and fauna.

2.2 Organic/Regenerative production

One of the key characteristics that consumers demand when purchasing in this category is *a preference for organic and, more recently, regeneratively focused production.* In the recent MPI discussion paper for a review of the benefits of organic regulation, it is stated that worldwide[9]:

> "between 2001 and 2016, the agricultural area organically farmed has more than tripled to reach 57.8 million hectares … the total value of organic food and beverages sold globally has also increased by about 330% reaching $124 billion"

The report from which this information came also stated that there are growing concerns about supply moving forward. The belief is that supply will not be able to meet demand.[10]

Organic consumers are primarily motivated to purchase for health issues, environmental concerns or food safety and quality. A generalised profile of an organic consumer is: "lives in a major city, has high disposable income and is discerning when buying food products. Most are women and or young parents."

This makes organic production a perfect companion for a high-value, targeted nutrition export growth strategy. This is not commoditised transactions, but instead realising and valuing the full potential of a transparent value chain and product. The other companion is regenerative agriculture (see Figure 3). Both are complementary to each other; however, regenerative agriculture is more holistic, inclusive and expansive than organic. It is less about checklists, practices and standards and more focused on principles, which seek to realise the potential of any agricultural system.

This is a far better aspiration for New Zealand than organic, as it includes the social, human, natural and ecological processes within its principles. A regenerative aspiration can also build a story and platform that would be unique to New Zealand and would require the development of our own unique standards. It also offers significant differentiation for our customers.

Figure 3. Andy Elliot Collection, Regenerative farming in practice.

Regenerative Agriculture is a system of farming principles and practices that increases biodiversity, enriches soils, improves watersheds, and enhances ecosystem services.

Regenerative Agriculture aims to capture carbon in soil and above-ground biomass, reversing current global trends of atmospheric accumulation.

At the same time, it offers increased yields, resilience to climate instability, and higher health and vitality for farming and ranching communities.

The system draws from decades of scientific and applied research by the global communities of organic farming, agroecology, holistic management, and agroforestry.

Figure 4. Definition of Regenerative Agriculture[11]

The 2018 Organics Aotearoa NZ (OANZ) Organic Market Report states that exports are booming, up 42% since 2015, to NZ$355 million. These figures are impressive, and it does seem like a lot of growth, but we need some context.

When compared to the approx. figure of $38B worth of food- and beverage-related export products in 2018, this represents only around 1% of our export value. This is reflected in the most recent figures I could find for the percentage of New Zealand's agricultural land that is in organic, which is 0.7%.

There is significant demand for organic production for primary products and ingredients, so why are these figures still so low? I believe part of the reason is we haven't grasped the full potential of organics as a base for health supplements and nutraceuticals, where the return and value are far greater. People will pay far more for health-associated products than foods.

Unfortunately, the standards that are in place in one country in terms of organic regulation are not the same as everywhere else. In New Zealand we have been slow followers, but our hurdles in some cases seem to be higher than others.

> As of 2017, 87 countries had mandatory requirements for organic production and a further 18 countries were in the process of drafting mandatory requirements.[12]

New Zealand currently has domestic standards, but it is voluntary to adhere to these. This makes it difficult to establish certainty and trust. If we were to develop a standard, then the link to these growth sectors in market may become more realistic. The nutritional and functional food pathway may also be a safer pathway than our conventional products and fresh offerings.

Figure 5. New Zealand native mussels (Andy Elliot Collection)

2.3 Natural and Unique Natives

This is an area that is largely untapped but developing in New Zealand. We have biodiversity that is unique and potentially very valuable. You don't need to look any further than mānuka honey to see this.

Around 80% of all higher plants that grow in New Zealand are endemic, not found anywhere else in the world.[13] To date we have failed to develop a way of protecting this biodiversity for the benefit of all New Zealand.

The Waitangi tribunal claim – Wai 262, has not been resolved, and as a country we have not been proactive at all in protecting this value for future generations.

In the scope that nutrition and health provide, our natural products base is immense and the key to unlocking a lot of this value is the traditional utilization of these plants and organisms by Māori.

This traditional knowledge in relation to flora and fauna, and genetic resources that are indigenous to New Zealand is scattered and as an exporting nation that prides itself on its uniqueness and rich natural

resources, this is a huge oversight. Future value is being lost by a lack of framework, leadership and future proofing. Currently there are few roadblocks preventing commercial entities from around the world in utilising our biodiversity for their commercial gain, and that needs to change … quickly.

2.4 Why Nutraceuticals and Functional foods?

Public demand and recognition for healthy components or extracts are becoming drivers for purchasing preferences. To demonstrate authenticity and trust, there is a need to provide scientific evidence to sit alongside these products. This requires ingredients producers to fully understand the consumer, their needs and the problem which the product is aimed at solving, and what will help convince the customer that they are trustworthy.[14]

According to Accuray Research, the global nutraceutical ingredients market is accounted for US$27B in 2016 and is expected to reach $58B by 2025, growing at a compound annual growth rate of 9.0% from 2016 to 2025. *Increasing prevalence of chronic diseases and rising health awareness, increased opting for organic and healthier foods by developed nations are the some of the key factors driving the market growth.*

"Food has the power to heal us. It is the most potent tool we have to prevent and treat many of our chronic diseases … food is not just calories, it is information. It talks to your DNA and tells it what to do. The most powerful tool to change your health, environment and entire world is your fork." *Dr Mark Hyman MD*

With annual growth of around 8-10% forecasted to occur from 2016 to 2025, most nutritional supplements are lacking clinical evidence. This evidence would elevate the product beyond its current scope of providing benefit to health, to a category where evidence would support its role in reduction of a chronic condition.

The global nutraceutical ingredients market is segmented by

Health Condition	What exactly is it?	Nutrition solution opportunity
Brain Health and Aging	The World Health Organization predicts that by 2020 over 65M people will have dementia and other neuro-degenerative brain diseases, like Alzheimer's.	Improving cognitive function by enhancing brain glucose metabolism The focus is on enhancing normal brain function and focusing on preventative treatments.
Gastrointestinal health	Gut Health issues, which range from indigestion through to diseases like celiac. Could currently include up to 100M people globally	Probiotic and prebiotic products. Development of "free from" products that aim to deal with the growing number of people claiming to be intolerant of certain conditions
Cardio and heart health	Cardiovascular disease is the number one cause of death globally. Caused by lifestyle choices which include a poor diet	Development of products that assist with cholesterol reduction, such as Vitamin E and Omega 3.
Endocrine Health and Diabetes	Huge problem around the world. Diabetes is linked to the consumption of high fat and high sugar content foods. In Asia it's referred to as TOFI (thin on the outside and fat on the inside).	Products with a low glycemic index (GI) and sugar substitutes Products that might be capable of re-sensitizing the body to insulin

Figure 6. Health Condition Table by author

application into dietary supplements, functional beverages, cosmetics, animal nutrition, baby products, functional foods and other applications.

The dietary supplements segment is currently the largest but is about to be overtaken by the rise of nutritionally enriched food and beverage products: products which are designed to be "better than" and target specific health enrichment. Technology is helping to push the capability of other categories such as functional beverages and foods, and the range of products is expanding quickly. The way these products are being marketed through e-commerce is also contributing to their growth.

The backdrop to all this is that the cost of our healthcare is continuing to increase; this forces consumers to continue to look for alternative ways to improve their health.

Of importance for New Zealand is that the Food and Beverages segment is expected to expand and grow the most. This growth category includes pet food and pet supplements, which is an easier stepping stone to entering this space. All these trends described for our food also hold true for preferences adopted to feeding our pets.

2.5 Nutraceuticals for Health

General principles for nutraceuticals are their ability to delay the aging process, their ability to prevent chronic diseases, they can increase life expectancy, and play a role in supporting the structure or function of the body.

The investment in the proof of efficacy is through development of clinical studies in which evidence results for the compound in achieving relief from various complications.

Consumers are demanding more variety and benefits from the format of delivery beyond the traditional tablet and capsule technologies. This has created a platform for the development of innovative products, which appeal to a wider reach of consumers. These products are being positioned as **natural and healthy** alternatives to traditional pharma medicines.

"the Doctor of the future will give no medicine, but will interest his patients in the care of the human frame, diet and in the cause and prevention of disease." Thomas Edison

Chronic diseases (see Figure 6 – health condition table) are long-term diseases that are not contagious and are largely preventable. They are the most common cause of death in the world and present a great burden for society, particularly diseases such as obesity, diabetes, cardiovascular disease and cancer.

Currently more than 1 billion adults are overweight and at least 300 million of them are clinically obese. The likelihood of developing Type 2 diabetes and hypertension rises steeply with increasing body fat. Making improvements in terms of diet and physical activity can help reduce the risk of these chronic diseases.

2.6 Constraints for growth in New Zealand

Lack of awareness is a key factor currently limiting New Zealand's further entry and growth into this market. It is still a relatively new sector of the market, and consumers around the world are developing a realization of the benefits offered by nutraceuticals. This means that New Zealand as exporters are also still not realising the full potential market opportunity. The default preference is still a conventional pharmaceutical as opposed to nutraceuticals for treatment.

This is due to less trust in the efficacy of nutraceuticals because of limited knowledge regarding such products. Price is a challenge and does hinder the demand for a nutraceutical product, but ultimately what price do you put on the health of you and your family?

The real challenge for New Zealand is not to play at another round of commodities. The multiplier for value creation from raw product to a commoditized nutraceutical or dietary supplement is around 1-5 times; that value can be increased by 15-20 times once that product is encapsulated and branded for retail. This is where New Zealand really needs to be focused, on obtaining the maximum value we can from our production. Why would we leave this value on the table for others further up the value chain to realise; why can't we aim higher?

You might ask, aren't we doing this through the High Value Nutrition National Science Challenge and the High Value Nutrition Programme? This is just a start and when you look at those projections expected from the Government investment being made, this is just another incremental step towards realising more value. It could be argued that a growth projection of $1B over the next 6 years to 2015 could be expected in this category anyway.[15] This is not necessarily the game changer. The challenge itself excludes offerings in the nutraceutical space and is focused on formulated and value-added products. Direct to retail, branded nutraceuticals are where the real value is to be found.

> *In 2014 the High Value Nutrition National Science Challenge was launched. It aims to increase the value of New Zealand food exports through scientifically validated claims.*
>
> *In their report "Measuring what counts" they estimated that in 2015, from $28B worth of food and beverage exports,* ***potentially 77% could be categorised as high value nutrition candidates****.*[16]

Regulations – In April 2009, the National Government and the Green Party announced plans to develop a regulatory scheme in New Zealand for Natural Health Products. This work developed into the Natural Health and Supplementary Products Bill.

The current Government has scrapped the bill last year, which is a shame as the Bill primarily aimed to provide security that products are safe to use and that the health claims are true. It is important for any Industry to have a bottom line that ensures that the products made do contain what their label says they do.

New Zealand is one of the only countries without a modern regulatory system, and the legislation would have enabled exporters to gain easier access into countries like China. I believe this lack of regulation also tells a story about our lack of long-term focus on export, the value that exists within the nutrition sector.

> "As the popularity of supplements has grown, so have the number of entities marketing potentially dangerous products or making unproven or misleading claims; consumers need to have access to safe, well-manufactured, and appropriately labelled products. One of the top goals is ensuring that we achieve the right balance between preserving consumers' access to lawful supplements, while still upholding our solemn obligation to protect the public from unsafe and unlawful products and holding accountable those actors who are unable or unwilling to comply with the requirements of the law." February 11, 2019 FDA press statement

A range of different interpretations internationally makes it a challenge: for example, in Japan, functional foods are defined according to their use of natural ingredients. They have a system called "food with function claims" which is unique and the first in the world like this. It's based on a three-tier system:

1. Nutrition = foods for health
2. Enhancement = food with nutrient function claims
3. Biomodulation = food with function claims.

On the other hand, functional foods in the USA can contain ingredients that are products of biotechnology. Traceability and transparency are important for both seller and buyer. By now we should all be familiar with some of the new technology available to provide this service.

> "I'm concerned that changes in the supplement market may have outpaced the evolution of our own policies and our capacity to manage emerging risks. To continue to fulfil our public health obligations we need to modernize and strengthen our overall approach to these products." FDA Commissioner Scott Gottlieb, M.D.

2.7 Traceability

There are several innovative technologies used for traceability in the food industry. One of these is blockchain, which is a technology protocol that can handle all types of data and contracts. Although it's not entirely clear if blockchain is the best technology for transforming traceability in the food industry, it is certainly worth considering. It is getting more attention as technology enablers look for ways to transfer the experience and make their mark in agri-tech and agriculture.

Blockchain seemed to have the most application when it's used for technologies and systems. However, blockchain is now being implemented for food traceability.

Farmers, particularly the ones who don't sell their food to a farmer's market or get an opportunity to interact with consumers, will struggle with how to engage with the public. Blockchain is a way to explain how and why they grow food the way they do. Blockchain could enables farmers to get data to consumers.

It could provide more context around the way food is produced, to educate consumers and provide information they need to make informed decisions about purchase.

Blockchain could be used to tell consumers that a crop was grown with a herbicide for example and why that is or, that it came from a regeneratively managed farm. A fellow Nuffield scholar, Matt Hamill from Alberta, Canada, is using blockchain in his malting business to develop a "farm to glass" story …

> "Blockchain is kind of like an open ledger. It's clear for anyone to see the information they want," said Hamill. "There are a lot of things that farmers are doing that all too often fly under the radar, and blockchain is a technology that makes it completely transparent for the consumer. We're proud of our farming practices and proud of what we do in the malt house, and this is one way to show that off." Matt Hamill, Red Shed Malting

2.8 How is the rest of the world responding?

> "Natural claims are evolving to provide greater clarity about the benefits of these products as consumers increasingly demand total transparency from food and drink companies."
>
> "Manufacturers, companies and brands are responding by providing more defined positioning, including substituting vague claims like 'all natural' in favour of more specific claims such as 'GMO-free' or 'preservative-free.' "
>
> "As such, focusing on free-from positioning appears to be a more direct means to communicate the inherent value of natural/organic products," Joel Gregoire*, Associate Director, Canada Food and Drink Reports, at Mintel.*

Historically the market demand for many products just hasn't been there, so accordingly neither has the research or investment. A good example of this is oats, so by default it's a GMO-free crop. Non-GMO is becoming a big marketing tool in Canada and in the USA. In Canada there are only four approved GM crops, so the scope for growth in this category is massive.

Based on the growth of this category in market claims, New Zealand should be looking into the labelling of products destined for export as GMO-free.

This is a labelling and leveraging advantage on products in market and we should all consider this in New Zealand before we lose this advantage to others.

Figure 8. Andy Elliot collection – Canola field in Winnipeg, Canada

The actual details representing both sides of whether a GMO-free stance for New Zealand should continue to be upheld are irrelevant to this discussion. My views are that this is a distraction and we should always be looking to maximise our advantage from whatever situation or limitations we are faced with. **The focus in this context is the outfacing leverage in market that could be achieved as a country that is currently GMO-free.**

An example from First Light who are a member of the GMO Project, from their website:

Non-GMO

At First Light, we believe you have the right to know what goes into the food you eat so you can make an informed choice about the products you buy. The Non-GMO Project seal is an independent verification that guarantees all First Light cattle are raised on a diet that is free from genetically modified organisms or crops.

The growing awareness in market of GMO is huge. The right to know what's in your food continues to ring true with consumers. According to the *Hartman Organic and Natural Report 2018* consumer awareness of GMOs is almost universal, at 97%.

> Looking to give their kids the best start in life, parents are most likely to purchase natural/organic products, with one third (33%) saying that half or more of their groceries are natural/organic, with safety a key driver. Parents (40%) are more likely to find food and drink products with natural/organic claims to be safer, compared to 33% of non-parents. [17]

The growth in consumer awareness also aligns with an increasing number of consumers seeking to avoid GMOs. Hartman reports that 46% of shoppers deliberately avoid GMOs when shopping.[18]

In marketing terms, it's like the notion of Grass-fed. Labelling of meat products produced by other countries includes "grass-fed" on their products. New Zealand hasn't always leveraged this position; it wasn't until other producers started labelling their products this way that we realized what a solid marketing position this was.

We also have a better platform and back-story than some of those claims being made by other producers in market which won't stand up to the claim we can make here in New Zealand. For example, being grass-fed in The Netherlands requires only that the animals be outside for at least six hours per day for at least 120 days of the year.

> "It is also important to remember EAT-Lancet is making many of its recommendations based on farming systems not commonly used in New Zealand, such as grain-fed livestock production, when in fact we are a world leader in producing grass-fed red meat." Beef + Lamb New Zealand's Chief Insight Officer, Jeremy Baker

We just need to get better at telling our own story. For me this is about what our story is going to be in the future. Beef + Lamb New Zealand are currently a good example of this.[19]

> "Our farmers are helping to preserve unique flora and fauna, with some 2.8 million hectares of native vegetation. This includes 1.4 million hectares of native forest, on sheep and beef farms, almost a quarter of the country's total – contributing to sequestering or removing carbon from the atmosphere … However, we know the job is not done. The sector will continue to implement our environmental strategy, which is to be carbon neutral by 2050." Jeremy Baker

It has been interesting looking at the various ways by which companies or Industries are dealing with some of the environmental shortfalls that may exist within their production systems. Denial or ignoring a problem is not going to make things better and it doesn't really matter if these issues are public or not.

What does seem to work is a degree of acknowledgement to your customer or consumer from you that there is a better way and that your entity is aspiring to get there. A stake in the ground as to a target for a solution or timeframe to occur is by far the safest strategy. Whether it be carbon neutral, using renewable plastics, being pesticide- or glyphosate-free. It is particularly noticeable when this target seems highly unlikely without a very significant change occurring, rather than just being a natural progression to becoming better.

2.9 Growth of Alternative Proteins

The category of plant-based proteins is become very big business. In 2018, the value of the global plant-based meat alternatives market was estimated at US$4.33B. Market research firms are projecting record growth in the plant protein sector in 2019 and beyond.[20] The category is fast growing, and New Zealand cannot afford to ignore it. Some companies are certainly developing products in the meat-replacement category, which is the most mature of the alternative protein products.

There is still little interest in other opportunities such as insect or algae-based products. Lab-grown meat products are off the table with our current GE regulations, so for most people it's still quite difficult to fathom the actual impact this is having. For me it's not actually the concept of alternative proteins that we should be frightened of, it's what they represent in terms of the consumers' changing attitudes.

A global report by Rabobank in Nov 2017, called "*Watch out … or they will steal your growth"* sums the situation in New Zealand nicely[21]:

> "Rabobank believes that domestic market penetration of alternative proteins and substitute foods in New Zealand and Australia will lag behind that in the EU and US, where current market development efforts are focused"
>
> "Similarly, their adoption in the emerging markets that we export to are also likely to lag – with most consumers still trading up to traditional protein products, like red meat and dairy, rather than embracing meat 'analogues'."

The interesting consumer lever in all of this is experience. These products are not only catering to a sector that chooses not to eat meat, but also to a far larger sector that chooses to eat meat less often. They are creating new experiences that are not only attractive to millennials, but are also tapping into those who desire meaning, transparency and trust. This is driving an environmental focus towards what we eat.

As many before me have noted, being environmentally conscious is now extremely important, and if there is a lack of transparency, watch out.

> "If we are not aware of it and participating in our own disruption, we basically deserve what we get."
>
> – Tom Mastrobuoni, Chief Financial Officer, Tyson Ventures

Hemp is a great example of the new opportunity presented by the demand for health and nutrition products and is perfectly placed to become the next major ingredient in alternate protein products.

2.10 Case Study - Hemp

A product with unprecedented market pull, where science and claims are playing catch-up.

"Cannabis is an essential nutrient for modern man" Dr Bob -Dr Robert Melamede

Through prohibition the *Cannabis* plant has been out of our agricultural system, our food system and our health system for most of the last 80 years. In 1927, New Zealand passed the Dangerous Drugs Act, whose schedule listed hemp amongst other controlled drugs. In 1937 it was removed from agriculture from most of the world.

Currently in New Zealand licences govern the growing and importing of hemp seed and related by-products. We can sell products derived from hemp seeds as foods; but cannot sell products derived from the whole plant. CBD, a bioactive of note, can be obtained by prescription in New Zealand and can be imported by prescription.

Although deemed legal by paperwork and correspondence to growers for many years, the ability to utilize hemp as an agricultural input was unceremoniously removed in November 2018 in an Agricultural Compounds and Veterinary Medicines (ACVM) alert.[22]

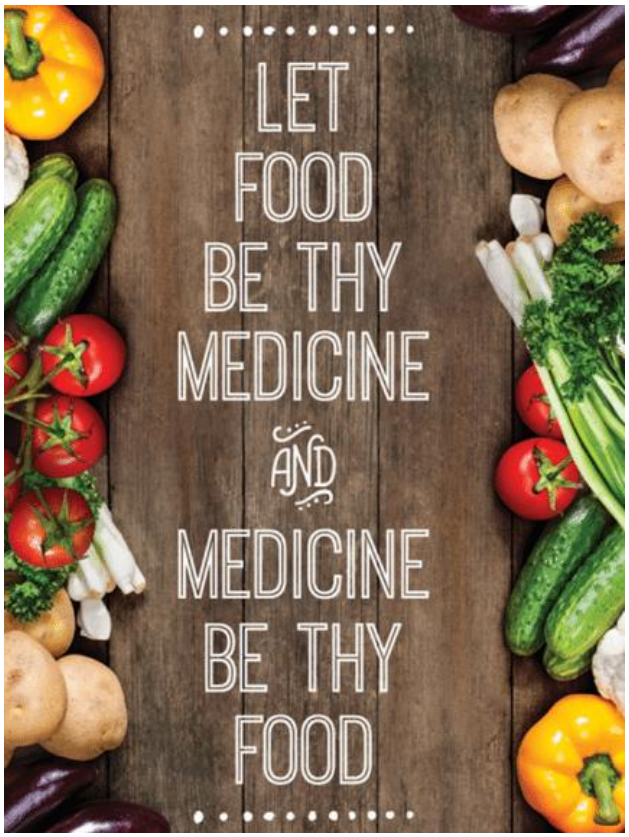


Figure 9. Source -Hippocrates Quote www.goodmix.com.au

Ultimately, the most complete way to reintroduce hemp to our diets involves feeding our livestock hemp, bringing the traditional diet full circle to reap the nutritional benefits of a plant that we've forgotten was already part of our food system.

> "not everyone can necessarily want Marijuana, but everyone can use Hemp, Industrial Hemp and the products it can make"
>
> Rick Trojan – Hemp Road Trip

Utilization of the whole plant should be the aspirational goal for the developing New Zealand hemp industry.

When a new industry like hemp is about to flourish, that is the time to show vision and leadership, through an Association. Embed a strategy that solves a problem, not just for our health, but for the environment as well. Hemp has this opportunity like very few others.

One of my observations while researching hemp was the amount of waste that was occurring across the industry in North America and Canada. This is largely due to the fast growth that has occurred, but it is also because of the huge demand

that the bioactive qualities have created. This is where I believe New Zealand can be different. How competitive or differentiated from the rest of the world in the food and extract categories we will be, remains to be seen. We are late to the start line.

A hemp plant provides a whole cascade of value and it is very tempting to chase a single primary product proposition and not look at all the secondary value that exists from within the one plant.

> "Slicing and dicing the Hemp plant leaves significant value on the table." Carl Leiburger – COO Pure Vision & Pure Hemp Technologies

A good example of this is in Colorado, there is a multitude of companies extracting CBD and full spectrum bioactive from the whole hemp plant. Once the bioactive are removed, the rest of the biomatter is put into landfill. This is because currently there is no regulation in place that allows it to be made into silage or pelletized and fed to livestock. Similarly in Canada and Australia, once seed is harvested the same problem is encountered with the stalk.

As an industry in New Zealand, there are good signs developing that investment in fibre manufacturing and hempcrete infrastructure are being made.

Meeting Carl Leiburger at Pure Hemp Technologies reinforced for me that every single part of the plant has a significant value if approached the right way. Their company is focused on a bio-refinery which produces outputs of pulp, lignin and sugars.

> His challenge to me was what will the New Zealand proposition be when you think about hemp; what are our circumstances here in New Zealand? what do we need fixing? and what is it that hemp can replace?

For example, if New Zealand moves from "Hemp for food and health" to:

- "Hemp for animals and livestock" - slightly more challenging now with the Government's U-turn! We should be focusing on big-picture stuff like replacing the importation and prolific use of palm kernel extract (PKE) with hemp pellets as a stock feed supplement. The nutritional profile of hemp is more complete than that of PKE and far more appealing to a transparency-driven consumer. Introducing hemp back into our whole agricultural system includes feeding our chickens, pigs and all our livestock.
  Hemp provides the opportunity for the agricultural industry to continue to expand New Zealand's efforts and reputations as pioneers in the global movement toward diversity and sustainability.

  > "This is also an opportunity toward sustainable agriculture and towards a low-carbon economy, to complement existing farms as an environmental crop rotation, and be developed as a stand-alone sustainable agricultural industry"[23] Polly Brownlee, 2018

- "Hemp for the environment" - use hemp as a rotational mop crop for spring removal of excess nitrogen in dairy farms. Cannabis is perhaps the greediest plant when it comes to its requirement for nitrogen, and this is a perfect rotational crop for farmers especially if the crop could be pelletised or made into silage.

"We think we're going to establish even more rare cannabinoid contents, returning the waste and regenerative qualities back to the soil, which adds more value to our animals, soil and people, returning hemp and CBD to our diet the way it was 100 years ago," Pauli Roterdam of Endo Scientific

- Or "Hemp for plastic" - the lignin produced by hemp has outstanding potential as a base material for plastic. New Zealand could do a lot more in the space, other than just ban plastic bags. We should be aiming to export only plastic made from biological inputs.

The real point I'm trying to make is there should be no waste in any food Industry, especially in an industry that we are just setting up.

2.11 Health proposition of Hemp

Figure 10. Andy Elliot Collection. Jeff Kotuik, Hemp grower Canada

A plant is made up of many different components and each of these individual components can have potential as nutritional solutions and functional benefits.

The endocannabinoid system (ECS) is a biological system composed of endocannabinoids, which are endogenous lipid-based retrograde neurotransmitters that bind to cannabinoid receptors. Cannabinoid receptor proteins that are expressed throughout the mammalian central nervous system (including the brain) and peripheral nervous system.

Discovered less than 30 years ago, The ECS is involved in regulating a variety of physiological and cognitive processes including fertility, pregnancy, during pre- and postnatal development, appetite, pain-sensation, mood, and memory. It is responsible for regulating an array of physiological processes that are instrumental in maintaining health.

Scientists have established that the system, when working properly, helps regulate processes like sleep, appetite, digestion, mood, motor control, immune function, reproduction and fertility, pleasure and reward, memory, temperature regulation, and pain. In cases where the endocannabinoid system is disrupted and gets out of whack because the body fails to produce enough endocannabinoids, disease and disorders can develop. Many believe that our ECS are deficient.

The entourage effect refers to how various cannabinoids and other natural constituents work together synergistically to magnify their potential therapeutic properties. Introduced in 1998, the entourage effect theory maintains that isolated or synthetic cannabinoids aren't as effective at eliciting curative effects as when all the natural constituents work together harmoniously (market demand case study, Bluebird Botanicals - Appendix 2).

When a complex mix of cannabinoids works in tandem with the essential nutrients and other natural components, they're better able to provide their therapeutic and healing effects.

> "When we understand that oil from the soil is the engine of the mind and is the future of sustainable farming and fuelling of our culture we won't look back." Chris Woodney, NZ Hemp Brokers

Figure 11. Andy Elliot Collection – Luckies store in Boulder, Colorado

As is the case for all extracted compounds and powders, how the process is undertaken determines both the quality of the product and the ability by which our bodies can uptake the compounds.

Hemp. It's a great example of how many components can be derived from one plant.

Hemp seeds are composed of more than 30% healthy fats, including the essential fatty acids (omega-3, 6 and 9). The ratio of omega 3 to 6 that is normally found in hempseed is between 2:1 and 3:1, which makes it ideal for a healthy diet and to enable maximum uptake.

Hemp seeds also contain gamma-linolenic acid, which supports the normal function and growth of cells, nerves, muscles, and organs throughout your body. Hemps seeds are about 25-30% protein. They contain all nine essential amino acids, plus dietary fibre, healthy fats and minerals. The amino acids are involved in important processes such as tissue growth, energy production, immune function and nutrient absorption. They also provide nutrients including vitamin E, phosphorus, potassium, magnesium, sulphur, calcium, iron, and zinc.

In general, animal proteins are more easily digested than plant proteins, but research shows that 91–98% of the protein in ground hemp seed is digestible.[24] Hemp protein powder is a good source of fibre, containing 8 grams per serving — much more than most other plant-based protein powders. Fibre plays an essential role in your digestive, heart, and skin health, and may improve blood sugar control and weight management.

Soluble fibre dissolves into a gel-like texture, helping to *slow down* your digestion. This helps you to feel full longer and is one reason why fibre may help with weight control. Insoluble fibre does not dissolve at all and helps add bulk to your stool. This helps food to move through your digestive tract more quickly for healthy elimination.

All these compounds and components could theoretically be selectively bred for. This presents a new value creation opportunity for industry participants.

Figure 12. Andy Elliot Collection – Hemp Fibre

2.12 Nutrition is the new start line for Plant Variety Rights *(*PVR) development

Hemp is an interesting situation, as focus on genetics for seed yield has dominated breeding objectives and overall breeding programmers have been scattered. Prohibition has caused a massive bottleneck to occur in Hemp breeding programmes. However, there is still a significant degree of genetic variation between existing families.

Hemp is very similar to asparagus, spinach and hops = a dioecious plant is one where the male and female reproductive systems occur on separate plants. While both plants produce flowers, one plant has the male reproductive parts and the other plant has the female parts. This is unlike a monoecious plant, which has both male and female flowers. Although this can also occur in hemp.

Hemp is one of the best examples of the scope for breeding objectives and potential for specialization because of the huge variety of end-users and potential applications in the health sector. This is what makes the situation for hemp as a new crop quite unique.

Figure 13. Andy Elliot collection -Hemp trial plot Manitoba Agriculture

In Canada for example there are more than 20 hemp breeders, but for lentils there is only one. Canada grew 3,193,800 tonnes of lentils in 2017 from 2.7M acres[25]; by comparison, there were 140,000 acres planted in hemp in the same year.

Other crops - Selection of genetics is often in the direction of traits that exhibit characteristics that push the product in the direction of consumer-friendly traits. These traits aren't always stacked in the favour of the grower: they can make the crop more difficult to grow, and often some resilience can also be lost (resilience to disease, climate, pests etc.)

The reason for this preference for consumer attributes in horticulture and arable crops is often the size, shape or colour.

A good example of this is chickpeas. Chickpeas are currently grown for preference of a large seed variety. There are, however, genetics available which allow a 20% greater yield, but the chickpea that is produced is a lot smaller. This trait is completely unattractive to any grower who has a normal farm-gate buyer for their food.

In the ingredient space demand is for compounds that make the formulated product more nutritious and healthier. This change is forcing companies to re-evaluate where the value now lies. It is allowing them to take some of the risk out of their business and create new opportunities.

When the product being supplied to a customer is an ingredient or compound, that presents an opportunity to evaluate a whole new way of developing the business into the future. If the final product does not have to look good, then every part of the production output can theoretically be utilized. This changes the breeding values that are selected for. It changes what needs to be produced by the grower and it changes the value proposition for the grower.

> If companies can create and own a new PVR, they begin a new start line for the future direction of that crop or organism. It is a new avenue for income, a new opportunity for sustained value creation.

Throughout my travels I encountered several examples of companies moving towards this as a part of their business strategy -companies that are understanding where the value is and where new value can be created.

In New Zealand the High-Performance Mānuka Plantations Primary Growth Partnership is another good example of this: the focus is on assentation of DHA, an active ingredient, with other factors like floral density, bee attractiveness, flowering period and hardiness to disease and climate becoming secondary.

Figure 14. photo credit - NZ Manuka Group

The earlier the opportunity is identified for a bio-active enhancement strategy, the cheaper the entry point will be for PVR ownership and development.

This opportunity exists within all horticulture and arable crops; aquaculture and livestock genetics are also candidates. The focus on nutrition or bioactivity over the whole product opens a new pathway that many industries and operators have not yet considered.

When there is a new start-line we should always race towards the clear space in front of us. Nutrition presents this opportunity within selective breeding for differentiation and value.

2.13 A targeted approach to breeding for nutrition

If nutrition became a targeted breeding trait for selective breeding over the next 10-20 years, it could elevate value within our current food production systems far beyond what we are currently achieving. Currently we produce an incredible amount of waste that has nutritional value, and this is lost because we are not focused upon nutrition.

If you look at these food losses at a high level, they also represent a waste of resources used in their production, such as land, water, energy and nutrient inputs, and also increase the greenhouse gas emissions for no good outcome.

It would not mean that we would be forced to completely give up the direction that has dominated our growth and opportunity for past decades, but rather look towards the future with a different lens of where new value will be created

We always hear people talk about market-driven production, about being consumer-focused or consumer-centric, but are we really prepared to make these changes to our food and production systems?

New Zealand producers need to start to take advantage of the opportunity that is being created by current demand for more flexible and varied diets. A demand for more sustainable and transparent production methods and for demand to fix food systems that "are broken," [26]

Although my report has focused on the opportunity for business differentiation that nutrition presents in this equation, you cannot really address the opportunity in isolation. It is all connected.

> *"There is a momentum here of everyone collaborating to change things, which will benefit the entire landscape of food initiatives. You always have early adopters and companies who are more willing to change. I have spoken to some of these companies and they have recognized the consumer push, and of course, the consumer is key. Now they get it, there will have to be some change. It is pervasive. We should expect a strong reaction from the industry."*[27]
>
> *Dr Gunhild Stordalen, Founder and Executive Chair of EAT*

To take advantage of the new consumer trends towards plant-based foods and "flexitarian" lifestyles, there are significant opportunities for New Zealand. It doesn't have to be all plant based either: this is an opportunity for our livestock and dairy producers to create something differentiated and targeted as well.

"The opportunity for New Zealand is in manufacturing high-value plant protein foods, sourcing ingredient streams from trusted sustainable and diversified production systems that meet our future climate change challenges and delivering premium products into the 'flexitarian' diets of our international customers."[28] Opportunities in plant-based foods – PROTEIN PFR May 2018

If our strategy for value creation is for nutrition-based health solutions that demand a premium price, then at some stage we need to understand where this fits into the systems being designed for the future. One of these systems is a circular economy, which describes a framework for our economy that is restorative and regenerative in design.

2.14 A circular approach to our food systems

If the product is ingredient focused, demand for it will ultimately come from an organic or regeneratively operated system. This will change some of the selection criteria; for example, in arable crops selection towards more aggressive growth to outcompete competition plants or natural resilience to pests or disease.

Waste reduction creates the opportunity to significantly reduce waste derived from production; if the visual and physical components of a crop are no longer a criteria for harvest then everything should be used.
A food system can be described as:

"an interconnected web of activities, resources and people that extends across all domains involved in providing human nourishment and sustaining health, including production, processing, packaging, distribution, marketing, consumption and disposal of food. The organization of food systems reflects and responds to social, cultural, political, economic, health and environmental conditions and can be identified at multiple scales, from a household kitchen to a city, county, state or nation."

Grubinger, Food systems, University of Vermont, 2010.

A circular approach to food is a focus on three main pillars:

1. Source food grown regeneratively and grown locally where appropriate
2. Make the most of food by preventing food waste by creating something new when waste is unavoidable
3. Harness the power of food designers – chefs, food companies and restaurants – to provide to customers the right options that are healthier and produced better[29].

Different harvest cycles allow a reduction in the requirement for a physical feature to dominate. For example, in mussel farming, there is strong farm-gate requirement for a size that fits a certain piece count per kilo or weight. If the demand is for a peptide, an oil or an extract, there is no longer any need to grow the product to a minimum average size. This creates better cashflow for farmers and it takes away the seasonal risk associated with meeting a size and condition target. For selective breeding, it opens the opportunity to select for fast early-stage growth or early maturation.

These factors and markers may not even be considered currently within our existing selective breeding programmes.

3 A new Business Model

3.1 New Zealand situation – New World vs Old World

"One way of viewing this ever-changing world that producers and exporters are now facing in their export markets is nicely described as an Old-World vs New-World model of business." Dr Hamish Gow

Our traditional business models of vertical integration fit into an Old World category. The main components of this are generalised as follows:

- There is some certainty in operating in this world. Market entry for products is relatively straightforward, with established trade agreements and tariffs.
- This is a push model of production. Based on supply, we produce commoditized products in volume; we innovate with product development and product formats trialled in our own domestic market and then expand these sales into international markets.
- There is often no real differentiation in offerings in this model over those of other producers, especially from New Zealand; in fact we are often competing for a slice of this new market. This is not the best strategy for value creation. We are also faced with competition with offerings from other countries where the cost of production may be cheaper.
- We are familiar with our customers, but the competitive offerings from the country we are entering are often cheaper. We risk simply being more expensive without a clear differentiation in the product's proposition.
- Australia, the UK and the USA are traditional markets for this model. They are markets that we are familiar with and where this model works the best. The markets could be described as having been essentially the equivalent of ours. The supply chains are similar, and we can claim an understanding of them.
- There is a reliance on the leverage that being from New Zealand: "New Zealand Story" or "Made in New Zealand" is enough to provide a driver for purchase of this product in any market.
- Market support for this product is relatively straightforward, as we can speak the same language.

A New World could be described as the opposite of many of the above characteristics:

- This world is filled with uncertainty. It is unpredictable and changeable. It would be difficult ever to say that you understand what is happening in these markets. This makes it more challenging for us to invest into these.
- This world includes markets different from the ones we are used to. They are not familiar to us and their customers have different drivers for purchase. They have different eating habits and different values attributed to their food. This highlights the need for us to partner in market.
- Every market is different. Asia is not one market, although similarly you could categorise each country in Asia as having different criteria and drivers for purchase, and different insights would need to be obtained or mastered for each country.
- A product push model does not work as well in these markets, and we have an even larger challenge of how we get closer to our customer.
- To be successful in this New World we must understand what the customer's needs are and then strive to develop a solution.
- Scale is more difficult to achieve in this New World. That means that New Zealand exporters are faced with the likelihood of more failures, which is not what we want.

This New vs Old World poses a huge challenge to New Zealand. We are faced with the reality of this New World and how to master and adapt to it, and there is uncertainty. It is tempting to default to a business model of product push, as it's what we know. But it's going to become riskier.

We are also faced with the challenge of trying to navigate this New World through our old pathways. We cannot afford to have every company represented with people in every market.

We need to start thinking about is a different strategy, a strategy that allows growth in new categories and segments of the market to what we have traditionally targeted. We need to operate a more collaborative model around how we do this. The finish line is no longer having product in international markets; that is the start line and if we start to think about export like this then we would reduce the reality that we currently live in, that of undercutting each other once we get there.

For me one of the key factors in enabling this transition is leadership: our industries, our Directors, our CEOs, and the timeframe by which we identify "the future".

3.2 Our Governance models

New Zealand is ideally placed to leverage our wealth of production, marketing, research and manufacturing capabilities into these new growth areas. Our Government has a role to play by providing support and countering the siren-calls of those intent on protecting the status-quo with positive, progressive policy.[30]

To achieve success, the scientific, business, government and conventional food and manufacturing sectors must work collaboratively to overcome challenges and fulfil the potential of a new and vibrant opportunity for our primary industries. What we've been doing is not working; it's not urgent enough; and it's providing us with only incremental export growth. Who then does this, you might ask?

The role the Government plays should be a facilitative role to enabling a clear pathway for our industries and business to **grow their vision for the future**. This vision needs to come from our Directors, Boards and CEOs. The trouble is that in this space we seem to be becoming risk adverse …

> "Isentia's second Leadership Index report, published today, found New Zealand - and Australian - business leaders were positioning themselves as conservative, committed and methodical, rather than disruptive, creative or agile."[31]

The irony of all this, is that an aversion to risk is likely to be the riskiest approach anyone can take in today's New World. If we are constantly trying to understand what is happening and how to react to it, how can we have a vision for the future?

When faced with challenges of environmental awareness and resource efficiency, public health challenges and disruptive elements like alternative proteins, an aversion to change is madness. The least risky thing to do is to let go of the past and the Old World ways of doing things and embrace the challenge of this New World head on.

We need a new set of skills. The future that everyone is talking about is upon us and we are being left behind in our attempts to understand and control what is happening. To me, the below quote from Glen Herud from the Happy Cow Milk Company sums this up beautifully:

> "Being right is based upon knowledge and experience. Knowledge is drawn from the past, which makes it easily provable and safe. Experience is built from the solutions that were used to solve the problems of the past. The problem with people who have experience is they rely on it. They overrate its relevance. They try to shoehorn the solutions of the past into solving the problems of the future." Glen Herud, 2019[32]

Approaching market is also an interesting subject to dive into. With a focus on China many companies have entered sales channels like JD.com or Alibaba, but does this approach represent a sustainable pathway for growth?

3.3 A random walk

If we look at this method of sales critically, then are we just crossing our fingers for a good result? We are getting sales to customers by bypassing our traditional supply chain and using an online platform for engagement.
This model does work from New Zealand: a quick search on Alibaba reveals a huge number of New Zealand honey, milk, meat and seafood and other food products in both commoditised and retail-ready formats. Success is measured in transactional numbers. I would assume that this is one of multiple strategies adopted for product sale for most of these companies operating from here.

> "The only types of innovation you can perform naturally within an existing business model are those that build on and improve the existing model and accelerate its progress along the journey."[33]

If we are planning to develop a long-term business around supply, then this sales method makes it extremely difficult. I would imagine that most of these transactions are one-off, without certainty of a repeat sale. We don't really get to know our customer or consumer and for commodity transactions we know that someone else will extract most of the value from this sale. What have we mastered, apart from a sales transaction? We do not receive detailed metrics from data for the sales and customer. That is their IP off the platform. We are not closer to our customer and we are at the mercy of price-taking behaviour because of competition from others, based on a cheaper offering.
There is no customer intimacy in adoption of this strategy. Achieving sales is great, it relieves pressure from our production push, but does it help us in a sustainable business?
Our traditional model in New Zealand is vertical integration and push product into market (see Figure 7). The best examples of successful companies in market are the ones who have mastered the "book ends" of this model in differentiation in genetics and their marketing strategy for the product e.g. Zespri Group Limited.

Figure 7 -Traditional New Zealand product push model, by author

Is our focus on China making this even more difficult for us and potentially making us less responsive to other markets. There are probably easier markets in Asia than China. The trouble with the Chinese market is it perpetuates the model of sell in New Zealand first, then export.
A perfect example of this is Daigou shoppers. Daigou products are recommended by word of mouth and apps such as WeChat; they gradually build up "trust chains" to buy for more and more people. These shoppers are primarily targeting premium products like baby formula, vitamins or nutritional supplements, but are also moving towards premium food offerings such as cherries and other fruit. This channel is essentially developing as a superior stamp of approval for premium products and produce.

This is becoming a valid pathway to China customers. However, it is reinforcing our product push business model. It is not taking us any closer to our customer or gaining consumer insight, as the channel is third party.

> A new approach is required, which involves moving from targeting and segmenting consumers based on income level, to targeting consumers for their specific needs and income levels. Health and wellness are the key drivers for this opportunity and nutrition is a need.

The model that this report proposes for entering new markets or market sectors is that of a **Horizontal Service Model** (see Appendix 1) where we develop direct partnership with customers already in market.

3.4 New Zealand food fashion vs nutritional evidence

Being on the pulse of the food fashion industry is where we will find the outliers, it's where the gems will be hiding but we are currently not getting this information fast enough. There are plenty of trends around key ingredients, key compounds such as "newly rediscovered" super-foods.

Beyond the trends of what is healthy and nutritious, the evidence of these claims is where the true value lies. This is where the focus and investment should be early on in business development. This is not just an opportunity for big established food exporters, but for small start-ups and every company focused on a health solution or product. Plan it, strategize it, and make it happen. Claims allow something relatively common to become elevated e.g. Vitamin C and its role in the treatment of cancer. Vitamin C is found in many different foods.

The challenge with a food fashion direction is that once described, it is already happening and is potentially too late to chase. The front runners in the market are already redefining their products and formulations. Nutrition also has these fashion elements, but with scientific evidence the confidence of the consumer shifts.

Our traditional production focus has meant that most investment has been on the production efficiency of yield and a strong pull towards visual consumer preferences in our breeding objectives. Nutrition hasn't always been on the top of the list for value creation. To me, this is an opportunity for new value creation within each of our industries.

The interesting thing about the claims and evidence pathway is that once evidence is established, it is generally published to gain credibility. If the claim is for a compound or ingredient, then this makes it available for the whole industry. This includes anyone utilising that component in a finished product or as an ingredient, but most importantly allows a claim to be made on the whole food proposition as well.

Figure 8. Andy Elliot collection. Cauliflower snack – vegan, gluten free, nothing artificial

For example, kiwifruit. Zespri have developed New Zealand's first self-substantiated health claim around the claim – "that Zespri® Green Kiwifruit can contribute to normal bowel function".

This was the first time in the world that a self-substantiated health claim has been assigned to a fresh fruit product. This is documented as being the culmination of a ten-year investment in clinical trials relating to kiwifruit. This claim benefits all kiwifruit export products from New Zealand, and as a result in 2014 and 2015 was the only product exported from New Zealand to make proven claims on health or function.

> "Health marketing is increasingly important when taking into account global trends towards an aging population, rising middle classes in developing countries, and increasing interest in healthy living.
>
> Zespri Kiwifruit has many health benefits and contributes to everyday good health and vitality: it has a high nutrient density, is a source of fibre and contains the enzyme actinidin, which may help to break down proteins during digestion. It is also an excellent source of vitamin C" 7 May 2014, 12:33 pm, Press Release: Zespri

What is interesting and further highlights the value and leverage, is in that same timeframe the total number of health claims on New Zealand exports (including unsubstantiated) reduced by close to 40%, but the number of claims made on kiwifruit in the functional category increased by almost 100%.

This is probably because of the spotlight going on what you can and cannot say about your product without evidence, and rightly so. Functional and health claims should have evidence. We should all be acutely aware of this value and leverage that is achieved through a functional claim.

> "We cannot solve our problems with the same thinking we used when we created them." Albert Einstein

Ten years of investment in science and clinical trials by Zespri and others achieved this. One focus of every Industry Governance Board should be do make sure that there is a clear strategy and pathway towards this goal of a functional claim for either the whole food or a component of their product. It doesn't need to take ten years, but this offers good return on investment for business, industry and Government. It's an investment that should be shared.

Just as important as investment in yield increase are productivity gains, disease resistance, new product development formats and processing capability. Functional and health claims will realize a long-term value proposition for our export offerings.

I wonder how many of our industries have a functional claim target in their 5- to 10-year strategic plans?

3.5 A New Vision

Figure 15. A high-value ingredients business model – **Horizontal Service Model**

Hopefully the last few sections have helped to paint a picture highlighting the changes occurring within the markets we are exporting to. Our primary sector currently has a huge reliance on our continued ability to sell products to consumers willing to pay a high price. Export-wise, we are still very reliant on meat and dairy for the majority of this.

Sustainability, integrity and transparency for our customers are becoming more important. Nutrition, health food and supplements categories are experiencing huge global growth. If our markets and our consumers are transitioning in their drivers for purchase, we should be reacting.

This next section proposes a new business model; one that is **customer- and nutrition-focused** and reframes our produce and offerings as ingredients and nutritional solutions.

> *"Vision without systems thinking ends up painting lovely pictures of the future with no deep understanding of the forces that must be mastered to move from here to there."* Peter Senge, *The Fifth Discipline; The art and practice of the Learning Organisation*

The clear aim of this approach is to identify the opportunity, engage with a customer and then co-design a solution. To do this we must engage with customers already in our target markets and who already have channels and distribution in market. The model will create multiple value propositions for both the New Zealand entity and the customer partner. It will slowly transform our production methods by using pull forces from market to direct and drive that change.

The focus is on differentiating through technology, supply chain, nutritional science and evidence and establishing long-term business relationships.

For Aotearoa-New Zealand, it is a way to double our export earnings without producing any more. A small shift from 1% of value derived from nutraceutical exports to 4% and a move from commodity transactions to branded, packaged products for consumers could create up to NZ$20B worth of additional value.

This would change our production methods and improve our sustainability and environmental credentials, and it would increase trust and transparency for our customers.

3.6 Unbundling – an exercise in reshuffling the deck

> "Make a new start line. If you were to sit down today with a clean sheet of paper, and you knew that the demand and technology is changing, what would be the form of product that you would take to market? I can't answer this for you because I don't know the problem I'm solving." Andy Elliot

A traditional product represents a bundle of processes and capabilities. These can be unbundled and represented as different offerings and standalone challenges. This presents an opportunity for the newcomer to test all those assumptions that have been made.

What would you do differently in trying to understand the customers, and where is your value proposition?

The same process needs to be applied to our business models. If we were to start again, would we do it the same?

Currently we value our brand very high up in the list under our most valuable business assets. Is it more important than channels to market and understanding our consumer; which is of more intangible value? Does it matter what format our product ends up in, if we are building a sustainable business around health solutions that puts relationships first?

When selling to a health-conscious consumer, given a choice a customer will gravitate towards the offering that gives them specifically what they need without the extras. This provides all new entrants a chance to use technology and processing to offer the customer a standalone product offering.

The aim of all this is to offer your customers a specialized solution to enable them to meet their needs.

Rapid transition with business models is not new. The pharmaceutical industry is a good example of this, within this industry there are companies specializing in product development technologies like gene mapping, and there are others that are focusing on specific disciplines like metabolic health or dermatology. Then there are others that have decided not to undertake any development in-house anymore. They invest in niche players and start-ups. Infrastructure is also undergoing changes as many companies look to outsource their clinical trials or their distribution.

There are many examples of unbundling, and companies are forced to rethink their traditional roles, identity and culture. The real challenge with all of this, is that business models aren't really designed to change. They become less flexible and resistant to change as time goes on. A bit like us.

4 Getting There

4.1 Six stages of a new business model

> To start a new health and nutrition business, we should only really need to ask three questions:
>
> 1. Is the purpose of the business to create a customer?
> 2. What problem does the customer have?
> 3. What solutions can I offer to that customer?

We should also resist the urge to force new businesses and models to find a home within existing business units; this whole exercise needs to sit outside the existing business.

What would this new business model look like? Let's walk through the stages step by step:

Stage 1. Discovery

Essentially the new business model starts with a clear aim to focus on *providing nutritional solutions to a recognised problem*. **This is a business choice first and foremost, but I believe that this could easily become the framework for a "New Zealand Incorporated" focus**. The aim is to not develop a product in isolation, but instead engage with the needs of our export target. It is not necessary to look at every potential country, but you would start with a country of focus and the size of the opportunity is then substantiated.

When nutrition is at the forefront of the offering, the extract or ingredient can be incorporated in a variety of different formats, so the scope is broad. The first step is to develop an understanding of what are the health issues and Government focus is in terms of that nation's health. What are the problem areas? What is on the increase in terms of government health spending and consumer solution spending. What are the solutions that are currently available in the natural product sector of that market?

The next step is to dive within the product offering that you have or want to work with, and to discover what is there that could help with this problem. This need not be a whole product; the product is a combination of nutrients, minerals, oils, proteins, carbohydrates, dietary fibre and bioactive compounds. Any one of these could become your ingredient or key component for your offering. The whole plant or animal is on the table; what was considered waste is no longer.

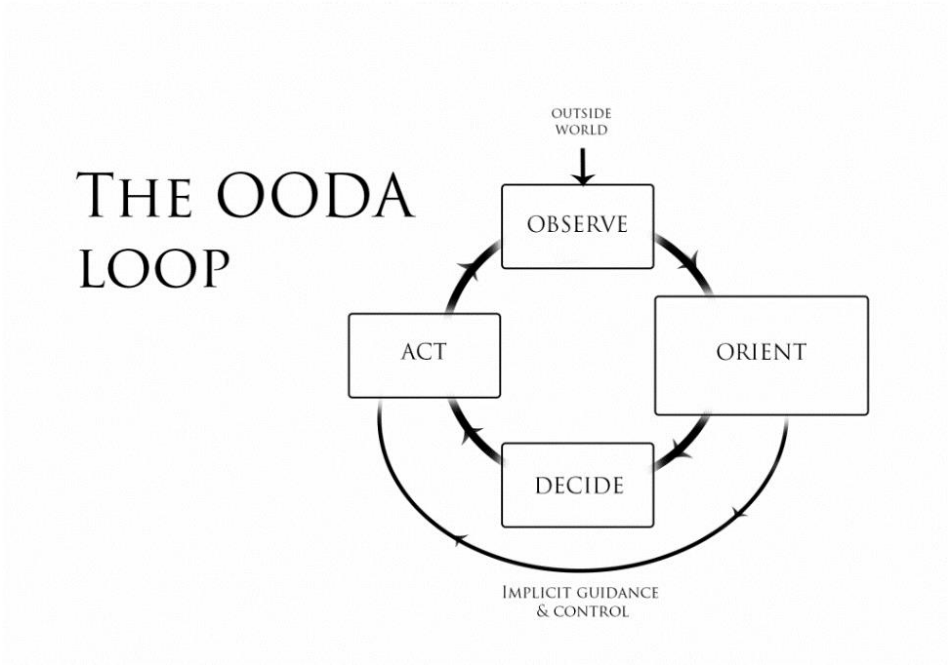
Whether this product is unique to New Zealand or not, there is likely to have been some science already undertaken in this space. What could these ingredients be utilised for, what are the compounds that could be developed, and what is unique about any of these components? If ingredients are already in market, what products are they ending up in?

Have there been any clinical trials undertaken and if so, how does this align to the identified problem? If the raw material is novel and new, this becomes a biodiscovery stage, where anecdotal evidence might have to be validated by bioassay.

Establishing a broad understanding of what the costs might be to get your product to the ingredient or extract stage would also be useful, as would an understanding of processing and extraction capability locally or nationally.

The OODA loop (see Figure 16) is a military model and simply described as a decision-making model. It can be more accurately described as a model of individual and organizational learning and adaptation. OODA stands for observe, orientate, decide and act. This is a useful way of viewing the discovery phase of my proposed model.

> "If individuals and organizations want to survive and thrive in a highly dynamic environment, they have to embrace uncertainty and novelty and learn to use it to their advantage." Taylor Pearson – the Ultimate guide to the OODA Loop



1. We should observe - what is the problem or opportunity?
2. We should then orientate – analysis and evaluation of what is happening
3. Decision – should be guided by our observations and orientation; what are you going to do next?
4. Act – do something based on your decision, then start again.

Figure 16. The ultimate guide to the OODA Loop, Taylorperson.me

Stage 2. Engagement

Once a market has been identified and an understanding of the scope for opportunity has been established, the next phase is engagement. Search out the companies in your target market that already have some offerings for sale. These companies will have scale, they will have market channels and distribution networks already established. They understand their customers and the market that you want to enter, and they have consumer data and trends. Some of these companies may already be aware of the offering potential that New Zealand has. What they won't be familiar with is what you are offering, which is an opportunity to work collaboratively from day one. The key aim here is to build further knowledge about the market by being in market and meeting people. Ultimately, they are after differentiation and supply; you are after a pathway to a market that they have already firmly established. There needs to be clarity about what you are offering and what do you have in common, what is your strategy, and what is the alignment with the company.

> Visiting nutraceutical companies in Japan hit this home for me, when the response from one was "We've had meetings with lots of companies from New Zealand, but we've never had anyone ask us what we want to work on. This is a very different approach." Andy Elliot

Use all and any network channels or support systems that are available to connect with potential customers. This is all about relationship development, opportunity scoping and fit. Some formalization of relationship is essential to start off on the right foot.

Stage 3. Development

This is also an extension of relationship development. The stage involves working through the scientific evidence and health claims that may allow validation or elevation of a product to occur. Proof of efficacy is extremely important; provision of samples, product specifications and developmental work may occur both in New Zealand and in your target market, it doesn't really matter. The customer is likely to have better access to all of this than you do.

Identification of what the value proposition for both parties is developed. What format will the supply occur in, what is the likely product going to be and what will each party contribute? This is also an opportunity to explore other sources within New Zealand of the ingredient that is being developed or discussed. Engagement with other experts and skillsets that you will need. This needs to happen quickly and beyond a pace that we might be used to.

Stage 4. Supply Network

The next step is formalizing and understanding the supply chain and what requirements there are to guarantee supply of a product to market. This is where relationships are developed and formalized at the New Zealand end. This production is likely to come from capacity that already exists. The ingredient might not need to come from the primary product channel; it may instead be from a by-product or waste stream. It might be better to work with other individual growers than larger entities like co-ops. This may not even be a product that your particular entity is currently producing.

How will the processing or manufacturing be undertaken, what will the contracts look like? How will it be managed? What technology is available within New Zealand and what spare capacity can be tapped into? This is an opportunity to understand all the capability and options that are available. Pilot runs could occur, and product specifications and stability can be further refined.

Contracts are put in place. The co-design enables different models to be established, creating maximum value for both parties is the aim.

There is confidence in being able to invest or secure investment because this is a market pull opportunity, not a product push. Full access to the knowledge of how your product is received in market and the consumer perception and preference should all be part of the co-design phase.

Stage 5. Growth

The product is now taking shape, it may be developed here or in your new market with your customer, depending on whether the labelling and marketing requirement is for "made in New Zealand" leverage or not. What each party is going to contribute is now finalized; you could be providing a brand as well as a provenance story, depending on what outcome is desired. Volume and scale are established by the customer and then contracts are put in place. The co-design enables different models to be established, and creating maximum value for both parties is the aim.

This stage is where further refinement occurs. It is also the stage where IP can be developed, if it hasn't already. Is there more science or technological development required? Can this occur under a dual investment model by both customer and business developer, and where is this best undertaken, in market or in New Zealand? Can the ingredient or extract be enhanced through different production or extraction methods or a different harvest or growth cycle? Can new technology for extraction be applied to the process or can it be transferred?

Can a breeding objective develop a different outcome and thus an opportunity for a Plant Variety Right (PFR) or a trademarked product to be developed? Do further clinical trials or scientific programmes need to be undertaken? Does the product category become elevated through organic or spray-free status? Certainty and confidence can now be provided to the producer to instigate these changes, to undertake backfill in transparency of production method.

Can there be a functional claim established, and what does this pathway look like over the next 5 years?

What other formats and products could be developed from the ingredient, to extend the range and offering. Now that you have a product in market, can this go into new markets in conjunction with your customer?

Stage 6. Expansion

A good relationship has been established with your customer(s), all aspects of the new business model have now in place. What does the pipeline look like for new offerings and solutions? It's unlikely that there has just been one single ingredient up to this point, so now is the time to expand the ingredient offering to the existing customer. There is understanding of the consumers and growing market, so these decisions are not so risky, because of the necessary relationships both in market and New Zealand have been established.

A portfolio can now be established in the health and nutrition segment, and new customers and categories can be sought out. New export targets can be established.

4.2 The challenge for all business

We've all heard of the concept of disruption, probably too much of late. Even if we are aware of what it means and what is happening, it is extremely difficult to instigate a defence mechanism towards this within our existing business. Simply put, we find ourselves stuck between our existing business model and where we want to go.

> "Definitions vary, but for our very rough purposes we can agree that incremental innovation changes a product, radical innovation changes a business model and disruptive innovation changes an industry.[34] *Simon Willis*

The safest way for businesses to change is from the top down in terms of clear directive, and for that to happen there needs to be confidence in an alternative pathway. Confidence also comes from new customers, new products and new export channels.

If the concept of this model is adopted within an existing business, it is likely to be rejected, as this requires a step change and not an incremental step. The best place for it then is outside the existing business, in the form of a start-up or innovation lab.

The mandate for more freedom to operate is key as is an understanding that not everything will work. This is the most important aspect of the concept. Failure and fast and agile learning must be embraced as the pathway forward.

One of the biggest risks is ownership of the new business model. It needs to be clear. As mentioned, it is extremely difficult to drive major innovation or change into large organisations; therefore it must sit outside the current business.

> "When it comes to innovation, leaders of an organisation need to demonstrate their commitment and display a clear vision. At Wakatū, innovation (doing things better, doing better things) requires an environment which fosters creativity, has an uncluttered process to assess and implement ideas / projects, is mid- and long-termed in its approach and has a culture of collaboration." Miriana Stephens, Auora – Wakatū Incorporation

Defaulting to what we have always done is a normal trait, and to develop a new business model like this requires full collaboration and commitment.

One of the other risks is not fully utilising those with knowledge and networks around you. This model requires relationships; relationships are fundamental. It won't work without the help of many people working collaboratively on multiple moving parts; within your organisation; within your industry; and across other industries and enablers.

This is the creation of a virtual team and if the individuals involved in the process are not able to quickly learn and adapt, and get help, it won't work. As quickly as possible a strategy must be adopted, and the support for the direction needs to be resourced.

Conclusions

To unlock more value from our existing production, New Zealand requires a targeted approach to sustained value creation. Health and nutrition are fronting some of the big challenges that the world is currently grappling with. These challenges are connected to our production, our environment, our food, and remedies that can be provided through nutrition. As farmers, producers and exporters, these challenges are going to affect our freedom to operate, our social licence, and our ability to make money in the future.

Our field of view should be in a 5- to 10-year horizon for action and implementation and a 10-year-plus view for meaningful change. This requires us to move beyond political cycles; the view has to become industry, iwi and business led. If it is our vision, then we should take full ownership. I have yet to meet a farmer who is not focused on the next generation's ability to make a livelihood from their assets.

Working for Wakatū Incorporation has reinforced the understanding that the estate we help to manage is a responsibility, there is no "exit strategy" they are building for their grandchildren's future. We need to incorporate more diverse thinking, capability and vision into our Governance Boards because we need to adopt more risk. We are too conservative and traditional in our business thinking.

This report is not just about a new business model for extracting value from new products. It's a challenge to think differently about what we want in the future. It is a challenge for us all to better utilise everything we currently produce and to look at sustainable nutrition as the driver of value, not just a food fashion.

For New Zealand, it has become too easy to just sit behind big lofty goals like doubling our export numbers and feeding 40 million people. These are the wrong levers for sustainability and enduring value, and regardless of that, we're not even on target.

We require a step change, not more incremental ones. We have a very small proportion of our current food exports focused on nutraceuticals, natural products and health propositions. If we just focus on growing that part and stopped sending our products overseas in drums, totes and bulk containers; if we instead turned them into branded and packaged offerings ready for retail - the value of our current natural products sector could grow towards becoming a $20B sector.

Uncertainty is a catalyst to change; uncertainty brings us opportunity. Our production methods, our sustainability and our environmental footprint can all change if the consumers we are selling to demand it. By focusing on global issues and health problems we are getting closer to understanding our consumers and customers that will purchase our products.

We need to remove some of this risk associated with change, and this can occur by becoming solution focused. Working in market and seeking partnership early from customers is a far safer strategy than producing a product and hoping it will sell.

This requires not just a small leap of faith, but more focus from our support teams; science, universities, our funding systems and from our Government departments and CRIs. We need buy-in from everyone. There needs to be more outcome-driven focus from cross-sector collaborations between industry leaders, our business leaders and our Government. This collaboration needs a common thread, and that thread is nutrition.

We require regulations and industry standards that support our export value and products. Moving to more consumer-ready retail products like nutraceuticals requires a strong regulatory framework that gives our customers confidence. It will help protect our identity and the value that is associated with our unique flora and flora. We do not value our endemic diversity and genetic IP enough; we're letting it slip through our borders through lack of leadership from collective New Zealand. Our culture, our wellness and our nutrition are all part of that IP and need to be at the front of our new export framework for the future. A framework that links Taiao (environment) with everything else.

For New Zealand to maximise its value proposition, we need to produce more evidence through clinical trials, and we need to develop networks internationally that fast-track this transition into market.

Successful exporters should be looking to leave the ladder down behind them, so that more small and medium businesses get to realise their potential. Those businesses are agile and reactive, everything that a big established business is not. We should be working more as a country, as a community and industry to collaborate.

I believe the way to do this is by not doing what we've always done. Businesses looking to focus on nutrition, health and wellness from their existing commodity base must accept that they will struggle to do this within their existing business and business model. An established business has a natural immunity to radical change, so this challenge must be approached with real purpose and commitment.

We need to change our export business models to become customer focused. To do this we identify the opportunity, the problem and then look to engage directly with those already in our target market. Our offering becomes a solution to the problem, and we can help our customers differentiate. The development of this business is safer and more long term, as we provide opportunity to expand our offerings and ultimately change the production method.

This is a product pull business model. It is not an incremental development step into export, it's focused entirely on export. I've called it a Horizontal Service Model, because it allows growth in both directions to occur simultaneously.

Recommendations

1. We embrace the global challenge to link dietary patterns with human health and environmental sustainability. It's a good business strategy. Every exporting food and beverage business should be acknowledging the UN Sustainable Development Goals. There are 17 to choose from; even one or two that have your focus is a start. It forces us to think about the auditability and transparency required from our consumers, which in turns gives us a deeper understanding of what we need to change. Sustainable Development for NZ should have a regenerative focus. Our food and nutrition offerings should reflect what value we place on both our health and the environment. Regenerative agriculture includes the social, human, natural and ecological processes within its principles, it aims for balance.

2. We choose to specialise in health and nutritional solutions from our production, collectively aiming for a target of 5% of our total production base into specialised nutraceuticals. This is well within our reach. The report, "Measuring what Counts" (2017) described 77% of our food exports ~~ha~~s having the potential to be categorised as high-value nutrition candidates. We need to apply more focus to the health properties of our production and products. This is not a nutritional panel on the back of a product, but rather requires development of evidence for function and health support. Our **HVN Science Challenge is just an incremental step** for whole food and formulated food and beverage products; it does not include nutraceutical scope. This alone is not aspirational or "High Value" enough.

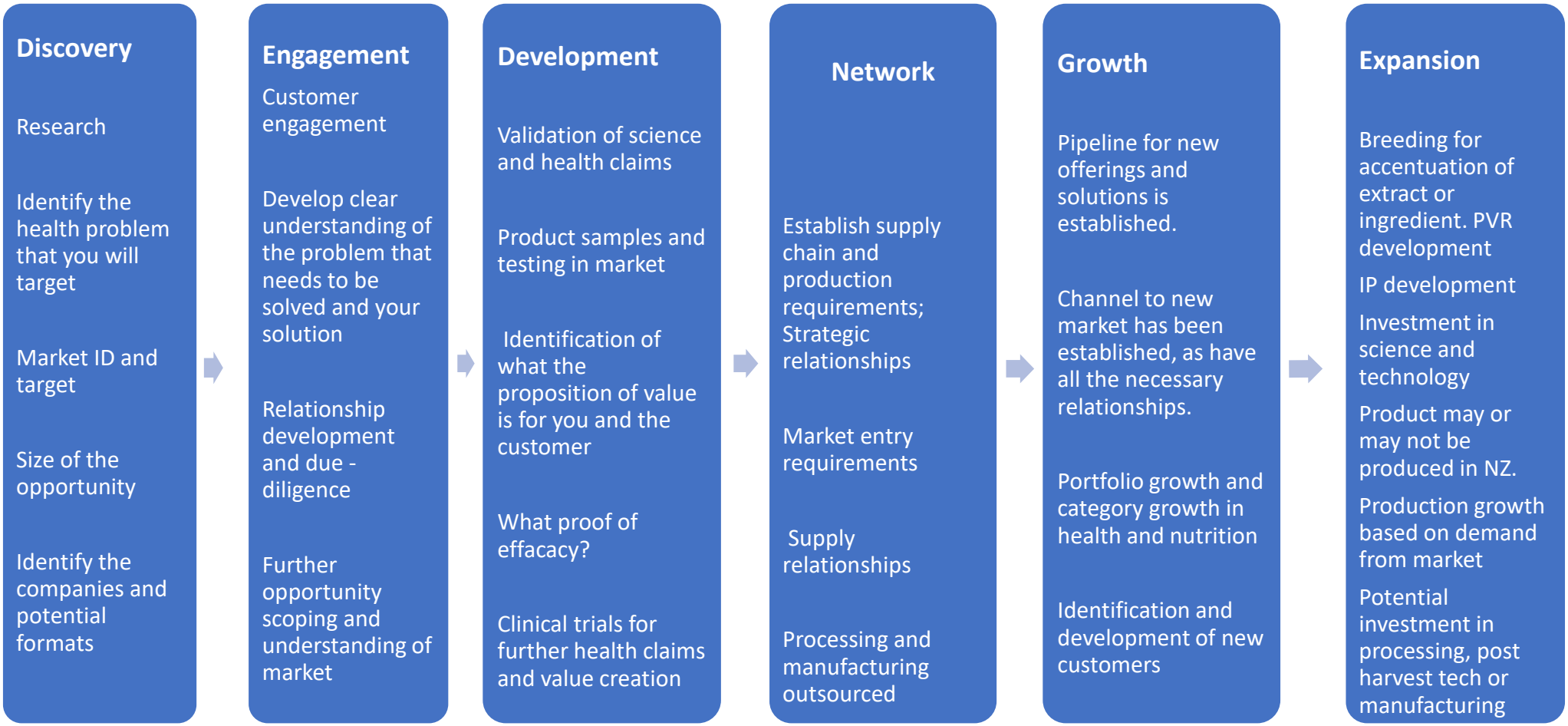
3. We partner with companies already established in target markets and categories and utilise them as our customers, to co-design solutions and differentiation. We need to be closer to the consumer and customer in our target market and this requires a new strategy. We do not have to own everything, and there are different value propositions for us to realise. It might be prudent to choose to give up more at the start, to get where we want to go faster. Relationships and collaboration are key to this approach. Our export enablers like **NZTE** need to adjust to a different approach and a new set of requirements from their clients; there is opportunity for New Zealand businesses to facilitate this process as well.

4. It will be important to develop and co-design with **MPI** strong industry standards and regulations that support these products and their safety and efficacy claims. It is prudent to be proactive in developing these standards before they are forced upon us, such as we have seen with mānuka. Clear and appropriate standards and regulations will give our customers confidence, and create barriers for others who are not authentic; it will also allow the value to be maintained and elevated. More investment is required in the development of evidence through health claims and functional claims for ingredients and products. This will also require a new era of vision, participation and leadership from **Governance Boards and Directors** to have active input into the future development of their industries and the creation of new value propositions. Any new industry being established should avoid commodity transactions from day one.

5. It is also critical that we develop more capability and expertise around these high-value opportunities through technology, manufacturing, genetics, functional food and consumer retail product offerings. There is opportunity for value creation at every point within our supply chain. We need stronger networks and collaboration at post-harvest and manufacturing, and this capability can be utilised across multiple industry groups. There is too much replication and redundancy within our current ecosystems, and this change should be directed by **business, not led by science**.

6. We have adopted **a new business model** to achieve these goals and create the opportunities for smaller businesses to get to market faster. We share our mistakes and our wins and truly embrace the concept of collaboration. If we can create greater value from what we produce, then every part of the supply chain wins. The traditional business model is not working, and innovation within this model is just too slow.

Appendix 1: A horizontal service model – Andy Elliot



Appendix 2

Market Demand Case Study – Bluebird Botanicals, Colorado, USA

A great example of the new degree of traceability that is becoming established in Health and Wellness products is highlighted in the Colorado Company, Bluebird Botanicals.

Founded in 2012, Bluebird Botanicals is a world-leading manufacturer of high-quality hemp extracts and CBD oil. This is currently the largest privately owned GMP hemp company in Colorado, and for me is a perfect example of some of the surprising and interesting factors that are accelerating this industry forward.

To begin with, the facility, which is GMP approved, is what you would expect from a company that is expanding so fast that just how-to future proof is a constant challenge. The vibe is great, people busy doing work things everywhere but without apparent stress. The office, although compact, has heaps of space and is set up for time-out activities or meetings.

Even though everything else seems to be quite concentrated and production is bursting at the seams, there is something else in the background that makes you think to yourself this would be a cool place to work. This company is a wholesale extract buyer. They buy their product from suppliers, and this business model enables them to keep an extremely high-quality control on their products and retain specifications that are 100% verifiable.

The wholesale product is mixed, further refined and blended to create their range of products and extracts, which is extensive. Approx. 20% of what they create is sold as wholesale, and e-commerce is their sales platform.

Bluebird "Better than Organic" (Kevin Liebrock COO Bluebird Botanicals)

Companies that supply Bluebird Botanical supply the extracted product in drums. This product is then tested in triplicate by third party accredited laboratories. From their website:

> "Third party laboratories analyze all of our full-spectrum hemp extracts and supplements for cannabinoid potency, heavy metals, bacterial/microbial life, mycotoxins (fungus), and pesticides. Our isolate is tested for potency, heavy metals, and pesticides. The un-summarized results of testing for all produced batches can be found in our online batch database."

Even in a grower/production environment where organic-regenerative principles are adopted and utilized to produce a crop, this does not guarantee that the resulting product will be pesticide- or residue-free. Often spray residues can be a problem, simply through drift. For example, a farmer next door to a hemp crop utilizing mosquito sprays can cause residues to be detected in a batch. Unfortunate for the grower, this testing regime allows Bluebird Botanicals to provide a degree of transparency that is creating a new norm in Health and Wellness products.

Quality control at a whole new level

Bluebird Botanical has developed an industry-leading quality control system, as evidenced by the 99% rating that the company was able to achieve in April 2018 for a third-party cGMP audit performed by Eurofins

Scientific, a world-renowned laboratory testing organization. By comparison, currently in the USA, a 70% level is a passing score. cGMP refers to the FDA's guidelines for current good manufacturing practices.

"Dietary supplement manufacturers are not required by law to perform 3rd-party manufacturing audits, but only need to undergo this process internally once a year. Bluebird however strives to go above and beyond, especially when it comes to quality, safety, and the wellness of our loyal clients."

Combine all this with all the other aspects and stickers that come with their products, such as Vegan, GMO Free, Gluten Free and sweetener free. They also carry a Glyphosate Residue Free Certification.

Glyphosate Residue Free Food & Supplement Certification

Similar in concept to the GMO project labelling, a glyphosate residue free certificate is fulfilling the consumer demand for an understanding of what amounts of glyphosate are in present in finished food products. USDA Organic certification does not ensure glyphosate residue-free food because it does not have supply chain testing standards. USDA Organic certification is also not based on testing of the final food product for toxic chemicals.

This Standard is voluntary and nonbinding. It is not intended to replace the legal or regulatory requirements of any country in which agricultural products or food products are produced, handled, or sold. Food Manufacturers participating in the Program are not ultimately required to utilize the Glyphosate Residue Free certification mark on Certified Products.

At present in New Zealand, a couple of honey companies appear to be the only New Zealand listed Companies utilizing this standard for their mānuka honey products, although many other companies in New Zealand do test for glyphosate in their products.

Bluebird know their customers, and they're not who you'd expect!

One of the most fascinating parts of this story for me was the discovery that over 60% of Bluebird customers were baby boomers, they were 60 years plus. The 25- to 40-year-old segment make up around 35%. These baby boomers are educating one another faster than anyone else. They are understanding the stand-alone health benefits of the cannabinoids in the products and they are also looking for solutions for whatever the health issues they may have.

Many are also taking these products to enable their endocannabinoid systems to simply function better, and this may also account for why the Generation Y is the next largest portion of the market and the Generation X (40-60 ish) is the smallest. It's likely that Generation Y is more on the pulse and ready to educate themselves about why and what they purchase.

My favourite part about the Bluebird business is also part of the reason that the customer demographics are the way they are, and this is because of their assistance programme. They operate a Low-income programme, a Veterans programme and a Long-term disability programme. These programmes offer 30% off to customers upon verification.

The other interesting part of having this large portion of baby boomers as their customers requires a different approach to customer service. Even though e-commerce might be the preferred space for a business such as this, actual internet transactions do not dominate sales as you would expect. Paying by cheque is still common, and even cash. The customers want to discuss their situation with an operator and talk in person about the products that might be suitable.

They also take over 70 forms of cryptocurrency and are very focused on recyclable packaging and the waste that is created by their business. All these factors make this company the sort of company that is easy to gravitate towards.

Bluebird are answering their consumer demand for transparency and quality.

Bluebird are providing solutions to their customers' problems.

References

[1] Global Nutraceutical Ingredients Market Analysis & Trends Report 2017. Accuray Research.
[2] Natural Products NZ Survey 2014 Analysis of Results and Key Findings, 4th November 2014
[3] Building Export Markets progress report, Aug 2012
[4] Food In The Anthropocene: The Eat–Lancet Commission On Healthy Diets From Sustainable Food Systems. Published:January 16, 2019

[5] Http://Www.Fao.Org/Nutrition/En/ Article from Website – FAO's Role in Nutrition
[6] Nadine Porter, Broken Food Systems 2018 Nuffield Report
[7] The Hard Truth About Business Model Innovation, MITSloan, Sept 13, 2016.

[8] Nutraceutical and Functional Food Processing Technology, First Edition, 2015, Joyce Irene Boye
[9] Would New Zealand Benefit from New Organic Regulation? MPI Discussion Paper No: 2018/0, May 2018
[10] Organics International (2018). The World Of Organic Agriculture. Frick And Bonn.
[11] Www.Theregenerativeagriculturedefinition.com
[12] Willer, Helga And Lenard 2018. The World of Organic Agriculture
[13] NZ Trade and Enterprise Report – New Zealand Consider The Source
[14] Global Nutraceutical Ingredients Market Analysis & Trends - Industry Forecast To 2025. Accuray Research 2017

[15] High-Value Nutrition Strategic Plan 2019-2024, 15 June 2018
[16] Measuring what counts -Export revenue from NZ high value foods, High Value Nutrition Science Challenge, March 2017
[17] December 06th, 2018, Mintel.Com Press Release
[18] Press Release August 7, 2018, GMO Project Website
[19] Eat-Lancet Report A Good Opportunity For New Zealand (Media Release Nz Beef And Lamb Thursday, 17 January 2019

[20] Meat Re-Imagined. The Global Emergence of Alternative Proteins - What Does It Mean For Australia? Food Frontier 2019
[21] Rabobank Global Report, Nov 2017, Watch Out… Or They Will Steal Your Growth
[22] ACVM Alert Notification 18-001 Hemp and hemp-based products used as agricultural compounds: Animal feeds and animal treatment product, Nov 2018
[23] Brownlee, P. (2018) New Zealand's Industrial Hemp Industry: Motivations, Constraints, and Moving Forward, (M.A.), University of Otago, Dunedin.
[24] J Agric Food Chem. 2010 Nov 24;58(22):11801-7. Doi: 10.1021/Jf102636b. Epub 2010 Oct 26.
[25] Statistics Canada. Https://Www.Statcan.Gc.Ca/Eng/Start
[26] Opportunities For Future Research And Innovation On Food And Nutrition Security And Agriculture In 2018

[27] https://eatforum.org/
[28] Opportunities in plant-based foods – PROTEIN Report Plant and Food Research, May 2018
[29] https://www.ellenmacarthurfoundation.org/
[30] Meat Re-Imagined. The Global Emergence of Alternative Proteins - What Does It Mean For Australia? Food Frontier 2019
[31] Isentia -Leadership Index – The Face Of Disruption, April 2019
[32] Stuff.Co.Nz Fonterra's Big Problem Of Needing To Be Right. Glen Herud, Jan 22, 2019

[33] The hard truth about Business Model Innovation, MITSloan, Sept 13, 2016.

[34] Managing Innovation teams in complex environments, Simon Willis, article on the Medium.com, Jan 9, 2019

Others

35. Nutraceuticals: The future of Intelligent Food – where food and pharmaceuticals converge, KPMG, May 2015
36. Growing for Good – Intensive farming, sustainability and New Zealand's environment, Parliamentary Commissioner for the Environment, October 2004
37. A Review of Marine Bio-actives. Seafood Innovations Limited 2005
38. We are what we eat. Healthy eating trends from around the world, Nielsen, Global Health and Wellness Report, January 2015
39. Report to the Ministry for Business, Innovation and Employment - Current land based farming systems research and future challenges, Preston Davies, David Moore, Dean Yarrall, 31 October 2018