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**The Interface Between Ethical Leadership
and Food Safety Culture
in Aotearoa New Zealand Food Businesses**

**A thesis presented in partial fulfilment of the requirements for the degree of
Doctor of Philosophy**

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New Zealand**

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Abstract

Measuring, evaluating and improving food safety culture is a priority for Aotearoa New Zealand food businesses. This is driven by the desire to produce food of the highest quality that safeguards consumers, protects the reputation of New Zealand Inc., and meets the requirements of international standards and regulations. This is the first in-depth qualitative investigation into food safety culture and ethical leadership in Aotearoa New Zealand food businesses, including some of this country's largest food exporters. Using a mixed methods approach this research has provided unique, contemporary understanding and insights, while simultaneously providing a novel contribution to the body of knowledge.

Two research workstreams were used; the first a quantitative workstream involving a voluntary survey of manufacturing and distribution employees in New Zealand's largest food business; a dataset of responses to food safety and ethical leadership questions from 1181 individuals. Using Principal Component Analysis (PCA) applied to Lickert-scale variables, combined with multivariable modelling, this research found a positive relationship between food safety culture and ethical leadership and evidence for differences in responses according to several respondent characteristics. These included associations between PCA coordinates that captured variation in individual responses to food safety and ethical leadership questions, and the supplementary variables: role (e.g. staff or supervisor), site and gender. Ethical leadership has been shown to improve effectiveness, performance and safety at an organisational and individual level. Therefore strategies to improve ethicality across Aotearoa New Zealand food businesses in order to improve food safety culture and ensure safer food outcomes are suggested: consultatively developing organisational values which are well communicated and lived; ensuring ethical considerations when hiring staff; ethical considerations when setting expectations, and in training and mentoring staff and managing performance processes including the use of consequences; and modelling good behaviour, making fair decisions, ensuring open, clear communication and giving employees a voice.

While largely positive, the quantitative strand did reveal a level of dissatisfaction with both ethical leadership and food safety culture, suggesting room for improvement. Further research is needed to better understand management's, supervisors' and workers' perspectives on both aspects.

The second workstream involved one-on-one semi-structured interviews with 32 founders, owners and senior food safety and quality personnel from 31 Aotearoa New Zealand food companies with thematic data analysis resulting in five key themes: Values; Responsible Stewardship of Natural Resources; Māori Worldview; Ecosystem Pressures and Leadership. The issues identified to be important to Aotearoa New Zealand food businesses include: individual, managerial and organisational values; leadership and management commitment in influencing organisational, food safety and ethical climate and culture; inter-generational value-creation, sustainable practice and acting as kaitiakitanga meaning guardianship or protection. This research has also provided insight into the drivers for and primary challenges related to food safety for Aotearoa New Zealand food businesses.

This research has contributed to an up-to-date understanding of the characteristics of ethical leaders in Aotearoa New Zealand, who, according to this study, are humble, honest, respect indigenous Māori values, and are not corrupt. They have a degree of relatedness, care about our natural environment, have a strong

sense of identity or place, are collaborative, are fair, and are accountable. Our size, Indigenous Māori worldview, and our geographical isolation contribute to the unique interpretation and application of these leadership characteristics in Aotearoa New Zealand.

Several limitations are acknowledged, not the least of which was the context for this research which began at the outset of the global pandemic, with both positive and negative consequences. The use of one, albeit large food business in the quantitative workstream is noted, as is the focus of the participants in the qualitative workstream. Broadening this research to all hierarchical levels in several food businesses would be of benefit, and this is one of a number of research recommendations for the future.

The positive correlation between ethical leadership and food safety culture found in this research suggests that maintaining and improving the ethicality of leaders within Aotearoa New Zealand food businesses may positively influence food safety culture and therefore, the production of safer food.

Acknowledgements

My academic journey began in August 2007 when my closest friend gave me a print for my 48th birthday. It read, "What would you attempt to do if you knew you could not fail?" The answer to that question at that time, was an MBA. I applied for and was accepted into the NZ1 intake of the Massey University Executive MBA programme, beginning my tertiary study with no prior undergraduate experience. I graduated in November 2010 with Distinction. I was 51 years of age. Despite advice to the contrary, I stair-cased into a Massey University Master of Management, beginning in February 2011, and graduated for the second time in May 2012. Life happened, and I finally enrolled in my PhD in January 2020. Sally Cleary – words can't express how grateful I am to you for that print. It changed my life as my friendship with you has. I was small child with a big dream to be a doctor. Family circumstances did not allow for that eventuality. But at age 65 I will finally achieve that goal.

My children, grandchildren and closest friends – my family – have nourished me throughout. There are no words to adequately thank them or to express what they mean to me.

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"What would I attempt to do if I knew I could not fail?" This indeed is the question. What next?

Wendy Newport-Smith (or Dr Nanna to my grandchildren)

October 2024

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Definitions

Food safety culture: Food safety culture is a long-term construct existing at the organisational level relating to the deeply rooted beliefs, behaviours and assumptions that are learned and shared by all employees, which impact the food safety performance of the organisation (Sharman et al., 2020, p.16)

Ethical Leadership: Ethical leadership is the implicit and explicit pursuit of desired ethical behaviour for self and followers through efforts governed by rules and principles that advocate learning motivation, health optimism and clarity of purpose to uphold the values of empowerment, service to others, concern for human rights, change for betterment and fulfilling duty towards society, future generations, environment and its sustainability (Shakeel et al., 2020, p.10)

Food Integrity: Food integrity is a multidimensional concept concerning the integrity of product, process, people and data, implying the controlled status of a food product to be intact, safe, of quality, and authentic in its claims, as well as sourced, processed, and distributed ethically throughout a food supply chain (Alrobaish et al., 2021, p.5)

Leadership: "The process of influencing others to understand and agree about what needs to be done and how to do it, and the process of facilitating individual and collective efforts to accomplish shared objectives" (Yukl, 2006, p.8).

Authentic Leadership: An authentic leader is one who: (1) is self-aware, humble, always seeking improvement, aware of those being led and looks out for the welfare of others; (2) fosters high degrees of trust by building an ethical and moral framework; and (3) is committed to organizational success within the construct of social values. (Whitehead, 2009, p.850)

Servant Leadership: Servant leadership is a moral-based leadership primarily driven by the idea that serving is a natural component ("altruistic calling") or inner conviction of the servant leader where the focus is on the personal growth and well-being of others. Spears established ten essential characteristics of servant leadership: listening, empathy, healing, awareness, persuasion, conceptualization, foresight, stewardship, commitment to the growth of people, and building community (Demeke, van Engen & Marko, 2024)

Spiritual Leadership: A value-laden approach that engenders feelings and expressions of a leader's spirituality at the workplace by intrinsically motivating the followers to envision work as a calling, thereupon culminating in greater organizational performance (Fry, 2003; Krishnakumar et al. Chen et al. (2018)

Transformational Leadership: Transformational leadership refers to the leader moving the follower beyond immediate self-interests through idealized influence (charisma), inspiration, intellectual stimulation, or individualized consideration. It elevates the follower's level of maturity and ideals as well as concerns for achievement, self-actualization, and the well-being of others, the organization, and society (Bass, 1999)

Transactional Leadership: Transactional leadership refers to the exchange relationship between leader and follower to meet their own self-interests (Bass, 1999)

Chapter 1 Introduction

Food safety culture, as a contributing factor to the production of safe food and as a distinct field of research, has been studied internationally for the past fifteen years. The influential role of leadership in food safety culture, organisational character, and workplace safety is generally accepted. Research into the flow-on effects from leadership, and in particular ethical leadership, has suggested its positive impact on worker attitudes and behaviour, and organisational reputation and performance. Little is known, however, about food safety culture and ethical leadership in the Aotearoa New Zealand context; neither severally nor whether there is a quantifiable relationship between the two.

This chapter provides an introduction to the study of the relationship between food safety culture and ethical leadership in New Zealand food businesses. The content is organised into six sections. Firstly, the researcher's interest in the topic is outlined, following which some key statistics regarding foodborne illness are introduced. The Aotearoa New Zealand context for foodborne illness is discussed next, followed by a commentary about food safety culture, performance and leadership. To conclude this chapter, the aim, objectives and structure of this thesis are outlined.

1.1 The Researcher's Interest in Food Safety Culture & Ethical Leadership

The researcher's professional role is that of Associate Director, Operations of the New Zealand Food Safety Science & Research Centre (NZFSSRC or the Centre), a position held since prior to the Centre's launch in May 2016. The Centre is a national, virtual, scientific network of nine research institutes, co-funded by Massey University (Massey), the New Zealand Government and 26 food companies including some of New Zealand's largest food exporters. Measuring, evaluating and improving food safety culture is a priority for the Centre's industry membership, driven by the desire to produce food of the highest quality that safeguards consumers, protects the reputation of New Zealand Inc., and meets the requirements of international standards and regulations. NZFSSRC's industry member food safety culture maturity could be mapped onto a continuum from emerging to embedded, that is, from a question about food safety culture on a staff satisfaction survey to a fully-fledged food safety culture programme respectively.

The research focus for this doctoral study evolved over two years; 2019 - 2020. Preparatory conversations with the NZFSSRC Director and Chief Scientist, and Massey Provost and Research Director prior to enrolment in the Massey University PhD programme ranged over such issues as why industry food safety research uptake was so poor at that time; what the motivations were for industry to fund food safety research; and what the key investment drivers were for each of the Centre's three key stakeholders – Government, researchers and industry.

Following enrolment in the PhD programme in January 2020, a working title of "Management of Food Safety Risk in Aotearoa New Zealand" was ascribed to the research. Through a series of conversations with NZFSSRC industry members the importance of food safety culture to industry became clear; how it is developed, enhanced; maintained and evaluated; how behaviour change is brought about; how engaged workers on the factory floor are in food safety; and how knowledge and attitudes influence food safety and therefore safer food production.

This led to an interest in understanding what role, if any, ethical leadership plays in influencing safer outcomes for New Zealand produced food?

This doctoral study builds on the author's work during an MBA (Distinction) and Master of Management completed through Massey's School of Management, and a personal interest in the impact of individual and collective values and ethics on culture, and in particular, food safety culture.

1.2 An Introduction to Foodborne Illness

According to the World Health Organisation (WHO), 600 million cases of foodborne disease and 420,000 deaths equating to thirty-three million healthy life years lost, are attributed annually to unsafe food (WHO, 2022). Children under five account for 40% of foodborne deaths with an estimated 125,000 deaths annually. One in ten people become sick after eating food that is contaminated (WHO, 2022). WHO estimates the burden of lost productivity and medical expenses in low and middle income countries at US\$110 billion annually (2022), and the annual cost of treating foodborne illnesses is estimated at US\$15 billion (WHO, 2020).

The safety of food products for human consumption must be guaranteed, and accountability for that safety, across the length and breadth of the supply chain, is both an individual and shared responsibility involving producers, operators, and consumers (Olsen & Bánáti, 2014). Food companies are required to produce safe food within regulated environments, however, it is argued that the rules matter less than the ethical values of the people working under those rules (Olsen & Bánáti, 2014), who both influence, and are influenced by, a supportive corporate culture, implicit within which are ethics and values (Moore, 2005; Moore & Beadle, 2006). Food safety goes beyond rules to live within the culture of a company (Havinga 2019), which, while not legislated, impacts on all aspects of an organisation. Culture is, therefore, one of the most important aspects of a company's ethical practice (Olsen & Bánáti, 2014), and one of the most important factors in food safety culture is leadership (Yiannas, 2009). The behavioural standards of leaders are fundamental in corporate climate and culture (Mihelič et al., 2010), and research suggests that better food safety leadership is needed to reduce the global burden of foodborne disease (Yiannas, 2009).

Over 200 diseases, from diarrhoea to cancer, can be caused by food that is unsafe because it is contaminated with viruses, bacteria, parasites, or chemical substances (WHO, 2022). Infants, young children, pregnant women, the elderly, and those with an underlying illness are particularly vulnerable (WHO, 2015). An ageing population globally, while an indicator of improved health, conversely means an increasing vulnerability to foodborne illness. Other trends, such as consumer preferences and assumptions about safety of niche products, such as organic or natural foods, may also increase vulnerability to foodborne illness if microbiological concerns are not taken into consideration during production (Jespersen et al., 2016).

Food safety, nutrition, and food security are closely linked (Fung et al., 2018). The globalisation of food trade, a growing world population, climate change and rapidly changing food systems have an impact on the safety of food. Modern food systems are complex, shaped by the interaction between a great number of inputs, outputs, processes, and actors (Wang et al., 2016, p.7). According to Wang et al. (2016), in the United States of America (USA) alone, over one billion meals are eaten daily.

The impacts of continuing outbreaks of foodborne illness are far-reaching – for individuals, communities, businesses, and economies. Despite the volume of information available about food microbiology, and significant investment to research the causes of unsafe food, the high incidence of foodborne illness remains (Fung et al., 2018). The potential consequences for a business responsible for a foodborne outbreak include negative impacts on brand identity, loss of market access, financial losses, and bankruptcy in up to one-third of cases (Griffith, 2000). This context provides the impetus for significant improvements in food safety management systems and food safety performance by the food industry and regulators globally (Nyarugwe et al., 2018).

1.3 Foodborne Illness in New Zealand

Approximately 200,000 people in New Zealand get sick each year from food (Food Surety, 2023). An assessment of the economic impact associated with the six main foodborne illnesses in New Zealand undertaken in 2010 estimated that the total cost allocated to foodborne outbreaks in 2009 was NZD\$161.9 million (Gadiel, 2010).

In a briefing to the then incoming Minister for Food Safety in 2022, the Ministry for Primary Industries (MPI) estimated the annual cost of foodborne illness caused by the seven most important pathogens to be approximately NZD\$86 million per year. 90% of that cost is attributed to lost productivity of people who get sick from foodborne illness (MPI, 2022). One of the most prevalent foodborne diseases in the developed world is campylobacteriosis, caused by the bacterial pathogen *Campylobacter* (WHO, 2020). New Zealand has the dubious title of '*Campylobacter* capital of the world' with rates of infection ten times that of the United States and more than 50% higher than Australia; the economic cost of which is in the tens of millions of dollars (Baker & Wilson, 2015). The reasons for this are complex and include epidemiological factors, production and processing methods, business and consumer handling of poultry products and the affordability of chicken as a source of protein in this country. In a 2021 update on the source of campylobacteriosis cases in New Zealand, Lake et al. attributed 84% of cases to poultry. Baker et al. (2021) suggested that despite successful interventions in 2006 – 2007, there was no substantive decline in campylobacteriosis in the decade to 2021. The 2023 Annual Foodborne Disease Report (MPI, 2024) noted that while the total number of human campylobacteriosis notifications have been slowly declining over multiple years, the total number of campylobacteriosis notifications was slightly higher in 2023 than in 2022. This was attributed in part to a doubling of the number of cases associated with overseas travel. This led to a net decrease of four cases per 100,000 in the rate of domestically acquired foodborne campylobacteriosis in 2023. Campylobacteriosis rates are higher in rural than urban areas (MPI, 2024), highlighting the potential risk of other factors such as contaminated water or direct contact with farm animals (MPI, 2024).

New Zealand's food and fibre sector is spearheading the country's export-led recovery from COVID-19 according to 'Fit for a Better World', the New Zealand Government's roadmap to transform the primary sector (MPI, 2021). The Government's commitment is to "support our food and fibres sector to meet increasing consumer demand for a secure supply of safe and healthy food, and for products that are produced and packaged ethically and sustainably" (MPI, 2021, p.6).

Despite significant challenges that include weather events, supply chain issues, high input costs, and internationally, continuing impacts from the global pandemic, weaker commodity prices, and high input cost inflation, export revenue from food and fibre export revenue is budgeted at \$56.9 billion for the year ended 30 June 2025, as summarised in Table 1 (MPI, 2024, p.10). It is therefore vital for New Zealand to create and maintain a food sector where those involved believe in food safety, not only because of the economic and reputational imperatives, but “because it is the right thing to do” (Kane & Taylor 2018, p.389).

Table 1: Food & Fibre Sector Export Revenue 2020 - 2026 (MPI, December 2024, p.10)

Table 1: Food and fibre sector export revenue 2020-26							
Year to 30 June, NZ\$ million							
Sector	Actual					Forecast	
	2020	2021	2022	2023	2024	2025	2026
Dairy	20,102	19,055	21,998	26,008	23,231	25,500	25,560
Meat and wool	10,617	10,373	12,310	12,114	11,336	11,390	11,870
Forestry	5,452	6,499	6,578	6,353	5,748	5,980	6,100
Horticulture	6,541	6,579	6,825	7,088	7,116	8,000	8,470
Seafood	1,857	1,789	1,919	2,097	2,141	2,210	2,370
Arable	289	261	252	272	345	360	370
Processed food and other products*	2,988	3,087	3,228	3,493	3,416	3,460	3,570
Total export revenue	47,846	47,642	53,110	57,425	53,333	56,890	58,310
Year-on-year % change	3%	0%	11%	8%	-7%	7%	2%

* Includes live animals, honey, and processed food.
 Totals may not add up due to rounding.
 Percentages are rounded to the nearest whole percent.
 Some values for 2022 and 2023 have been updated due to revisions made by Stats NZ.

1.4 Food Safety Culture, Performance & Leadership

The relationship between food safety culture and food safety performance was highlighted by Yiannas in 2009 (Fatimah et al., 2014; Griffith et al., 2010a; Nyarugwe et al., 2016). In 2013, Griffith recommended that food handler behaviour should be the focus of research into food safety, rather than the pathogens involved. Research into food handler behaviour suggests that over 40% of food safety-related behaviours are connected to food safety culture (Griffith et al., 2010a; Griffith et al., 2010b); and that 50% of cases of foodborne illness are attributed to failures in food safety culture (Jespersen et al., 2018). According to the Institute of Food Science & Technology (2019), the issue is not if, but how food safety behaviour, one the most important aspects of a company’s ethical practice (Havinga, 2019; Olsen & Bánáti, 2014), is impacted by organisational culture.

Strategies to improve safer food handling, and therefore safer food, include: increased leadership visibility; enforcement of policies and procedures; encouraging a team approach; effective risk management; and creating a system of accountability including rewards and punishment (Nyarugwe et al., 2016; Yiannas, 2009). These strategies align with ethical leadership characteristics: modelling of desirable behaviours; communication and reinforcement; influencing behaviour through rewards and discipline; citizenship; care;

and honesty, integrity and trustworthiness (Brown et al., 2005; Brown & Treviño, 2006; Eisenbeib & Giessner, 2012; Mayer et al., 2008; Resick et al., 2006; Stouten et al., 2012).

Food safety culture has been referred to as the zeitgeist or issue of the current time, of the world of food business (Institute of Food Science & Technology, 2019), thus introducing a positive food safety culture into operations is the greatest challenge currently for food businesses. From a public health perspective, a positive food safety culture must be an imperative for the food industry. From a business perspective, a positive food safety culture can be a competitive point of difference, a tool to enable customers to make informed choices, and a vehicle to build consumer trust and promote confidence along a supply chain (Jespersen et al., 2018; Powell et al., 2011). To avoid food safety failures, the people involved must be committed to food safety at both a rational and an emotional level.

According to Kayne and Taylor (2018, p.387) food businesses must “get better or get out”. Thus, optimising company culture to improve food safety performance is considered the path for more visionary organisations. The question is how, not whether food safety is impacted by culture; and of determining the best way to improve company culture (Jespersen et al., 2018).

While food safety culture is a shared responsibility, leadership is considered the most important and influential cultural factor (Yiannas, 2009). The behavioural standards of leaders are fundamental in corporate climate and culture (Mihelič et al. 2010), and better food safety leadership is needed to reduce the global burden of foodborne disease (Yiannas, 2009).

1.5 Thesis aim, objectives and structure

Overall, ethical leadership enhances the performance and outcomes of employees, for the organisation as a whole and in relation to safety (Chughtai, 2015; Enwereuzor et al., 2020; Shafique et al., 2020). It may be inferred, given the dearth of literature on the topic, that ethical leadership could enhance food safety performance and outcomes. However, following an extensive search, to the best of the author’s knowledge, there is little or no published research regarding food safety culture and ethical leadership in New Zealand food businesses, nor on the nature of the relationship between food safety culture and ethical leadership generally.

The focus of this doctoral research is to fill this gap by investigating the nature of the relationship between food safety culture and ethical leadership using a mixed methods approach to respond to the following three research questions:

1. What is the nature of the relationship between food safety culture and ethical leadership in New Zealand’s largest food company?

This question will be responded to by:

- quantitative research into the relationship between food safety culture and ethical leadership in the ingredients business of New Zealand’s largest food company (Chapter Four)

This will be supplemented by:

- qualitative research regarding the status of food safety culture and ethical leadership in food companies in Aotearoa New Zealand according to senior food safety and quality personnel (Chapter Five)

and underpinned by a review of extant literature about ethical leadership and food safety culture severally and the interface between the two (Chapter Two)

A secondary purpose for this research was to provide Fonterra with data to assess the efficacy of its food safety culture framework and to affirm or otherwise the degree to which its leaders align with its standards of ethical conduct.

2. What are the unique characteristics of ethical leadership in food companies in Aotearoa New Zealand?

This question will be responded to by:

- qualitative research regarding the unique characteristics of ethical leadership according to personnel in key roles in food companies in Aotearoa New Zealand (Chapter Five)

and underpinned by a review of extant literature about ethical leadership and food safety culture severally and the interface between the two (Chapter Two)

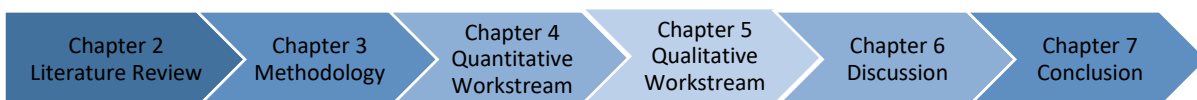
3. What is the nature of the relationship between food safety culture and ethical leadership from an international perspective?

This question will be responded to by:

- exploring the body of literature about ethical leadership and food safety culture severally and the interface between the two (Chapter Two)

The remainder of this thesis is structured according to Figure 1 :

Figure 1: Thesis Structure



1.6 Contribution of the Research

To the author’s knowledge, this research is the first to explore the nature of the relationship between food safety culture and ethical leadership, either nationally or internationally. It will make a theoretical contribution to the understanding of this relationship. Further, there is limited research examining either the status of food safety culture or ethical leadership in Aotearoa New Zealand food businesses. Extant literature about food safety culture is focused on Europe and North America food businesses therefore this study will contribute to an Aotearoa New Zealand-specific understanding about food safety culture and ethical leadership. In addition, this study will also contribute to the limited body of scholarship regarding the unique characteristics of ethical leadership in Aotearoa New Zealand.

The question of how to positively influence food safety culture in Aotearoa New Zealand food businesses has consistently arisen through personal conversations between the author and NZFSSRC food industry members. This study has practical implications for the food industry; establishing a relationship between food

safety culture and ethical leadership provides justification for a focus on professional and organisational ethics development that may lead to the production of safer food for all consumers.

The following chapter, Chapter Two, constitutes a review of the literature that provided the basis for this thesis, focusing on food safety culture and ethical leadership in turn, before exploring the synthesis of these concepts within the recent body of literature regarding food integrity. The focus of Chapter Three is the philosophical position and methodology used in this study which is situated within a pragmatic research paradigm and mixed methods research design. Ethical considerations are discussed in Chapter Three. Chapter Four details the findings of the quantitative strand of this doctoral research, and Chapter Five, the findings of the qualitative strand. Chapter Six is a discussion of the findings from the quantitative research strand (Chapter Four) and the qualitative research strand (Chapter Five), in order to respond to the research questions which have driven this doctoral research. Finally, Chapter Seven summarises the key findings arising from my research. The theoretical contribution, implications for the food industry, and limitations of my research are outlined, and a series of recommendations for future research that resulted from this doctoral study are proposed.

Chapter 2: Literature Review

This chapter provides an overview of the scholarship pertaining to food safety culture and ethical leadership. A Scopus search of literature using the boolean search terms “food safety culture” and “ethical leadership” returned zero results. Forty-four combinations of words were used in total in an attempt to source peer-reviewed literature with limited success, suggesting that there is a dearth of literature that synthesises the relationship between these two concepts; a gap that this doctoral research seeks to fill. The field of food integrity has evolved in recent years and since 2021, models of food integrity climate and culture have emerged building on models of food safety climate and culture. The timing of the emerging scholarship about food integrity climate and culture coincided with the data gathering phase of this doctoral research. Therefore, the body of scholarship upon which this doctoral research was predicated evolved in real time from a focus on food safety culture and ethical leadership to food supply chain integrity. Hence, an introduction to the concept of food integrity will conclude the review while its relevance will be addressed more fully in Chapter Six with the discussion of the results of this research.

The first part of this literature review is focused on food safety culture: its emergence, definition, the climate versus culture debate, the influence of leadership, differing perceptions of food safety culture and climate, food safety culture in Aotearoa New Zealand, and the measurement of food safety culture. This section culminates in a brief review of Frank Yiannas’s Behaviour-Based Food Safety Management System; the basis for the food safety culture-related questions in both the qualitative and quantitative research strands of this doctoral study. Research questions one and three above are underpinned by the review of food safety culture scholarship.

The second part of this literature review focuses on ethical leadership: the ethics of food safety; business ethics and the relationship between character, values and virtue; the characteristics of ethical leadership; Aotearoa New Zealand Māori perspectives on ethical leadership; measurement of ethical leadership; and ethical leadership and workplace safety. Research question two is underpinned by the review of ethical leadership scholarship.

The literature review concludes with a focus on the emerging scholarship relating to food integrity: definition; origins and evolution; terminology; and food integrity performance.

The terminology of senior leader, leader and manager, and of follower and employee is used interchangeably throughout Chapter Two, and the specific terminology used is reflective of the underpinning literature.

2.1 Food Safety Culture

2.1.1 What is Food Safety Culture?

Several authors have proposed definitions of food safety culture, with those of De Boeck et al. (2015), Griffith et al. (2010b), and Yiannas (2009) prominent in the literature. Food safety culture is the thinking and behaviour of company employees that is learned over time by being a part of that company, and is one component of a company’s broader culture (Yiannis, 2009). Implicit in this definition are both individuals and the collective. Food safety responsibility within an organisation is multi-dimensional; both independent and

interdependent, and organisational food safety is greater than the sum of its parts; it is how food safety is done in an organisation or group (Yiannis, 2009). Doing food safety involves company-wide system integration and includes management commitment, communication, and an understanding of responsibilities; it also involves understanding of an organisation as a unified system that can impact on food safety (Griffith et al., 2010).

A widely accepted definition of food safety culture is that of Griffith et al. (2010b, p.435), "*the aggregation of the prevailing, relatively constant, learned, shared attitudes, values and beliefs contributing to the hygiene behaviours used within a particular food handling environment*". Food safety culture has also been defined in terms of the interaction between the food safety climate, i.e. the worker perception or the human route, and a company's food safety management system that results in a microbiological output, i.e. the techno-managerial route (De Boeck et al., 2015. p.243). In 2020, a refreshed definition of food safety culture was proffered by Sharman et al. (p.16) following an analysis of commonly used words or statements in definitions of food safety culture and climate: "*food safety culture is a long-term construct existing at the organisational level relating to the deeply rooted beliefs, behaviours and assumptions that are learned and shared by all employees, which impact the food safety performance of the organisation*".

Influencing and changing human behaviour is key to reducing the global burden of foodborne disease (Yiannas, 2009, p.xi) which in turn is predicated on understanding organisational culture (Ball, et al., 2010; De Boeck et al., 2015; De Boeck et al., 2017; De Boeck et al., 2018; Fatimah et al., 2014; Griffith et al., 2010a; Griffith et al., 2010b; Jespersen & Bedard, 2015; Jespersen et al., 2016; Jespersen et al., 2017; Ko & Kang, 2019; Manning, 2017; Manning, 2018; Nyarugwe et al., 2016; Nyarugwe et al., 2018; Taylor & Rostron, 2018; Yiannas, 2009). This finding has led to the development of psychological and behavioural frameworks and approaches to evaluate and improve organisational food safety (De Boeck et al., 2015; De Boeck et al., 2017; Jespersen et al., 2016; Nyarugwe et al., 2018; Taylor, 2011).

The link between foodborne illness and food safety culture was first recognised around 2005, building on the empirical foundations established by research into safety culture (Griffith, 2014) which in turn is built on the theoretical underpinnings of organisational culture – the way things are done in an organisation (Deal & Kennedy, 1983).

Organisational culture is made up of shared values, common assumptions, beliefs and behaviours that influence the way people see each other with the most stable, dominant behaviours passed onto new employees (Deal & Kennedy, 1983; Powell et al., 2011; Yiannas, 2009). Culture is thus understood as something that is between people rather than within individuals, and is shared (Alvesson, 2002). These intangible patterns of behaviour relate to organisational engagement internally as well as externally, and are the vehicle through which business identity is manifested and communicated to stakeholders (Griffith et al., 2010b).

Organisational culture provides the context for individuals to judge the appropriateness of their behaviour (Health & Safety Executive 2019). The relationship between human behaviour and organisational performance was highlighted by the 2007-2008 global financial crisis, following which a range of reports

identified that in organisations, culture was fundamental to understanding and influencing human behaviour (The Association of Chartered Certified Accountants, 2014). Organisational culture is reflective of the organisation's personality and as such can be characterised by positive or negative traits (Kane & Taylor, 2018). The field of organisational culture initiated the concepts, definitions and measures for safety culture (Cox & Flin, 1998); hence a brief discussion of this follows, in order to demonstrate the evolutionary nature of the fields of organisational, safety and food safety culture and the parallel debates between each.

2.1.2 The Nascence of Safety Culture

The 1986 report of the International Atomic Energy Agency (IAEA) on the root causes of the Chernobyl disaster, the worst commercial nuclear power generation accident in history (Wiegmann et al., 2002), is widely recognised as the first time the phrase 'safety culture' entered the lexicon (Antonsen, 2009; Cooper, 2000; Cox & Flin, 1998). Chernobyl was the catalyst that led to debate about acceptable levels of risk, the need to increase the reliability of high-risk systems (Turner et al., 1989), and recognition that technical and human factors embedded within a culture are the root cause of system failures (Weigmann et al., 2002).

Despite numerous attempts, there is no standard working definition of safety culture. A pertinent concept is that safety culture is something an organisation has (Cooper, 2000), so it is a conceptual label rather than a tangible concept. Multiple safety cultures may co-exist in an organisation which can result in a lack of co-ordination or competition between teams, a critical factor in a time of crisis. Subcultures can arise due to divergent perceptions of management and employees, geographically dispersed teams, or differing work protocols (Griffith et al., 2010b) and are normal (Cooper, 2000; Griffith et al., 2010b). Safety culture cannot be treated as something simple that can be added onto an organisation, or as something that can be easily taught and implemented, rather it is an essential component of risk management (Turner et al., 1989). As recently as 2018, there remained a lack of consensus and agreement about the definition of safety culture, what should be measured and what constitutes the difference between safety culture and safety climate – terminology that has been debated over time which is termed 'culture's confusion' (Goncalves et al., 2018, p.193).

Section 2.2.8 below discusses the evolution of food safety culture and climate to food integrity culture and climate which is based on the food safety culture definition from De Boeck et al (2015) and the food safety climate definition of De Boeck et al (2018). Despite the apparent lack of consensus regarding the definition of either safety or food safety culture, Yiannas' (2009) definition that acknowledges the relationship between the broader organisational culture and food safety culture is applicable to this research. As discussed above, according to Yiannas (2009) food safety culture is the thinking and behaviour of company employees that is learned over time by being part of that company, and is one component of a company's broader culture.

2.1.3 Safety Culture vs Safety Climate

Safety culture and safety climate are two terms that have frequently been used interchangeably in the literature (Clarke, 2000; Griffith et al., 2010b; Harvey et al., 2002; Wiegmann et al., 2004). There is considerable disagreement on the differences and/or similarities between definitions of safety culture and safety climate (Wiegmann et al., 2004). Both terms have evolved in parallel, however have their origins in different theoretical roots of organisational science. Safety climate is a 'snapshot' of safety culture,

determined by the attitudes and perceptions of employees at a given point in time (Cox & Flin, 1998; Goncalves et al., 2018; Griffith et al., 2010b) The safety climate of an organisation is affected by the organisational climate (Ko & Kang, 2019). Culture can be thought of as an organisation's personality with traits that may be stable over time, and climate as an organisation's mood that may be more transient, visible, and easier to change (Antonsen, 2009). Due to the potential differences between what an organisation claims to do (culture) versus what it actually does (climate), research into organisational climate cannot draw inferences regarding organisational culture (Antonsen, 2009). Safety climate measures have been used as a surrogate for safety culture according to Cooper (2000). These same debates are evident in the field of food safety culture and are discussed below.

2.1.4 The Emergence of Food Safety Culture

Beginning around 2005, several well-cited outbreaks of foodborne illness focused attention on the concept of food safety culture including an outbreak of Enterohemorrhagic *E. coli* (EHEC) in South Wales in 2005; infant formula melamine poisoning in China in 2007; a listeriosis outbreak in a Maple Leaf Foods packaging plant in Canada in 2008; and an outbreak of Enterohemorrhagic *E. coli* (EHEC) in Germany in 2011 (Jespersen et al., 2017; Nayak & Taylor, 2018). Organisational food safety culture was identified as an emerging risk factor alongside those factors that contribute to the risk of foodborne disease such as food preparation, storage, food handling, contamination, and cross contamination (Griffith et al, 2010). Food safety scares that do not result in illness also highlight the importance of food safety culture; an Aotearoa New Zealand-specific example being the recall by Fonterra of 1,000 tonnes of consumer product across seven countries after suspected disease-causing bacteria (*Clostridium botulinum*) were found during safety tests (BBC, 2013).

Food safety culture is an overarching concept within which are multiple, heterogenous organisational subcultures (Griffith et al., 2010b; Manning, 2017) but which remains poorly understood (Jespersen et al., 2017; Nayak & Taylor, 2018). As noted in the context of safety culture, subcultures may be thought of as internal or external collective identities which may or may not be distinguishable, that construct barriers to non-members (Manning, 2017).

There may be several collective identities within a business that have values specific to its members in addition to the dominant core values of the business (Manning, 2017). An incompatibility between subcultural values can result in conflict; for example, tensions between departmental or hierarchical sub-groups, or between goals and objectives, or profitability versus food safety priorities, therefore recognising how these subcultures interact is necessary to minimise the risk of a food safety incident (Manning, 2017).

2.1.5 Positive and negative food safety cultures

Every organisation has a food safety culture, created consciously or unconsciously by management, on a continuum from positive to negative and strong to weak (Griffith et al., 2010b; Nayak & Taylor, 2018; Yiannas, 2009). A shared sense of purpose among employees in maintaining food safety standards leads to a positive food safety culture (Nayak & Taylor, 2018). A negative food safety culture may be actively or passively acquired and is reflected in other business processes. Further, an organisation with this prevailing attitude will perform less well overall (Griffith, 2014). Food Standards Australia New Zealand (FSANZ) identify the elements of a strong food safety culture as: Strong leadership commitment to prioritising food safety;

Managers committed to food safety; Everyone in the business plays a part in keeping food safe; Everyone in the business is accountable for food safety; Everyone knows the risks and does the right thing every time; and Everyone looks for ways to continually improve (2019). Creation of a strong food safety culture is a choice which involves intentional commitment and must take precedence over other cultures such as cost-saving (Yiannas, 2009). A focus on customer and employee safety alike, or a response to a significant incident, for example an outbreak of foodborne illness, can provide the impetus for such a choice (Yiannas, 2009).

2.1.6 Food safety culture versus food safety climate

It appears that no agreed definition for either food safety culture or food safety climate exists (De Boeck et al., 2017; Sharman et al., 2020), however it is apparent that food safety is the behaviour that reflects an organisation's food safety culture and climate (Ko & Kang, 2019; Powell et al., 2011). Food safety culture versus food safety climate debates mirror those of safety culture and safety climate. Food safety climate is temporal and subject to individual perception of the elements of food safety, whereas food safety culture is the underpinning framework that persists through time (De Boeck et al., 2015; De Boeck et al., 2018). Drawing on organisational and safety culture, Griffith et al (2010a) identified six indicators of food safety culture, namely management systems, styles and processes; leadership; communication; commitment; environment; and risk awareness, perception and risk-taking behaviour (p.441). After analysing several studies that consider components or aspects of safety and food safety culture, De Boeck et al (2015) identified five recurring components as elements of food safety climate: leadership; communication; commitment; resources; and risk awareness (p.244). Fatimah et al. (2014) conversely consider that employee perceptions of the elements of food safety constitute food safety culture.

There is much overlap between definitions of food safety culture and food safety climate, however an analysis of the evolution, definitions and descriptors of culture and climate undertaken by Sharman et al. (2020), showed that there are three areas of difference between climate and culture: time; sociology; and psychology (p.16). These authors suggest that climate is temporary (time), individual (sociology), and is about attitudes and perceptions (psychology); whereas culture is long-term (time), relates to a group or organisation (sociology), and is about beliefs, behaviours, and assumptions (psychology) (p.16). Their resultant definition of food safety culture is articulated in Section 2.1 above. This can be contrasted with their suggested definition of food safety climate being "*a temporary construct existing at the individual level, relating to the perception and attitudes of individuals and how they influence others in an organisation to adhere to the food safety management systems and practically apply these in their working environment*" (pp.16-17).

Trends in food safety culture research reflect those of safety culture research in investigating the relationship between culture, human behaviour, and safety outcomes (De Boeck et al., 2015). The inability of food safety management systems to guarantee food safety, given the continuing incidence of foodborne illness, led to an assertion that food safety culture contributes to food safety performance (Fatimah et al., 2014; Griffith et al., 2010b; Nyarugwe et al., 2016; Yiannas, 2009). The effect of culture on food safety and quality is an important, topical issue (Kane & Taylor, 2018), and better food safety management and more food safety leadership are needed to reduce the global burden of foodborne disease (Yiannas, 2009). While food safety

culture is a shared responsibility, the most important and influential cultural factor is leadership. The importance leadership places on food safety is evidenced by the strength of organisational food safety (Yiannas, 2009).

2.1.7 Food Safety Culture and Leadership

Food safety culture is conditional upon the character, knowledge, trustworthiness, and communication and leadership ability of the person in charge (Griffith et al., 2010b; Griffith, 2013; Yiannas, 2009). Senior management commitment is the standout feature in organisational food safety leadership (Manning, 2017). Managers are role models for employees; key in developing and maintaining culture is not what managers say, but what they do (Kane & Taylor, 2018) with important business goals communicated both overtly and subliminally by management to staff (Griffith, 2013). Management commitment is identified as one of the organisational factors that influences food safety practices at both the individual employee and organisational level (Fatimah et al., 2014; Griffith et al., 2010a; Powell et al., 2011; Yiannas, 2009). Productivity, competitiveness, and responsiveness are improved in those organisations with better leaders (De Boeck et al., 2015; Griffith et al., 2010a). Food safety culture influences employees' food handling practices, therefore, a poor food safety culture constitutes a risk for foodborne illness outbreaks (Fatimah et al., 2014; Griffith et al., 2010b; Powell et al., 2011; Yiannas, 2009). Increasing tangible and visible leader and management support is suggested to improve employees' safe food handling practices in the workplace (Fatimah et al., 2014).

Food safety leadership is defined as *“the perception of the extent to which the organisation’s leader/s are able to engage staff in hygiene/safety performance and compliance to meet the organisation’s goals/vision/standards concerning hygiene and food safety”* (Griffith et al., 2010a, p.444). Leadership style significantly impacts organisational culture and in turn, organisational climate positively impacts employee compliance with food and hygiene behaviours (Ko & Kang, 2019). In the food safety context, leaders have a role in motivating employees, and in setting and communicating objectives and expectations. They need to be open to employee feedback, create an environment of continuous improvement and address any food safety-related issues constructively and respectfully (De Boeck et al., 2015). Leaders exemplify organisational commitment; motivating and rewarding staff through techniques such as praise and recognition, resulting in workers who are more likely to work in a hygienic way (Griffith et al., 2010a).

2.1.8 Influencing Safer Outcomes for Food Safety

Several scholars have made the assertion that food safety equals behaviour, and a positive food safety culture influences safe food behaviours and outcomes (De Boeck et al., 2015; Fatimah et al., 2014; Griffith et al., 2010a; Jespersen et al., 2018; Nyarugwe et al. 2016; Yiannas, 2009). Consistent with Yiannas' behaviour-based approach (2009), Fatimah et al. (2014) suggest five intervention strategies that lead to safer food handling practices by employees: an increase in visible leadership and management support; consistent, organisation-wide application and enforcement of food safety policies and procedures; encouraging a team approach across multiple departments and multi-generation workforces; creating a system of accountability including rewards and punishment; and effective communication of risk.

They further suggest that management “walking the talk” is an important contextual cue of an organisation’s safety culture and, as such, influences the safety performance of an organisation. Thus ideally, positive communication (to foodservice employees) should be by role models who have developed relationships with the receiver, using words that are understandable (Fatimah et al., 2014). Knowledge exchange outside of training programmes is more easily facilitated between staff who have positive relationships and who work co-operatively with adoption of positive behavioural attitudes more likely when the safety attitude of senior management and employees align (Griffith et al., 2010a).

2.1.9 Staff & Supervisor Perceptions of Food Safety Culture & Climate

Research shows that safety and food safety culture and climate scores vary between workers and management and are therefore contingent on organisational roles, leading to differing perspectives about food safety within and across organisations (Alrobaish et al., 2021; Alrobaish et al., 2022; Alrobaish et al., 2023; De Boeck et al., 2015; Harvey et al., 2002; Taylor & Budworth, 2018). The findings from these studies are summarised in Table 2.

Table 2: Safety & Food Safety Climate & Culture Perceptions of Managers and Staff According to Extant Literature

Authors	Focus	Findings
Harvey et al (2002)	Safety culture	<ul style="list-style-type: none"> • Safety culture varies between workers and management; may differ across different departments or plants • Management have positive views of themselves • Staff have more negative views about management communication, commitment to safety, being listened to and taking personal responsibility for safety • Safety cultures may be fundamentally different; not different versions of the same safety culture, leading to multiple organisational safety cultures
De Boeck, Jacxsens, Bollaerts & Vlerick (2015)	Food Safety Climate	<ul style="list-style-type: none"> • Differing perceptions between staff and managers • Managers more positive about provision of financial resources, education and training to support food safety, and constructive and respectful addressing of food safety issues • Staff more positive about leaders setting clear expectations, motivating staff, food safety messaging, recognition and reward systems and the active involvement of employees in food safety related matters
Taylor & Butterworth (2018)	Culture Excellence Assessment Programme	<ul style="list-style-type: none"> • Food safety scores are contingent on role; differing perceptions about food safety within and across an organisation • Managers more positive about company culture, strategy (purpose), reward and empowerment (people) dimensions of the culture excellence framework than workers • Workers more positive about more practical dimensions such as setting short term goals and training frequency and lower scores in most areas of food safety
Alrobaish et al (2021)	Food Integrity Climate	<ul style="list-style-type: none"> • Differences in perception between managers and operators, perhaps due to differing roles and tasks • Perceptions of organisational food integrity may be shared “across hierarchical levels • Managers rated people and product integrity higher than operators; overall ranked product integrity as best performing element and process integrity as worst performing element • Operators ranked data and process integrity higher than managers; overall ranked process integrity as the best performing element and people integrity as the worst • Leadership, Communication, Commitment, Risk Awareness rated higher by managers than operators but no meaningful statistical difference found between managers’ and operators’ ratings

Authors	Focus	Findings
		<ul style="list-style-type: none"> • A strong food integrity climate positively impacts worker motivation which leads to better food integrity behaviour
Alrobaish, Jacxsens, Spagnoli & Vlerick (2022)	Food integrity climate	<ul style="list-style-type: none"> • Triangulation study using data from Alrobaish et al (2021) above • High food integrity climate is associated with high food integrity performance and low food fraud vulnerability • People integrity registered the lowest score overall in this study for both managers and operators, primarily related to “rewarding the employees’ ethical behaviour and conduct”
Alrobaish, Vlerick & Jacxsens (2023)	Food integrity culture	<ul style="list-style-type: none"> • Differing perceptions of managers and operators • Managers more positive than operators about food integrity climate • Employees viewed people integrity as the lowest dimension overall • Positive relationship between food integrity climate and performance

The reasons for differing perceptions of safety, food safety and food integrity climate and culture between supervisors or managers and workers may also include the nature of the relationships, demographic characteristics, certification status, and company size. The different relationships supervisors, termed agents of climate, have with individual employees can impact on the way employees perceive and understand the work group climate (Kessler, 2019).

According to Kessler (2019) more frequent, formal engagement between supervisors and employees with whom there are formal and less trust-based relationships (out-group members) could lead to out-group members reporting a higher safety climate than employees with whom there are close and informal relationships (in-group members) who may have conversations with supervisors that are less focused on expectations. An alternative view is that supervisors’ behaviour is tailored to individual employees, recognising their differences and developing them based on their needs, thus this individual attention could mean increased frequency of communication, and therefore the employee reporting higher climate perception (Kessler, 2019).

There are conflicting results in the literature concerning the influence of demographic characteristics. Fatimah et al. (2014) found that demographic characteristics including age, gender, work status, and years of experience influenced perception of food safety culture by non-supervisory food service employees. Ellis et al. (2010) found that demographic characteristics such as age, gender, seniority, training level and contract type influence the safe food handling practices of employees. Conversely Alrobaish et al. (2023) proposed that demographic characteristics other than job function do not appear to impact on food integrity climate and culture.

Product-type (animal versus plant-based), certification status, and company size appear to be related to food integrity culture, whether positive or negative (Alrobaish et al., 2023). The lowest food integrity culture was found in the only purely animal-based food business in their study which is at a greater risk of contamination than plant-based food products. The largest company in their study had the highest food integrity culture, perhaps because food safety information in larger companies tends to be more efficient and structured than that in smaller companies where people in charge have competing priorities; and companies that have certification for multiple food standards are positively associated with a higher food integrity climate (Alrobaish et al., 2022; Alrobaish et al., 2023).

Leaders as role modellers, listening to and motivating employees, encouraging open and honest communication, rewarding positive behaviour, respecting employees and customers' rights, investing in working conditions and training are motivating factors for employees (Alrobaish et al., 2022; Alrobaish et al., 2023; Ellis et al., 2010). The extent to which employees are supported and encouraged to discuss safety issues with management is an indicator of a positive safety culture while conversely, a culture of blame undermines a positive safety culture and discourages such speaking out, therefore increasing the risk of unfavourable outcomes (Griffith et al., 2010a). Better food safety behaviour is associated with a better food safety climate (De Boeck et al., 2017).

Characteristics of, or risk factors associated with a poor food safety culture include ineffective communication, poor management commitment, and inadequate facilities. Assessing food safety culture can identify likely problem areas to mitigate this risk (Griffith et al., 2010; Powell et al., 2011) and provide a measure of and identify ways to improve food safety performance (Nyarugwe et al., 2016).

It is recognised that what gets measured gets managed, however the measurement of organisational or food safety culture is a challenge (Kane & Taylor, 2018) as highlighted in the next section.

2.1.10 Measurement of Food Safety Culture

Quantifying and benchmarking food safety culture is identified as a means to: raise awareness of food safety; promote commitment to food safety; benchmark or compare sites or units; identify weaknesses and evaluate risk; determine training needs or remedial actions; and assess potential compliance with safety management systems to avoid errors and unnecessary costs (Griffith et al., 2010a). However there is no consensus about a valid and reliable approach to measuring food safety culture against performance, although it is suggested that any assessment of food safety culture should incorporate attitudes of management, supervisory staff, and food handlers as distinct groups (Griffith et al., 2010b). Several models have been developed since 2009 for measuring food safety culture. Fourteen commonly cited tools are outlined in Appendix 1 and span continents, countries and sectors, and represent small and larger-scale studies. Several groupings of identified constructs emerge from an examination of the summary: Leadership/management/commitment; Infrastructure/environment/resources; Communication; Organisational climate and culture/vision, mission, values and strategy; Personal understanding/risk awareness and Perception/adaptability/food safety knowledge and motivation.

In order to coalesce food safety culture research, an evaluation of eight food safety culture evaluation systems was conducted by Jespersen et al. (2017). Building on the work of Griffith et al. (2010a) and Yiannas (2009), this evaluation resulted in a recommendation of a food safety culture framework comprised of five dimensions: values and mission; people systems; adaptability; consistency and risk awareness. The Global Food Safety Initiative subsequently adopted this framework (2018). Despite this progress, an overall consensus on measures remains elusive. It is evident that there is no 'one size fits all' model for evaluation of food safety culture and that this remains an area for further research.

2.1.11 Food Safety Culture in Aotearoa New Zealand

Aotearoa New Zealand’s Food Safety Assurance and Advisory Council (FSAAC), through MPI, commissioned research in 2017 from Colmar Brunton to establish a food safety culture baseline in the Aotearoa New Zealand food industry. Using both quantitative and qualitative methods, six dimensions of food safety culture (Leadership; Management commitment (walking the talk); Accountability; Sharing practice and knowledge; Following best practice and understanding; and Confidence that the organisation values food safety) provided the framework to respond to three research questions: How do food businesses approach food safety?; Is food safety culture different in different sectors/segments of the food industry?; and Is there a link/correlation between food safety culture and compliance (MPI., 2017, p.16). Key findings from this research by dimension are outlined in Table 3.

Table 3: Aotearoa New Zealand’s Food Safety Assurance and Advisory Council-Commissioned Colmar Brunton Food Safety Culture Research Key Findings by Food Safety Culture Dimension

Food Safety Culture Dimension	Research Findings
Leadership	The key drivers for food safety commitment were: customer safety; brand reputation; and staying in business and continuing to employ people. Larger businesses tended to have more formalised approaches to food safety than smaller businesses. Decision-makers and staff responses differed when asked whether food safety is emphasised when a business comes under production pressures with staff less positive.
Management commitment (walking the talk)	While businesses were largely positive about management commitment to food safety, frontline staff were less likely than decision-makers to agree that managers walk the talk; managers follow the rules when no one is looking; managers are held to account; and managers give clear feedback (p.6).
Accountability	While it was agreed that food safety performance was a core part of employee performance, over half of decision-makers and staff indicated that apportioning blame was the first response to a food safety problem; reward schemes were rare; and staff were less inclined to agree than decision-makers that allocation of food safety roles and responsibilities were clear.
Sharing practice and knowledge	While generally positive about communication, staff were less positive than decision-makers with c20% of staff not agreeing that food safety information was communicated to them regularly. Internal training was more common than external training with 70% of businesses having sent staff on food safety training in the two years prior, however there was a perception that training was relevant for frontline staff only, rather than, for instance, directors.
Following best practice and understanding	Over one third of businesses involved in this research admitted that they had staff who did not follow rules and procedures; while 16%, largely medium to large-size businesses, admitted to having had a serious food safety incident in the previous two years. These incidents provided the impetus for increased focus on best practice including investment in training. Noted was the temporary change to staff behaviour during verification or audit visits.
Confidence that the organisation values food safety	96% of businesses were confident about a strong commitment to food safety, however large businesses were less likely to be very confident. Supervisors were less likely than staff to be very confident, with trust in staff the main influence on the level of confidence. The greatest influence on overall confidence was agreement that staff will follow food safety rules even if no one is watching (p.10).

Overall, the research found that business demographics influenced approaches to food safety; primarily large versus small businesses. A sizeable gap between the perceptions of decision-makers and staff toward questions regarding line managers was found. In relation to food safety culture, the size of the business and whether it operated across more than one site was responsible for variation in survey responses. The research did not find a clear correlation between food safety culture and compliance.

To conclude this section of the literature review, the work of Yiannas (2009), upon which both the qualitative and quantitative strands of this doctoral research are predicated in part, will be outlined (section 2.1.12).

2.1.12 Frank Yiannas' Behaviour-Based Food Safety Management System

"We won't make dramatic improvements in reducing the global burden of food borne disease ... until we get much better at influencing and changing human behaviour" (Yiannas, 2009, p.11).

In 2009, Yiannas developed an interdependent behaviour-based food safety management system continuous improvement model (2009) that: uses systems thinking to focus on creating a food safety culture; recognises the complexity of behaviour change; is focused on people rather than process; and incorporates elements of food, behavioural and organisational climate thinking (Yiannas, 2009, pp.79-80). Each element of this model will be briefly discussed next.

Expectations: Food safety training and inspections are insufficient to achieve food safety conformance and performance. Food safety performance expectations should exceed the minimum requirement to comply with regulatory standards. Setting and documenting clear, achievable and high quality food safety performance expectations is key to achieving the right actions, outcomes and results, as is ensuring employees have a positive food safety attitude (Yiannas, 2009).

Education & Training: Food safety education, according to Yiannas (2009) is about 'why' food safety is important whereas food safety training is about 'how' food safety is performed. Both are carried out to influence behaviour which is more effective if employees understand the level of risk and the potential consequences, and the use of personal stories to reinforce food safety messages (Yiannas, 2009). Food safety training and education needs to be risk-based, user-friendly and consider the diversity of the workforce (Yiannas, 2009).

Communication: Communication can influence behaviour (Yiannas, 2009). It is important to communicate about food safety using a variety of ways, using tools such as posters, symbols, signs and pictures, and through having conversations with people – involving listening and talking, and asking questions (Yiannas, 2009). Yiannas stresses that shaping culture is in part predicated on reducing barriers and increasing connectivity, both outcomes of personal communication (2009).

Developing Food Safety Goals & Measurements: Performance gains can be made through the establishment and correct use of goals, which should be paired with consequences (Yiannas, 2009). Yiannas advocates food safety goals that are achievable, specific, risk-based, measurable and clearly documented (2009). In order to maximise the use of food safety measurements, it is suggested that they be used to catch people doing things right, not just doing things wrong; to trend and compare; and to innovate (Yiannas, 2009). In addition to the physical condition of the establishment and the food, processes, knowledge and behaviour should all be measured, with consideration of lag indicators (for example surveillance of foodborne disease) and lead indicators (for example measures of critical control points and results of internal audits) (Yiannas, 2009).

Using Consequences to Change Behaviours: Consequences can help to shape or reinforce positive food safety behaviours by affecting the probability of a behaviour recurring (Yiannas, 2009). A needs assessment to understand why desirable behaviours are not occurring is the place to start according to Yiannas, with three potential performance problems highlighted; lack of skill; an ineffective system; and lack of motivation

(2009). Naturally occurring or management-created positive and negative consequences enhance food safety and should be immediate and certain with the frequency of positive consequences outweighing the use of negative consequences (Yiannas, 2009).

2.2 Ethical Leadership

Ethical Leadership is the focus of the second part of this literature review. A discussion of the ethics of food safety sets the scene for this section. The relevance of character, values and virtues to ethical behaviour and leadership segues into a discussion of what ethical leadership is and why it matters; how ethical leadership may be measured; and how ethical leadership influences followers and workplace safety and, by implication, food safety. All three research questions articulated in Section 1.5 are informed by this review of scholarship about ethical leadership. Section 2.2.4 provides context for the second research question: What are the unique characteristics of ethical leadership in food companies in Aotearoa New Zealand?

2.2.1 The Ethics of Food Safety

Ethical dilemmas concerning safe food abound, often at the intersection of science, politics and consumer attitudes and include issues such as: the increased focus on novel food development; public attitudes toward processing technologies or approaches to food; consumer trends in food such as genetically modified organisms or dietary preferences; and the global food system and the inherent difficulties in risk assessment as foodborne pathogens are dispersed around the world. Consumer approaches to food do not necessarily adapt to changing food and food pathogens (Olsen & Bánáti, 2014).

There is no stronger demonstration of a food company's ethics than when an incident occurs. The 2007 Melamine poisoning scandal in China is an example of a catastrophic foodborne outbreak which was not a one-off incident, but rather a "large-scale intentional activity to deceive consumers for simple, basic, short-term profits" (Voice of America, 2009). "Illegal business practices and lax supervision were the main causes of the scandal" which resulted in the death of six babies with a further 290,000 becoming ill (Custance & Dongni, 2013, p.54) Some twenty-two brands were implicated including Sanlu Group, which had formed a joint venture in 2005 with Fonterra which had 43% equity interest (Dobson, 2008; Ingelfinger, 2008); and three Chinese national brands that had been exempt from governmental quality monitoring and inspection; Mengniu, Yili and Brightdairy (Custance & Dongni, 2013). Fonterra became aware of the problem on 02 August 2008. With Fonterra's encouragement, Sanlu withdrew 10,000 tonnes of contaminated products from the market, however refused to disclose publicly that product was tainted until 11 September 2008 following pressure from firstly the Aotearoa New Zealand government, and secondly the Chinese government (Custance & Dongni, 2013). Adding melamine to infant formula was both unethical and illegal, however covering up the scandal for fear of negatively impacting the impending Beijing Olympic Games was highly unethical (Olsen & Bánáti, 2014). Thus, the extent to which a food company and its management voluntarily acknowledges a food safety breach, acts transparently, investigates the root cause of the incident, and takes action against those responsible for the breach will directly impact the company's image and bottom-line, both short and long-term.

2.2.2 Business Ethics and the Relationship Between Character, Values and Virtue

Companies in the food industry must determine standards of compliance and vigilance; ethical standards that may be equated to personal integrity – who a person is, rather than what a person does (Olsen & Bánáti, 2014).

The business world is the people who work in business, therefore, an organisation's integrity is reflective of individual integrity and vice versa (Hartman, 1998; Moore, 2005; Moore & Beadle, 2006; Peterson & Park, 2006; Solomon, 1992). A person of virtuous character is an ethical person, exhibiting the principles of honesty, fairness, reliability, trustworthiness, and commitment to others (Chun, 2005) who acts from an inclination to do the right thing (Hartman, 1998). The optimal situation for an organisation is to have employees for whom doing the right thing comes naturally; acting morally because they are virtuous. Therefore an understanding of how structure, systems, people, and culture can be deployed to accommodate ethical behaviour and make unethical behaviour disadvantageous will aid managers in creating or maintaining an ethical organisation (Hartman, 1998). Business ethics is about individual decision-making and consequences in response to perceived or actual organisational conflicts and what counts is the development of character (Solomon, 1992). Managers play a critical role in shaping the collective character of the organisation by providing a moral framework for organisational members (Neubert et al., 2009).

Organisations may be thought of as having a character like an individual and may therefore be "virtuous or vicious" (Moore & Beadle, 2006, p.374). Character is the bundle of attributes that constitute the nature of a person or object and refers to moral qualities, ethical standards, and principles (Wright & Goodstein, 2007). Character is comprised, in part, of virtues (Peterson & Park, 2006) and is the opposite of personality; character is who we are on the inside, whereas personality is what we show to the world (Gavin et al., 2003). Character is developed by doing (Park & Petersen, 2009), and it matters because it determines conduct (Wright & Goodstein, 2007). The study of character and character-based leadership may be a useful lens through which to investigate the role of ethics in leadership (Wright & Quick (2011). In the organisational sciences, interest in character, however, has been overtaken by an interest in values (Wright & Huang, 2008).

Values are best thought of as principles or standards of behaviour and are more likely to be situationally based; not typically tied to a moral code; help identify goals and behaviour; concerned primarily with self-interest; emerge over time; are affected by family, work, society and national cultures, and also affect workplace behaviour and attitudes (Manz et al., 2010). While values help to shape organisational culture and identity, representing pervasive beliefs and attitudes, there is no predominant organisational value set (Manz et al., 2010). Values must be communicated from the top of the organisation and constitute the glue that can hold things together (Treviño et al., 2000). The terms 'values' and 'virtues' are sometimes confused (Manz et al., 2010). Values are principles or standards of behaviour (Manz et al., 2010; Mihelič et al., 2010) whereas virtues are universal qualities (Manz et al., 2010; Park & Peterson, 2009).

Virtues are ideals that define character (Solomon, 1992). They are enduring character traits (Moore & Beadle, 2006), a link to a meaningful life purpose (Manz et al., 2010), and have always signified individual

excellence (Moberg, 1999). Highly valued social and moral virtues or core characteristics are wisdom, courage, justice, temperance (the cardinal virtues), humanity, and transcendence (Park & Peterson, 2009). Virtue equals ethical character (Chun 2005), the common dimensions of which are integrity (honesty and trust); empathy (sympathy, concern and warmth); courage; conscientiousness (dependability, hardworking) and zeal (humour, fun and excitement) (Chun, 2005), with integrity unifying of all the virtues (Solomon, 1992).

A virtuous organisation is created from the efforts of each member of that organisation, leading to shared and distinguishing organisational characteristics that align with its ethical values (Chun, 2005), however it is managers who are primarily responsible for its creation (Moore, 2005). There is a positive link between perceived organisational virtuousness and perceived organisational performance (Cameron et al., 2004). A climate characterised by virtue is perceived to be ethical (Neubert et al., 2009), and it is through this climate that members learn what behaviour is appropriate or acceptable (Moore, 2005; Neubert et al., 2009). While the corporation may be the sum-total of the management and worker personalities (Solomon, 1992), there are numerous ways in which corporations can behave badly despite their people acting virtuously, for example exploitation of limited resources and ignorance (Schudt, 2000). It is not enough to have good workers; the goal of the workers must also be good; therefore, it is necessary to have both virtuous people and virtuous organisations (Schudt, 2000).

The apparent decline in character and the ethics of leaders provided the impetus for the development of spiritual, servant and authentic leadership theories, incorporating a moral dimension of leadership (Wright & Quick, 2011). The work of Brown et al. (2005) attempted to provide the moral guidance for these theories and resulted in the construct of ethical leadership. A defining feature of ethical leadership is good character which leads to the long-term well-being of the organisation and greater social good (Wright & Quick, 2011). The construct of ethical leadership is detailed further in the next section.

2.2.3 What is Ethical Leadership?

Leadership, while well observed, is not well understood (Griffith, 2013) and definitions abound. Despite numerous studies and publications, the concept of leadership is still maturing, however what matters is the behavioural modelling by those in positions of leadership (Imboden, 2014). For the purposes of this review, leadership is defined as “*the process of influencing others to understand and agree about what needs to be done and how to do it, and the process of facilitating individual and collective efforts to accomplish shared objectives*” (Yukl, 2006, p.8).

Leadership is an evolving and dynamic field; the face of leadership is changing in an increasingly complex and ambiguous world and emphasis needs to be placed on non-traditional leadership dimensions such as character, underpinning values, personal world views, and attitudes and ethics in order to respond to these challenges (University of Cambridge Institute for Sustainability leadership, 2017). The Global Leadership and Organisational Behaviour Effectiveness (GLOBE) Project, founded in 1993, has researched the organisational norms, values and beliefs of leaders in over 60 countries (The Globe Project, 2020) finding that charismatic/value-based leadership is favoured by most cultures (University of Cambridge Institute for Sustainability Leadership, 2017).

Business ethics is defined as “behaviour that is consistent with the principles, norms and standards of business practice that have been agreed upon by society” (Treviño & Nelson, 2010, p.19). Ethical behaviour is that which is “morally accepted as good and right as opposed to bad or wrong in a given situation” (Mihelič et al., 2010, p.32). Business ethics positively impacts risk and reputation management, financial performance, customers, cost structure, innovation capacity and human resources (Stouten et al., 2012); and ethics is the top predictor of trust in leaders (Craig & Gustafson, 1998).

Despite the need for contemporary organisations to have leaders who behave ethically, thus encouraging workers to follow their example, ethical wrongdoing occurs on a regular basis (Stouten et al., 2012). Haidt (2008) suggests a connection between increasing individualism and wealth within today’s complex society which may lead to diminishing social cohesion which in turn may cause variations in ethical behaviour. Media and public interest in corporate ethics scandals such as Enron (2001), Arthur Andersen (2002), the News of the World (2005 – 2007) and Lehman Brothers (2008), and in manmade crises such as negative environmental impacts and climate change (Eisenbeib & Giessner, 2012), reflects the importance society places on ethical governance and leadership and ethical behaviour in business (Mayer et al., 2008). Ethical leadership has long been studied by philosophers and theologians, however studies of ethical leadership in organisations is a recent phenomenon (Mayer et al., 2008). Ethical leadership as a concept is also known as responsible leadership (Voegtlin et al., 2012), moralised leadership (Fehr et al., 2015), managerial ethical leadership (Enderle, 1987) and managerial integrity (Kaptein, 2003).

Most social-scientific empirical-descriptive research related to ethical leadership is based on the work of Brown et al. and goes onto develop multidimensional approaches and introduce sub-dimensions (Eisenbeiss, 2012). The most highly cited and widely accepted definition of ethical leadership is that of Brown et al. (2005, p.120): “*the demonstration of normatively appropriate conduct through personal actions and interpersonal relationships, and the promotion of such conduct to followers through two-way communication, reinforcement and decision-making*”. According to Brown et al. (2005), whose definition is premised on social learning theory, the thinking is that anything that can be learned directly can also be learned vicariously by observing the behaviours and consequences of attractive and credible models. Leaders model ethical behaviour which attracts employee attention, who consequently perceive leaders as being attractive, credible, legitimate and proactive role models (Brown et al., 2005).

Three moral facets of leader ethics are the ethics of leaders themselves; the ethics of how a leader leads; and the ethics of what a leader does (Cuilla, 2007). Ethical leadership improves organisational effectiveness through improved senior management effectiveness, financial performance (Jespersen et al., 2018), worker performance, job satisfaction and organisational citizenship behaviour (Eisenbeib & Giessner, 2012; Ko et al., 2017); and by reducing harmful or unethical behaviour (Bouckenooghe et al., 2015). Leaders can be equally effective and unethical or ethical and ineffective (Brown, 2007). Ethical leadership also provides ethical guidance to employees (Brown et al., 2005, Brown & Treviño, 2006), and is a key factor in reputational management and in the competitive environment (Mihelič et al., 2010). Employee satisfaction with, and assessment of their leader, their motivation to go the extra mile and raise concerns with management are all positively related to ethical leadership (Brown et al., 2005).

Contextual factors that impact ethical leadership include follower characteristics, leader characteristics, leader-follower relationships (Yukl et al., 2013), organisational characteristics such as ethical mandates, the ethics of stakeholder networks, and environmental complexity (Eisenbeib & Giessner, 2012; Ko et al., 2017).

Employee attitudes and behaviours are influenced by the internal ethicality of an organisation: the reward or discipline system to support ethical behaviour; consistency between what is said and what is done (policy versus practice) and leadership's commitment to ethical behaviour (Blackman, 2018; Brown & Treviño, 2006; Treviño et al., 2008). Employees exhibit more ethical behaviours in organisations that have ethical leaders (Bazerman, 2020; Qi et al., 2014). Ethical leadership leads to commitment, and motivation of followers who exceed expectations when they are treated fairly and feel trusted (Brown & Treviño, 2006); and to a reduction in absenteeism and staff churn (Shakeel et al., 2020); benefits beyond compliance. That said, research on the preferred leadership practices from an employee perspective (followership) is sparse (Collinson & Collinson, 2009).

It is senior leadership's responsibility to ensure that ethical decisions are made and to develop a climate where ethical conduct of followers is fostered (Ko et al., 2017; Mihelič et al., 2010). It is the view of Mihelič et al. (2010) that integrity cannot be delegated – it is the chief executive who is the organisation's ethics officer and who determines the moral health of the organisation. However, ethical influence does have a trickling down effect through an organisation's hierarchy (Eisenbeib & Giessner, 2012; Mayer et al., 2008) and may also move horizontally through peer groups within a hierarchical level (Eisenbeib & Giessner, 2012). Leaders at all levels should, therefore, model high standards of ethical leadership. The values and interests of organisational leaders determine how and what decisions are made and the role of ethics within those decisions (Stouten et al., 2012). With its singular focus on the ethical aspect of leadership and on role modelling as a teaching and learning tool, ethical leadership differs from transformational, transactional, spiritual and authentic leadership, although some characteristics may be shared (Ko et al., 2017; Mayer et al., 2008; Yukl et al., 2013).

While ethical leadership provides a pathway to sustainable success (Qi et al., 2014), unethical leadership is neither stable nor sustainable (Brown, 2007). However, not much is known about the factors that develop and maintain ethical leadership in an organisation (Eisenbeib & Giessner, 2012). Brown and Treviño (2006) suggest that ethical leadership can be grown within an organisation and identify selection, role modelling, training, and organisational culture and socialisation as four mechanisms to do so. Blackman (2018) identifies a series of steps ethical leaders can take to establish an ethical culture which broadly align with Yiannas' 2009 behaviour-based food safety management system of: creating performance expectations; educating and training to influence behaviour; communicating effectively; developing goals and measurements; and using consequences to increase or decrease behaviours.

Research shows that there is a lack of understanding from management about the reasons for unethical behaviour of workers (Carroll, 1975), and senior managers are likely to hold 'rosier' perceptions of organisational ethics than lower-level organisation members (Treviño et al., 2008). Thus, an individual's view may be determined by where they sit in the organisational hierarchy (Pratt & Rafaeli, 1997). Further,

individual perceptions of an organisation's identity may also be influenced by a range of factors that leads to senior leaders identifying more strongly with their organisation and, therefore, identifying their organisation's ethics more positively than workers in lower hierarchical levels (Treviño et al., 2008).

2.2.4 Ethical Leadership Characteristics

Implicit in the definition of ethical leadership of Brown et al (2005) are two essential pillars; the moral person (*"the demonstration of normatively appropriate conduct through personal actions and interpersonal relationships"*); and the moral manager (*"the promotion of such conduct to followers through two-way communication, reinforcement and decision-making"*) (Brown et al, 2005; Treviño & Brown, 2004; Treviño et al., 2000). The first part of the definition, "normatively appropriate conduct" refers to leaders modelling conduct that includes characteristics and behaviours such as honesty, trustworthiness, fairness and care, while the second part of the definition, "promotion of such conduct to followers through two-way communication" refers to talking about ethical behaviour and giving followers a voice, that is, including them in the decision-making process (Brown et al., 2005). Reinforcement refers to setting ethical standards and the use of rewards and discipline, while decision-making refers to making principles-based choices after consideration of the ethical consequences of those decisions (Brown et al., 2005). The moral person component, the substance of ethical leadership that helps to determine an ethical leader's reputation (Treviño et al., 2000), focuses on the individual traits and qualities of ethical leaders; who they are, what they do and what they decide, ensuring others know this about them (Lasthuizen, 2018; Treviño et al., 2000) whereas the moral manager focuses on stimulating ethical behaviour among followers (Heres, 2014), and relates to the practices of ethical leaders, or the how question: role-modelling, communicating and using reward systems to hold followers accountable to standards and values (Lasthuizen, 2018; Treviño et al., 2000). Employees watch effective moral managers for signs about what matters, therefore the environment of those could be likened to a fishbowl (Treviño & et al., 2000, p.134). Intent is not visible whereas actions are. Followers or employees make inferences based on those actions (Treviño et al., 2000). The system of rewards and discipline used at all levels of an organisation provides cues about appropriate conduct and is a means to ensure standards and rules are followed (Treviño et al., 2000).

In summary, ethical behaviours include: honesty, integrity and trustworthiness; ethical behaviour in personal and professional lives; citizenship; care; setting ethical standards; considering the ethical consequences of decision-making and making principled and fair choices; ethics-related communication and reinforcement; and proactively influencing followers' ethical and unethical behaviour through rewards and discipline (Brown et al., 2005; Brown & Treviño, 2006; Eisenbeib & Giessner, 2012; Mayer et al., 2008; Resick et al., 2006; Stouten et al., 2012). The relationships of ethical leaders with their followers are respectful, supportive, and based on trust. Principles and values drive decision-making, including the use of the 'golden rule' or the 'New York Times Test' (Treviño & Brown, 2004), a simple rule to guide ethical conduct that says an individual should not behave in such a way that they would mind having that behaviour reported on the front page of a major newspaper.

There has been little criticism of Brown et al.'s definition of ethical leadership according to Kaptein (2019) but the criticisms that have been made are on the bases of the definition being descriptive and western-based; incomplete; not multidimensional; and containing items that some researchers believe are not characteristics

of ethics. Further, their definition was specific to their research as opposed to being intended as a general definition.

Kaptein (2019) argues that an ethical leader is also a moral entrepreneur who is innovative in ethics; who creates new ethical norms, standards, principles or values; who leads ethics or morality, rather than conforming to existing societal or cultural norms that Kaptein suggests is implied by Brown et al.'s (2005) definition, that is, "the demonstration of normatively appropriate conduct". Leadership in ethics is a proactive and future-focused activity that can result in establishment of norms that are not yet generally accepted in society (Kaptein, 2019). The definition of ethical leadership is therefore re-stated by Kaptein (2019), as "*the demonstration of normatively appropriate and new conduct through personal actions and interpersonal relationships, and the promotion of such conduct to followers through two-way communication, reinforcement and decision-making*" (p.1146).

Shakeel et al. (2020) present a broader definition of ethical leadership, classifying ethical conceptualisations into two schools of thought: classical and contemporary. The two-dimensional approach of Brown et al. (2005), constitutes the classical approach according to these authors, focusing on the moral person and moral manager as discussed above while the contemporary approach takes a broader view, emphasising care for society and the environment and evolving the role of the leader from a manager using rewards and punishment to that of a mentor who puts people first and thus inspires followers. While acknowledging the importance of the classical approach as the basis for a large body of research, Shakeel et al. (2020) highlight seven points for consideration. The classical approach focuses on negative reinforcement; does not focus on external stakeholders (e.g. customers or society); lacks consideration of the importance of empowering employees; is unclear regarding the term 'normatively appropriate'; does not address role clarification, meaning transparency in setting follower goals and expectations; does not consider sustainability concerns; and does not address the need for leader learning which includes the knowledge required to both lead effectively and adapt to a dynamic environment. In incorporating insights from the virtuous, authentic and positive, spiritual, transformational and professionally grounded leadership styles and the moral manager, a broader ethical leadership definition is proposed:

"Ethical leadership is the implicit and explicit pursuit of desired ethical behaviour for self and followers through efforts governed by rules and principles that advocate learning motivation, health optimism and clarity of purpose to uphold the values of empowerment, service to others, concern for human rights, change for betterment and fulfilling duty towards society, future generations, environment and its sustainability" (Shakeel et al., 2020, p.10).

In summary, Table 4 contrasts ethical leadership characteristics according to well cited papers published between 1992 – 2020. Some common features can be seen throughout all these definitions; for example, integrity, honesty, doing the right thing, fairness and behavioural modelling.

Table 4: Ethical Leadership Characteristics 1992 - 2020)

Characteristics of Leaders with High Integrity (Zauderer, 1992)	Ethical Leadership Pillars (Treviño et al, 2000)	Diamond of Managerial Integrity (Kaptein, 2003)	Characteristics of Ethical Role Models (Weaver, Treviño & Agle, 2005)	(Resick, Hanges, Dickson & Mitchelson, 2006)	Characteristics of Ethical Leaders (Mihelic, Lipičnik & Tekavčić, 2010)	Ethical Leader Behaviour Dimensions (Kalshoven, Den Hartog & De Hoog, 2010)	Characteristics of Ethical Leaders (Yukl, Mahsud, Hassan & Prussia, 2013)	Characteristics of Ethical Leaders (Witzel, 2018)	QueLEvaluation Mitropoulou, Tsaousis, Xanthopoulou & Petrides (2020)	Development of a Broader Conceptualisation & Measurement Scale of Ethical Leadership Shakeel, Kruyen & van Thiel (2020)
<p>Possess humility Maintain concern for the greater good Be truthful Fulfil commitments Strive for fairness Take responsibility Have respect for the individual Celebrate the good fortune of others Develop others Reproach unjust acts Be forgiving Extend self for others</p>	<p>Moral Person Traits Honesty Integrity Trustworthiness</p> <p>Behaviours Do the right thing Concern for people Being open Personal morality</p> <p>Decision-Making Hold to values Objective/Fair Concern for society Follow ethical decision rules</p> <p>Moral Manager Role modelling through visible action Communicating about ethics & values Rewards & Discipline</p>	<p>The Manager as a person of integrity Authenticity: clear limits, ideals & values Reliability: walks the talk, is consistent, constant & coherent Constructiveness: Does things right; does the right thing; creates value economically, ecologically, socially</p> <p>The Manager as a manager of integrity Gentle hand: entrusts confidence, inspires employee commitment, and provides support through coaching Protective hand: makes realistic demands/sets realistic targets, sets rules, and sets up safeguards Strong hand: detects irregularities, addresses them and takes action in response</p>	<p>Interpersonal behaviours Care, concern & compassion Supports others Hardworking, helpful Positive Accepts others' failures Fairness with others Resources distributed equitably Open to input Equal respect Offers explanations of decisions Ethical action & expectations for self Honesty Trustworthiness Integrity Humility Holds self to high ethical standards Consistently ethical publicly and privately Is responsible for own ethical failings Articulating ethical standards Consistent ethical vision Communicates high ethical standards Holds others ethically accountable Puts ethics above personal/company interests Long term, multiple stakeholder perspective</p>	<p>Character and integrity Ethical awareness, Community/people orientation Motivating, encouraging and empowering, Managing ethical accountability</p>	<p>Is humble Is concerned for the greater good Is honest and straightforward Fulfils commitments Strives for fairness Takes responsibility Shows respect for each individual Encourages and helps others Serves others Shows courage to stand up for what is right</p>	<p>Fairness Principled & fair choices Treating people in a way that is right and equal No favouritism</p> <p>Power Sharing Include followers in decision-making Listen to followers</p> <p>Role Clarification Clarify responsibilities, expectations and performance goals</p> <p>People Orientation Care about, respect and support followers</p> <p>Integrity Consistency between words and actions Keep promises</p> <p>Ethical Guidance Communicate about ethics Explain ethical rules Promote and reward ethical conduct</p> <p>Concern for Sustainability Care about the environment and stimulate recycling</p>	<p>Honesty and integrity (including consistency between values and actions) Behaviour to communicate/enforce ethical standards Fairness Use of rewards Behaviour that shows kindness, compassion and concern for others</p>	<p>Honesty Trustworthiness, Authenticity and transparency Virtue, Moral courage and wisdom Empathy understanding, Self-reflective capacity Self-responsibility, kindness and compassion Leading by example Encouraging and supporting others Consistency and considered decision-making Humility, and generosity</p>	<p>27 Dimensions: Honesty, Sincerity & Integrity Reward of ethical behaviour Altruism Clarification of ethical role Ethical role modelling Humility Application of green policies Ethical self-control Ethical vision Ethical responsibility Ethical vigilance Ethical possibility Development of ethical vision Power distribution Ethical culture Ethical encouragement Ethical training Ethical determination Collaboration Ethical evaluation Ethical influence of stakeholders trust Ethical insight Ethical guidance</p>	<p>Classical Conceptualisation: Moral Person Moral Manager</p> <p>Ethical Components of Other Leadership Styles: Grounded leadership Responsibility Transformational leadership Authentic & Positive Leadership Virtuous Leadership Social Responsibility Leadership</p> <p>Contemporary Values: Empowerment Role Clarification Leader Learning Sustainability</p>

The meaning of ethical leadership differs according to individual ethical moral points of view, or cultural perspectives (Bell et al., 2017). Given this doctoral research is situated in Aotearoa New Zealand it is important to understand the perspectives of Aotearoa New Zealand's indigenous peoples pertaining to ethical leadership. These perspectives are introduced in section 2.2.5.

2.2.5 Aotearoa New Zealand Māori Perspectives on Ethical Leadership

The people of Aotearoa New Zealand have been shaped by a number of factors: environmental aspects such as the climate, accessibility of bush and beaches; the South Pacific location; and the different cultures brought to the country by waves of settlers beginning with this country's indigenous Māori who journeyed across the Pacific to Aotearoa approximately 800 years ago (Te Ara, 2024). While modern day Aotearoa New Zealand is home to many different peoples and cultures, according to the 2023 Census of Population and Dwellings, people of European ethnicity make up the majority of the population at 67.8 percent; with 17.8 percent identifying as being of Māori descent which is based on whakapapa or genealogy; the lineage from ancestors to the present day (Statistics New Zealand, 2024; Te Ara, 2024). In policy terms, only these two cultures are recognised by the state, with the partnership between Māori and the Crown established by Te Tiriti o Waitangi (the Treaty of Waitangi) signed in 1840 (Te Ara, 2024).

“A relational, belonging worldview with the purpose of serving as a steward of resources is at the heart of Māori culture” (Spiller et al., 2011). Ethical and social crises such as poverty, inequity, environmental degradation, climate change, and sustainability have led to organisations operating in a complex, fragmented and uncertain world where expectations concerning a focus on sustainable practices, equity and values-driven business have increased (Spiller et al., 2011). Spiller et al. (2011) suggest that the distinctive relational approach to business taken by the Māori economy (diversified assets including primary production, geothermal, digital, services, education, tourism and housing owned by entities who self-identify as Māori with an estimated valuation of over \$50 billion (Ministry of Foreign Affairs & Trade (MFAT), 2024)) provides an intrinsically right and good “relationship wisdom position” (p.224) from which innovative businesses can gain insights into creating relational well-being and health through a stewardship or kaitiakitanga approach.

Consciously created wellbeing is the goal of wisdom according to the Māori worldview; more specifically, “how wisdom serves others”, with ‘others’ acknowledging the interconnectedness of the self, others and the environment; a reciprocity of respect between people and ecosystems, or a “woven universe” (Spiller et al., 2011, p.227). Wellbeing across the spiritual, cultural, social, environmental, and economic dimensions is created by a Māori values-based approach according to Spiller et al. (2011); also termed the Five Well-beings approach (Spiller et al., 2010).

“Care and compassion for others are at the heart of the Māori values system, which calls for humans to be kaitiaki, stewards of the mauri, the life-force, in each other and in nature. These values include manaaki, to show respect or kindness; aroha, to show care, empathy and charity; hau to respect, promote and maintain vitality; kaitiakitanga, which includes guardianship, preservation, conservation, fostering, protecting and wise use of resources; and hāpai meaning to uplift others. Stewardship practice creates value for stakeholders and builds relational wellbeing and wealth” (Spiller et al., 2011, p.226).

Through practising values within an ethic of kaitiakitanga (stewardship), organisations manifest wisdom (Spiller et al., 2011). In addition to the values mentioned above, Spiller et al. (2011, p.226) suggest kotahitanga (create alliance, unity, connectedness); mātauranga (knowledge, understanding and skill); mohio (realise, recognise); pono (honesty, truthfulness); tawhito (expert, authority); tika (just, right, correct, appropriate behaviour) and whanaungatanga (relationships) – most of which have touchpoints with western literature relating to ethical leadership. In fact, Spiller et al. (2011) highlight that an advantage of a position on wisdom through kaitiakitanga “offers a meeting place for wisdom in organisations drawing together an Indigenous perspective with Western” (p.232).

Central to the concept of sustainable development is the interconnectedness of human and environmental systems with the notion of corporate social responsibility being fundamental to Māori organisations that follow a stewardship approach, as opposed to an add-on (Spiller et al., 2011). Businesses that do good or make a difference can do well or make money, an assertion that is backed by a body of literature (Spiller et al., 2011).

While the characteristics of servant leadership are distinct from those of ethical leadership, there is some overlap. Ruwui & Elkin (2016), conceptualising and aligning the characteristics of servant and Indigenous Māori Leadership, focus on the characteristics of integrity, empathy, foresight, stewardship and community. Each of these characteristics also appears in western literature about ethical leadership. Underpinning the Māori worldview are the values of Manaakitanga (relationships with people), Whanaungatanga (relationships among people), Kaitiakitanga (relationship with the natural environment) and Wairuatanga (relationship with the gods) (Ruwui & Elkin, 2016). Ruwui & Elkin (2016) demonstrate the convergence or ‘touch points’ of these two sets of values to demonstrate leadership more holistically and positively in an “international and increasingly multi-cultural context” (p.317) (Table 5). According to Ruwui & Elkin (2016), “a key feature of both servant and Indigenous leadership is that they are never morally neutral nor socially disconnected, providing insight into leadership based on universal human values of respect, integrity and care for others”. (p.318) - attributes of ethical leadership.

Table 5: Māori & Servant Leader Values (Source: Ruwui & Elkin, 2016)

Servant Leader Values	Māori Leader Values			
	Manaakitanga	Whanaungatanga	Wairuatanga	Kaitiakitanga
Integrity	Valuing and empowering people Ethical behaviour	Genuine acknowledgement of others and relationships	Authentic and honest	Being open and accountable
Empathy	Listening, valuing difference in others	Accepting and being aware of others and their connections	Recognising the holistic nature of the human being	Sensitivity to others' concerns
Foresight	Possessing appropriate knowledge and supporting others	Learning from the past, understanding present realities and potential for the future	Viewing situations holistically	Future focus, visionary goals
Stewardship	Nurturing people's growth and development in the long term	Serving others' needs before self	Nurturing the spiritual growth of others	Seek to influence, not dictate Commitment to hold something in trust
Community	Shared leadership, interacting openly	Building relationships, maintaining connections between individuals and community	Conscious and genuine action for the holistic health of the community	Strong personal relationships, working collaboratively

Focusing specifically on ethical leadership, Haar et al. (2018) suggest that it may be enhanced through insights gained from a study of values of Māori leaders in Aotearoa New Zealand. They examined indigenous culture values across three studies, finding five values that are common to indigenous leaders in Aotearoa New Zealand and identifying the ‘touchpoints’ with western ethical leadership concepts; whakaiti (humility), ko tau rourou and manaakitanga (altruism), tāri ate wā and kaitiakitanga (long-term orientation), whanaungatanga (collectivism), and tikanga Māori (cultural authenticity) (p.621); manaakitanga, kaitiakitanga and whanaungatanga having been identified by Ruwhui & Elkin (2016) as fundamental Māori values converging with the values of servant leadership. The term ‘touchpoints’ rather than ‘translation’ is employed by Haar et al. building on the work of Spiller et al. (2011). “The translation of Māori values into western concepts is akin to defining the undefinable” (Haar et al., 2008). Haar et al. conclude that these five values constitute antecedents of ethical leadership, finding that they positively influence perceptions of ethical leadership and enhance the quality of relationships between leaders and employees leading to positive wellbeing and outcomes for employees. The key components of each of these values is outlined in Table 6.

Table 6: Values of Māori Leaders in Aotearoa New Zealand. Source: Haar et al., 2018

Value/Touchpoint	Components/Meaning
Whakaiti/Humility	Humbleness Self-discipline Consideration of the influence on others
Ko tau rourou and Manaakitanga/Altruism	Manaakitanga: care and concern for others; doing the right thing by others Ko tau rourou: generosity of spirit; giving for long-term benefit
Tāri ate wā and Kaitiakitanga/Long term orientation	Tāri ate wā: the long journey or long time Kaitiakitanga: sustainable, long-term guardianship and protection
Whanaungatanga/Collectivism	Relationships with past, current and future generations
Tikanga Māori/Cultural authenticity	Knowing and being true to one’s tikanga; the Māori way of doing things

Having defined ethical leadership and reviewed its essential characteristics from a western and an indigenous perspective, the ways in which ethical leadership may be measured and the relationship between ethical leadership style and workplace safety are reviewed in the next section.

2.2.6 Measurement of Ethical Leadership

The Perceived Leader Integrity Scale (Craig & Gustafson, 1998); the Ethical Leadership Scale (ELS) (Brown et al., 2005); and the Ethical Leadership Work Questionnaire (De Hoog & Den Hartog, 2008) are the three most commonly referenced survey instruments to measure ethical leadership. In a critique of five instruments including the three mentioned here, Yukl et al. (2013) conclude that there is much confusion about both the scope of the construct of ethical leadership and of appropriate ways to measure it. They suggest an alternative assessment tool, the Ethical Leadership Questionnaire, that focuses solely on ethical leadership behaviours. As discussed in section 2.2.3, the effectiveness of ethical leadership in influencing follower or employee behaviour has been well researched. The next section outlines the practical implications of ethical leadership for workplace safety and, by implication, food safety.

2.2.7 Ethical Leadership and Workplace Safety

There is a perception that organisations that place importance on safety are more ethical than those that do not (Armenakis et al., 2010). Positive leader behaviours can play a key role in enhancing workplace safety, however research underpinning this assertion has focused primarily on the role of transformational leadership with limited investigation into the impact of other types of leadership on safety outcomes in the workplace (Chughtai, 2015; Enwereuzor et al., 2020; Khan et al., 2018; Piccolo et al., 2010; Shafique et al., 2020). While a positive association has been established between safety performance and leadership (Yang & Wei, 2017), there is little agreement on the most effective leadership style (Ta et al., 2022). Ta et al. (2022) found that generally all nine leadership styles included in their literature review positively influenced safety performance, however concluded that a transformational and transactional leadership style appeared to be the most important in establishing safety performance. The positive relationship between ethical leadership and safety climate was noted by these authors whose research findings were ultimately inconclusive, largely due to their perception of the blurred boundaries between leadership constructs. Leadership styles may, in fact, be contingent on organisational objectives and context (Nasim et al., 2022).

Specific behavioural characteristics of ethical leadership, namely inclusive decision-making, caring about workers' health and well-being, and engendering trust between leaders and followers are relevant to improving employee safety performance, as is modelling the highest standards of workplace safety and fairly monitoring, evaluating and rewarding best practice (Brown and Treviño, 2006; Chughtai, 2015; Enwereuzor et al., 2020; Piccolo et al., 2010; Shafique et al., 2020). Emphasis on shared values and acting with integrity positively influence employee behaviour and perceptions of the workplace, increasing a sense of pride and organisational commitment as does the way in which organisational resources are managed, for example assignment of tasks, rewards and opportunities for promotion, and by clarifying roles and determining the ways in which employees interact (Piccolo et al., 2010). The impact of ethical leadership on worker behaviours is also due, in part, to the nature of the relationship between supervisors and workers (Bouckenooghe et al., 2015; Piccolo et al., 2010), with the role of the worker as important as that of the leader according to Bouckenooghe et al. (2015), who found that worker motivation, psychological capital (hope, resilience, self-efficacy and optimism) and performance may be positively influenced by ethical leadership behaviours and modelling.

Piccolo et al. (2010), in examining the relationship between ethical leadership, task significance, job autonomy, and effort and performance, found that ethical leadership has a positive impact on worker motivation and performance. They identified that the use of strategies such as a values-based approach, giving employees a voice, and rewarding ethical behaviour enhances task significance, that is, understanding the importance, value and impact of their work; and results in greater effort and citizenship behaviours from workers. The importance of working for organisations that individuals perceive as ethical, and to make a meaningful contribution to the lives of others appears to be an attribute of the modern workplace (Piccolo et al., 2010). Other studies have also found a positive relationship between ethical leadership and performance through leader-member exchange (the quality of exchange between supervisors and workers), self-efficacy (individual perception of ability to carry out a task) and organisational identification (a sense of belonging to an institution or group) (Walumbwa et al., 2010; Yang & Wei, 2017).

Trust in leaders is the key driver of the relationship between ethical leadership and safety compliance or workplace safety according to Enwereuzor et al. (2020). When workers feel trusted and valued through being involved in decision-making and working autonomously, they are motivated to comply with and promote safety regulations in the workplace, thereby leading to increased safety participation (discretionary behaviours such as citizenship behaviours, e.g. helping others) and safety compliance (formal and defined within a job description such as following procedures and working safely) (Chughtai, 2015). Further, self-efficacious individuals show initiative and go the extra mile by learning new skills to work more safely, also leading to increased safety participation and safety compliance. Therefore, organisations that hire and develop ethical leaders are more likely to be safer (Chughtai, 2015). Shafique et al. (2020) found that even though ethical behaviours lead to higher safety participation, safety compliance and safety attitudes, in a safety critical context ethical leadership may not enhance task performance due to an ethical leader focus on worker safety rather than task performance.

Strategies that organisations may use to improve workplace safety include recruiting and developing ethical leaders through appropriate selection processes and ethics training programmes that focus on the importance of supervisor role-modelling, recognition and reward programmes for employees and communication about the importance of ethics (Chughtai, 2015; Khan et al., 2018). From a worker perspective, self-efficacy can be improved by empowering employees, again using appropriate training and through mentoring and modelling behaviours. Providing more responsibility, freedom and decision-making opportunities to employees can likewise improve job autonomy (Chughtai, 2015). Similarly, fair decision-making, and transparent communication can positively influence trust in leaders, leading to greater safety compliance (Enwereuzor et al., 2020).

The research discussed above established an indirect relationship between ethical leadership and safety compliance and performance (Chughtai, 2015; Enwereuzor et al., 2020; Piccolo et al., 2010; Shafique et al., 2020; Walumba et al., 2010; Yang & Wei, 2017). Two studies found a direct or positive relationship between ethical leadership and safety compliance and performance (Freiwald, 2013; Khan et al, 2018). Freiwald's findings suggested a positive relationship between an ethical workplace climate and safety culture and between worker perceptions of ethical leadership and safety outcomes (2013). Khan et al. (2018) found that safety culture is a primary driver of safety performance, extrapolating that positive behaviours and safety performance of employees will result from a positive safety culture; and that there is a positive relationship between ethical leadership and employee safety consciousness. The role of a positive safety culture was found to play a greater role than safety consciousness in influencing employee behaviour, with the authors noting that the most important predictor of organisational health and safety performance is safety culture. Thus, it is the moral approach of ethical leaders in supporting learning and development about organisational safety that is important (Khan et al., 2018).

The literature related to ethical leadership discussed in section 2.2 was conducted in a range of sectors including healthcare, aviation and telecommunications rather than the food industry. Given the dearth of literature on ethical leadership and its impact on food safety, it is suggested that 'safety' is an adequate proxy for 'food safety'.

In a time when it could be argued that food has never been safer, the reported incidence of foodborne illness has not diminished (De Boeck et al., 2015; De Boeck et al., 2017; Fatimah et al., 2014; Nyarugwe et al., 2016; Powell et al., 2010; Yiannas, 2009). Therefore, it is critical to understand how to influence behaviours that achieve safer outcomes across the food sector.

In a food safety-specific context, a body of literature has evolved rapidly in the past ten years focusing on food integrity or food supply chain integrity that provides a link between food safety and ethics, with food safety being one of four elements of the food risk matrix (Figure 2). Section 2.2.8 provides a brief outline of the concepts of food integrity and supply chain integrity.

2.2.8 The Definition & Origins of Food Integrity

Integrity equates to honesty or wholeness/unity and is defined as “the quality of being honest and having strong moral principles that you refuse to change” or “the quality of being whole and complete” (Cambridge Dictionary, 2023). In reviewing several definitions of integrity from different domains, Ling & Wahab (2020) found that the consistent characteristic of integrity is that of being whole. When applied to the food supply chain this equates to food being free from intentional or unintentional adulteration (Ling & Wahab, 2020). Honesty is presumed in current approaches to food management which can lead to vulnerability to fraud (Van Ruth et al., 2017). Given the inability of conventional food safety and defense strategies to reduce vulnerability from food fraud (Spink et al., 2017) moving from a food safety approach to a holistic food integrity approach is needed to reduce the incidence of food fraud (Alrobaish et al., 2021).

Definitions of food integrity culture and food integrity climate build on the food safety climate and food safety culture models of De Boeck et al. (2015) and De Boeck et al. (2018) as discussed in section 2.1.1, and are illustrated in Table 7.

Table 7: Definition Evolution: Food Safety Culture & Climate → Food Integrity Culture & Climate

Food Safety Culture	Food Integrity Culture	Food Safety Climate	Food Integrity Climate
The interplay of the food safety climate as perceived by the employees and the managers of a company (so called, “human route”) and the context in which a company is operating, the current implemented Food Safety Management System consisting of control and assurance activities (so called “techno-managerial route) resulting in a certain microbiological output”. (De Boeck et al, 2015)	The result of the interplay of the food integrity climate perceived by the employees of a food company (human dimension), the food integrity performance of operators in terms of product, process, people and data integrity (operational dimension), and the context in which the company is operating with technical and managerial control measures to prevent potential food fraud vulnerabilities (technical and managerial dimension) (Alrobaish, Jacxsens, Spagnoli and Vlerick, 2022)	Employees’ (shared) perception of leadership, communication, commitment, resources and risk awareness concerning food safety and hygiene within their current work organisation. (De Boeck et al, 2018)	The employees’ shared perception of leadership, communication, commitment, risk awareness and resources regarding food integrity within the company’s work environment in terms of product, process, people and data integrity. (Alrobaish, Jacxsens, Luning and Vlerick, 2021)

An economic and consumer confidence crisis in Europe was caused by ‘horsegate’ - the illegal addition of horsemeat to beef products in 2013 which, while adulterated, were not hazardous to human health (Spink et al., 2017).

In addition to the European horsemeat event, the extent and nature of which regulatory authorities had not previously experienced, concern about the increasing potential for food fraud and food crime triggered a United Kingdom (UK) government review into the integrity and assurance of food supply networks (Elliott, 2014).

The review report was the first to identify food crime, that is, organised activity carried out by groups who deliberately set out to deceive or injure consumers of food products, as distinct from food fraud (“random acts by rogues”) as a food supply chain issue (Brooks et al., 2017; Elliot, 2014, p.83).

The report recommended a systems approach to address the issue of food fraud and food crime in food supply networks through establishment of a national crime prevention framework, premised upon a partnership between industry, regulators and government (Brooks et al., 2017; Elliot, 2014). An ambition of the Elliot report was to reassure and protect consumers and bolster (the UK’s) reputation in agri-production, given the failure of traditional food defence and food safety strategies to address vulnerability to food fraud (Spink et al., 2017, p.216). Extending food science and technology research through the disciplines of social science and criminology with business decision-making to address the root cause of food fraud and move to a food protection focus was recommended (Spink et al., 2017, p.219). However, a review of Elliott’s recommendations four years after horsemeat revealed variable progress toward uptake, and despite government and industry awareness of how incidents of food fraud can happen in complex supply chains, food fraud was on the rise (Alrobaish et al., 2022; Alrobaish et al. 2022; Brooks et al., 2017).

Several other initiatives were commenced post-2013 focusing on the issue of food integrity, food authenticity and food fraud including establishment of the European Union Food Fraud Network 2013 (European Commission, 2023); a Codex Alimentarius Commission (CAC) electronic working group in 2017, the output of which was a 2018 paper, ‘Food Integrity and Authenticity’; and the Food Integrity Project – a five year, €12M pan-European interdisciplinary project completed in 2018 that resulted in a network of experts from 54 countries, and a suite of scientific opinions, tools and systems to address food integrity and food fraud (Fera, 2023).

2.2.8.1 What is Food Integrity?

The horsemeat scandal and subsequent Elliot report spawned a field of research that focused on prevention of food fraud and food crime across the food supply chain, otherwise known as food supply chain integrity or food integrity. Several definitions of food integrity, integrating the concepts of safety and ethics, exist in the literature, summarised in Table 8.

Table 8: Definitions of Food Integrity

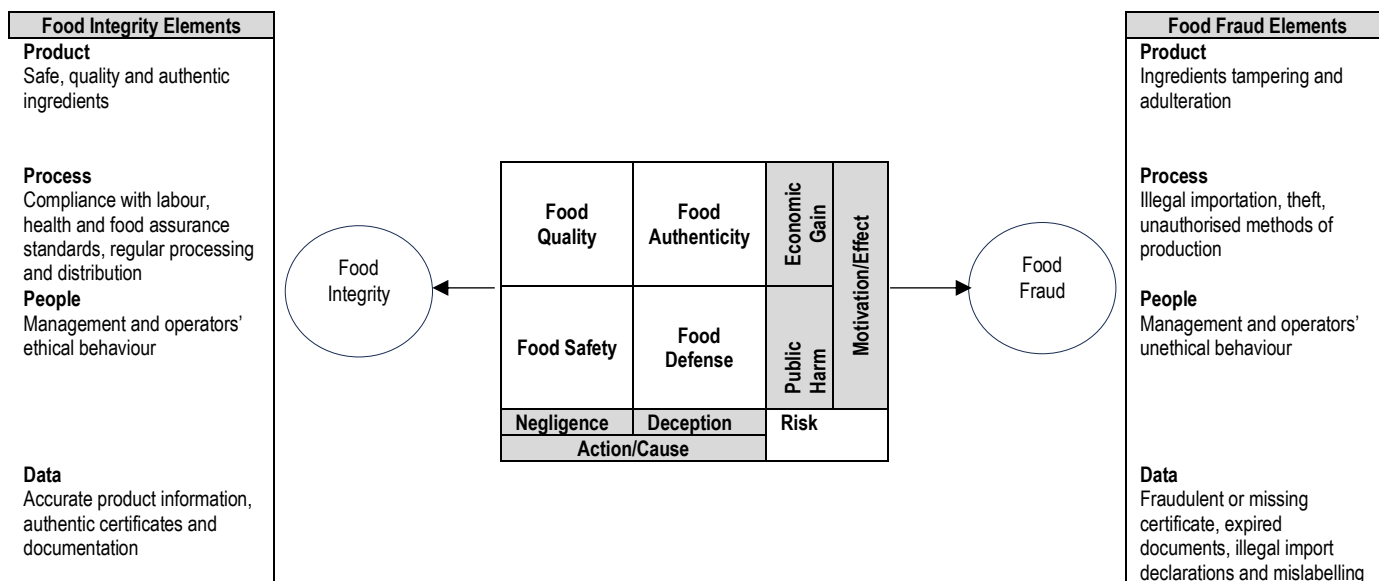
Food Integrity Definition	Author/s
Food integrity is ensuring that food which is offered for sale or sold is not only safe and of the nature, substance and quality expected by the purchaser but also captures other aspects of food production, such as the way it has been sourced, procured and distributed and being honest about those elements to consumers	Elliott, 2014, p.84
Food integrity is the reliability, trustworthiness, transparency, morality and ethical conduct of actors and stakeholders in the food supply chain	Kendall et al, 2018 p.8
Food integrity is “The status of a food product where it is authentic and not altered or modified with respect to expected characteristics including, safety, quality, and nutrition”	Codex Alimentarius Commission, 2018, p.2
Food integrity is a multidimensional concept concerning the integrity of product, process, people and data, implying the controlled status of a food product to be intact, safe, of quality, and authentic in its claims, as well as sourced, processed, and distributed ethically throughout a food supply chain	Alrobaish et al, 2021, p.5

Four elements of food integrity were identified by Manning in 2017 to categorise food fraud:

- Product (“intrinsic integrity of the food item”, p.18; the product is what it claims to be)
- Process (“extrinsic characteristics” of the food production process, p.16; the product is produced in accordance with defined standards)
- People (“honesty and morals” of individuals or groups, p.16; standards drive ethical corporate behaviour) and
- Data (“integrity of information” about the food item, p.16; the intrinsic and extrinsic characteristics of the products can be verified).

Building on the work of Manning’s elements of food integrity (2017) and the food risk matrix of Spink et al. (2017), Alrobaish et al. (2021) articulated the interconnection between food integrity and food fraud (Figure 2). Food safety and food quality impacts are largely unintentional and caused through negligence while food authenticity and food defense breaches are intentional strategies to deceive consumers or to cause harm. Detrimental impacts to public health may be caused by food safety and food defense risks while economic impacts result from food quality and food authenticity incidents. Food integrity and food fraud are inversely related (Alrobaish et al., 2021). Spink notes that food fraud can be the root cause of food safety incidents (2019). Overall, adequate control mechanisms applied to food safety, quality, authenticity and defense may result in food integrity with the lack of such mechanisms potentially increasing the risk of food fraud vulnerability (Alrobaish et al., 2021).

Figure 2: Food Integrity & Food Fraud Interconnection (Source: Alrobaish et al., 2021, p.4)



It is noteworthy that while the concept of food integrity focuses necessarily on the food product, it is human behaviour across the food supply chain that determines a positive or negative outcome for consumers.

2.2.8.2 Food Supply Chain Integrity

Until recently, food supply chains were comprised of small to medium sized businesses, were localised, and short or concentrated, facilitating trust, visibility and quality control (Ali et al., 2017). Food supply chains are now globalised complex systems which are more vulnerable to incidents that impact food integrity (Ali et al., 2017; Ali & Suleiman, 2017; Brooks et al., 2017; Elliott, 2014; Ling & Wahab, 2020; Manning, 2017; Manning & Monaghan, 2019; Wang et al, 2016). These globalised systems amplify the scope and scale of food fraud events (Spink et al., 2017). Food supply chains are more accurately thought of as networks of connected and interdependent actors as opposed to simple, linear systems (Ling & Wahab, 2020). A competitive marketplace, lack of sanctions, lax governance of supply chains, third party manufacturing and demands on food businesses can contribute to opportunities for fraudulent behaviour across food supply chains (Manning, 2017).

Food supply chains differ from product supply chains due to the risk of contamination and negative impacts on quality, particularly in relation to fresh meat and produce (Ling & Wahab, 2020). The increasing scope and scale of food fraud events has led to a changed focus from mitigation to lessen the negative consequences of an event that is assumed to occur frequently, to prevention, that is elimination of the root cause or significant reduction of the likelihood of an occurrence (Spink et al., 2017).

Food supply chain or network integrity, predicated upon food quality, authenticity, safety and defence, that guarantees the integrity of a final food product leads to increased consumer trust and brand confidence (Davidson et al., 2017; Ling & Wahab, 2020; Manning & Monaghan, 2019)

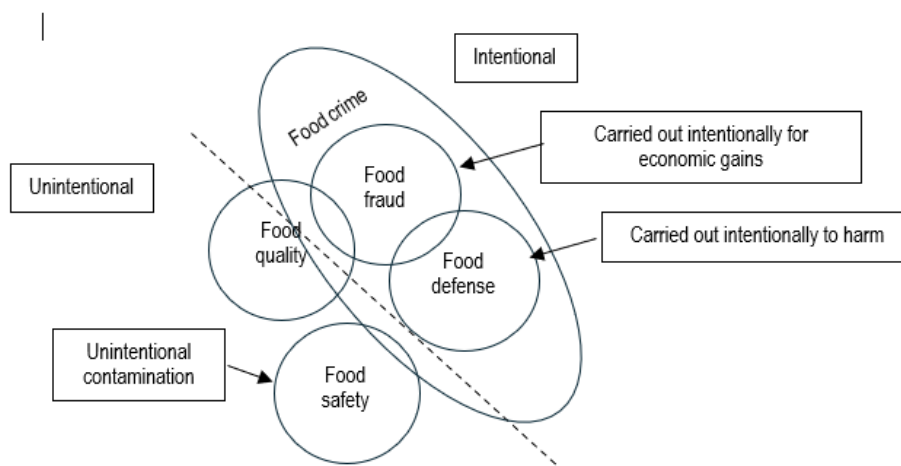
Section 2.2.8.3 provides clarification of the terminology used in relation to food integrity; specifically food defence, food fraud, food safety and food quality.

2.2.8.3 Food Integrity Terminology

Contamination or modification of food may be intentional (food fraud and food defense) or unintentional (food quality and food safety) (Manning & Soon, 2016). Manning and Soon (2016) define food defense as deliberate adulteration driven by ideology, resulting in food that is harmful to health. They describe food fraud as deliberate adulteration motivated by economics, potentially causing harm to health. Food safety, according to them, involves unintentional food contamination leading to health hazards. Finally, food quality pertains to providing attributes that impact a product's value to consumers.

These concepts and their relationships are graphically represented in Figure 3 (Manning & Soon, 2016). Food terrorism, ideologically motivated, is also a subset of food crime (Ling & Wahab, 2020). It should be noted that food defense may also be defined as prevention and mitigation of intended threats and incidents (Davidson et al., 2017).

Figure 3: Intentional & Unintentional Food Modification (Source: Manning & Soon, 2016)



2.2.8.4 From Compliance to Food Integrity

Food safety, food authenticity, traceability, and integrity are significant issues for consumers and food businesses alike (Manning, 2017, p.1). Food integrity is also an emerging food supply chain issue (Ali et al., 2017; Alrobaish et al., 2021). Changing consumer values and attitudes about food quality, sustainability of the food system, and ethics in food production are the impetus for change in the food supply chain (Wang et al., 2016).

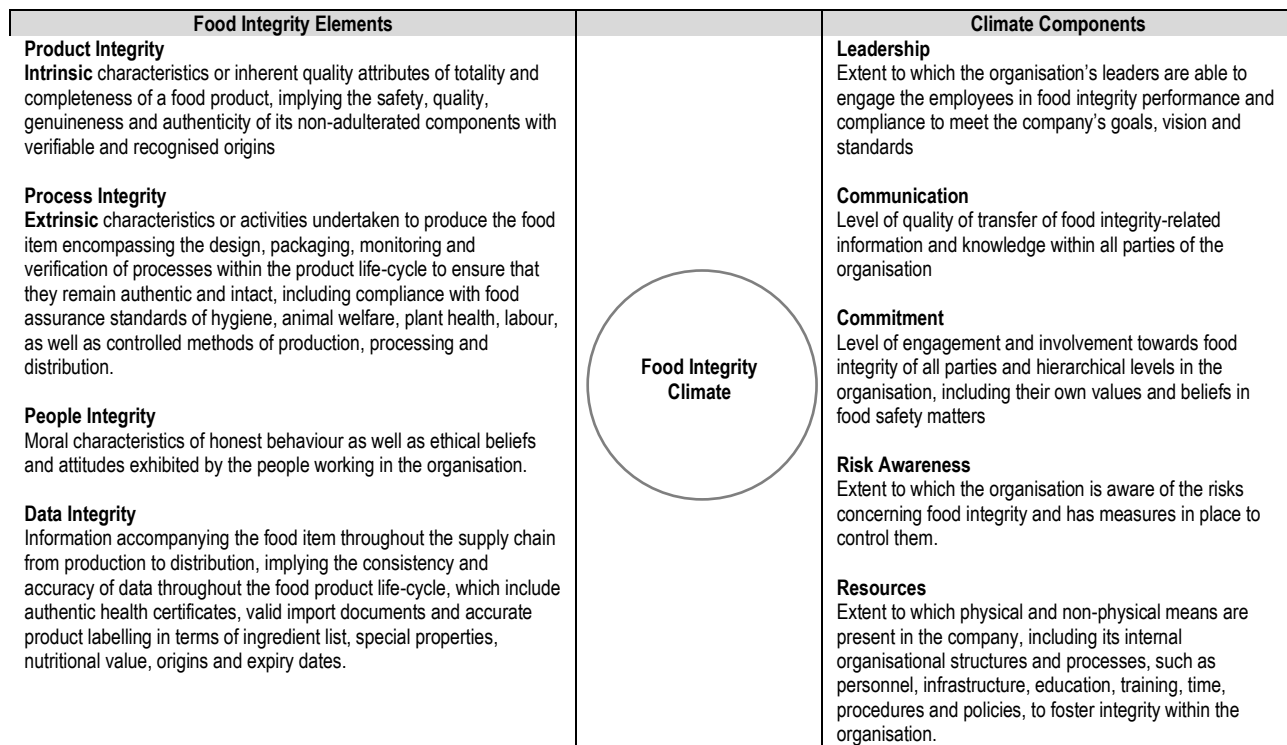
The concept of food integrity goes beyond compliance with product and process standards and rules (Manning 2020). Characteristics of integrity such as such as honesty, trust and accountability, and an active commitment by an organisation to its own set of principles and values are needed to ensure integrity of the food supply chain (Manning, 2020). It is important to note the distinction between compliance and organisational integrity. Compliance is the avoidance of negative legal consequences while organisational integrity is driven by values and ethics (Paine, 1994).

Values and ethics therefore are the focus of integrity-based management systems which are necessary to assure food integrity (Manning, 2020). Alrobaish et al. (2023) agree that focusing on compliance with product and process requirements to assure food integrity is not sufficient, and advocate for moving from a compliance-based to an integrity-based approach, suggesting that in fact this approach has become critically important for food businesses. Approaches may include clearly communicated organisational codes of conduct incorporating guiding values rather than policy-driven compliance; credible leaders who act in accordance with their values; and empowering managers to make ethically sound rather than compliance-driven decisions (Manning, 2020).

2.2.8.5 The Evolution of Food Integrity Climate & Culture

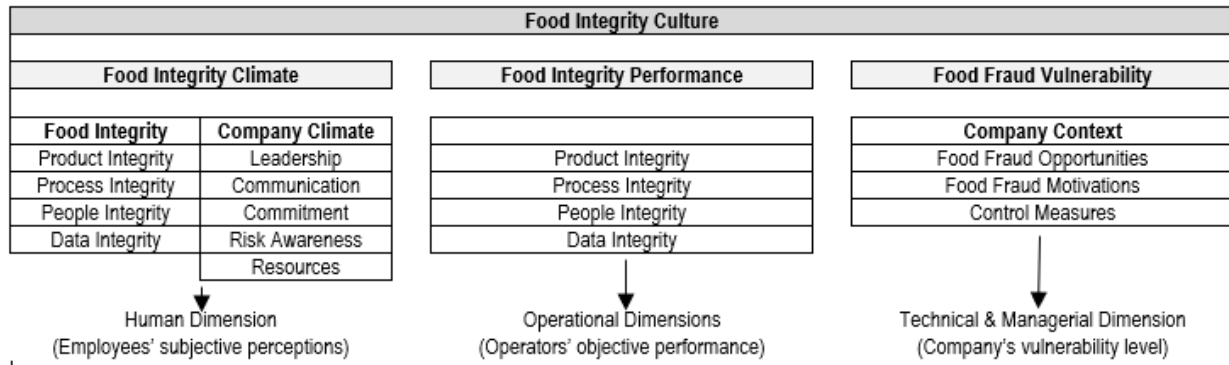
Current models of food integrity climate and culture have evolved from the definitions of food safety culture and food safety climate of De Boeck et al. (2015) and De Boeck et al. (2018) as summarised in section 2.2.8. This has led to the development of a food integrity climate conceptual model (Alrobaish et al., 2021) (Figure 4).

Figure 4: Food Integrity Climate Conceptual Model (Source: Alrobaish et al, 2021, p.6)



This was closely followed by the development of a food integrity culture model in Figure 5 (Alrobaish et al., 2022).

Figure 5: Food Integrity Culture Model (Source: Alrobaish et al., 2022)



The company climate components articulated in each of these models are consistent with those outlined in Section 2.1.6 which examines the food safety culture versus food safety climate debate; thus these models have evolved the work of De Boeck et al. (2017), to understand the association between organisational food integrity climate and employee food integrity behaviour.

2.2.8.6 Food Integrity Performance

Food integrity behaviour encompasses any action by an employee that has a direct or indirect impact on, or is connected to, the integrity of products, processes, individuals, and/or data within a reputable organisation. This includes both actions that can be observed and those that are not readily visible (Alrobaish et al., 2022).

In their study involving three behavioural variables namely, compliance, participation and unethical pro-organisational behaviour, Alrobaish et al., (2022) found that food integrity is promoted by employees within their businesses if compliance and participation is high and unethical pro-organisational behaviour is low, and that a positive relationship exists between food integrity climate and food integrity behaviour.

Alrobaish et al. (2021) and Alrobaish et al. (2022) both emphasise the need to consider the people element in improving food safety and food integrity performance and thereby reducing vulnerability to food fraud. Promoting control measures such as an ethical business culture and implementing managerial measures such as robust recruitment processes, support for whistle-blowers, guidance for fraud prevention and an ethical code of conduct and understanding the motivation and opportunities for food fraud, may assist in mitigating this risk (Van Ruth et al., 2017).

Ethical climate refers to how individuals perceive what is considered morally correct behaviour, which in turn shapes their decision-making processes and actions (Martin & Cullen, 2006). Employees are more inclined to comply with company rules and regulations in a more ethical environment because it constitutes morally acceptable behaviour (Rae & Subramanyam, 2008). Further, the risk of unethical behaviour is minimised in businesses with a stronger ethical corporate culture (van Ruth et al., 2017). Development and implementation of a business's strategy, objectives and business standards is influenced by management integrity and ethical commitment, an offshoot of corporate culture, the development of which is influenced by senior management (COSO, 2017). Leadership and management communicate ethical values by example, including through taking to task those who break the rules (Rae & Subramaniam, 2008).

2.3 Summary

The evolution of food safety culture with its nascence in safety culture has been described in this chapter that reviewed the link between food safety and behaviour, the concepts of food safety culture versus food safety climate, and the implications of leadership for food safety performance. How food safety culture is measured, specifically drawing on the foundational work of Yiannas (2009) which is the basis of the food safety and quality framework implemented by New Zealand's largest food business upon which the quantitative strand of this research is based, and which forms the basis of the guide to the qualitative interviews, was outlined.

Leaders and managers shape the collective character of an organisation which is defined by its virtues or ethical character. Ethical leadership has been shown to improve effectiveness, performance and safety at an organisational and individual level. This review has defined ethical leadership, its characteristics, measurement and links to workplace safety. The unique cultural perspectives of Aotearoa New Zealand indigenous people have provided another dimension to the review of literature concerning ethical leadership in 2023.

According to workplace safety literature, ethical leadership enhances employee, safety and organisational performance and outcomes (Bouckennooghe et al, 2014; Chughtai, 2015; Enwereuzor et al., 2020; Freiwald, 2013; Khan et al., 2018; Picolo et al, 2010; Shafique et al., 2020, Walumbwa et al, 2010). In the food safety-specific context, culture and climate, leadership style and management and organisational commitment influence food safety and health behaviours of employees (De Boeck et al., 2017; Fatimah et al., 2014; Griffith et al., 2010; Nyarugwe et al., 2016; Nyarugwe et al., 2017).

The 2013 horsemeat scandal, from which the concept of food crime arose, provided the impetus for the food industry, government and regulators to move to a focus on food protection by considering the integrity of the food supply chain in its entirety. Food integrity integrates the concepts of food safety and ethicality of all elements of the food supply chain and has developed rapidly in the five years that this doctoral research has been underway. Its relevance to this doctoral research will be discussed more fully in Chapter 6.

There is little or no published research regarding the relationship between food safety culture and ethical leadership, neither as it relates to New Zealand food businesses, nor internationally, hence the focus of this doctoral research. The review of literature about food safety culture and ethical leadership in this chapter provides the context for the three research questions articulated in Chapter One:

- What is the nature of the relationship between food safety culture and ethical leadership in New Zealand's largest food company?
- What are the unique characteristics of ethical leadership in food companies in Aotearoa New Zealand?
- What is the nature of the relationship between food safety culture and ethical leadership from an international perspective?

The methodological foundations for this doctoral research are discussed in the next Chapter.

Chapter 3: Methodology

This chapter is in three parts: First is a holistic discussion of the research philosophy and approach employed which includes a discussion of a mixed methods approach, followed by a strategic view of the implementation of the mixed methods research design, and then ethical considerations. The methodology used in each strand is discussed separately.

The second section summarises the methodology used in quantitative research strand including management of risk, the design and delivery of the survey instrument and analysis.

Part 3 introduces the methodology used in the qualitative research strand following which the population and sampling frame are discussed. The survey design and delivery, risk assessment and data analysis approach are reported. The way in which data were validated concludes this section.

3.1 Research Philosophy & Approach

Philosophical perspectives or research paradigms, the socially constructed reflections of researchers' worldviews or belief systems (Byrne & Humble, 2007) are shaped by their discipline and experience, and in turn influence the design, methodology, methods and interpretation of data (Feilzer, 2010; Moon & Blackman, 2014).

Researchers may relate to multiple perspectives (Moon & Blackman, 2014). That said, solving a real-life problem, addressing a real-life issue or answering a question is the typical starting point for social research, rather than determining a philosophical position or research paradigm; every piece of research is unique and therefore it is necessary to select the methodology or methodologies that most suit a particular piece of research (Crotty, 1998). Azorin & Cameron (2010) advocate for the paradigm of choices which acknowledges that different situations call for different methods.

Ontology describes what can be known (Berryman, 2019); our assumptions about how the world is made up and the nature of things (MacIntosh, 2009); or at a simple level, what is reality? (Chauncy, 2012; Patel, 2015). It underpins the epistemological position (how we should investigate the world), methodology (how we should best collect data) and research methods (details of exactly how we collect data) for a particular piece of research (Stainton, 2019). Whether or not a paradigm is tied to a specific methodology however is termed the paradigm debate (Byrne & Humble, 2007, Hanson et al., 2005).

My ontological position is one of pragmatism; both in terms of my world view, but also as an appropriate paradigm for a mixed methods research design upon which this doctoral research is predicated (Creswell & Plano Clark, 2018). Pragmatism addresses real world, practical problems (Feilzer, 2010) and is based on the notion of experience being the perpetual interplay between beliefs and actions with inquiry being one form of experience and research one form of inquiry (Morgan, 2013). It is grounded in the work of John Dewey, William James and George Herbert Mead (Parvaiz et al. 2016; Tashakkori & Creswell, 2007). Dewey's process model of inquiry resonates with the researcher as a leader and manager and as a researcher; beginning with recognising a problem, then moving through a process to consider the nature of

the problem, suggest a solution, consider the effects of the solution, then taking action, simultaneously acknowledging that beliefs influence actions and actions in turn influence beliefs (Morgan, 2013; Schoonenboom, 2019). Indeed, a measure of success of research within the pragmatic paradigm is the contribution to solving a temporary problem (Schoonenboom, 2019).

From a personal perspective, acknowledging the uncertainty and fluidity of experiences and relationships, that knowledge is relative, that multiple realities exist, and that research needs to be useful are all aspects of the pragmatic paradigm with which the author connects, particularly as a mature student and experienced manager (Feilzer, 2010). Reflexive research practice to ensure the usefulness or utility of research requires asking questions such as ‘what’ and ‘who’ the research is for (Feilzer, 2010). It emphasises the importance of ‘why’ and ‘how to’ questions (Morgan, 2013).

To conclude this brief discussion of the philosophical basis for this doctoral research, the pragmatic research paradigm is summarised in Table 9 (Patel, 2015).

Table 9: Pragmatic Research Paradigm (Source: Patel, 2015)

Paradigm	Ontology <i>What is reality?</i>	Epistemology <i>How can I know reality?</i>	Theoretical Perspective <i>Which approach do you use to know something?</i>	Methodology <i>How do you go about finding out?</i>	Method <i>What techniques do you use to find out?</i>
Pragmatism	Reality is constantly renegotiated, debated and interpreted in light of its usefulness in new, unpredictable situations	The best method is one that solves problems. Finding out is the means, change is the underlying aim	Deweyan pragmatism Research through design	Mixed methods Design-based research Action research	Combination of quantitative or qualitative methods eg sampling, measurement & scaling, statistical analysis, questionnaire, focus group, interview; observation, case studies, life histories, narrative, theme identification and more, such as data mining, expert review, usability testing, physical prototype

In order to respond to the research questions, and consistent with the pragmatic research paradigm, a mixed methods approach was selected. Chapter 4 addresses the quantitative approach taken to respond to the question: what is the nature of the relationship between food safety culture and ethical leadership in New Zealand’s largest food company? This is supplemented with the qualitative approach addressed in Chapter 5 which addresses the question: what are the unique characteristics of ethical leadership in food companies in Aotearoa New Zealand?

A brief discussion of mixed methods follows before the specific methods employed in each of the quantitative research strand (Chapter 4) and qualitative research strand (Chapter 5) are detailed.

3.2 Mixed Methods Research

“Mixed methods is an approach to research in which the investigator collects, analyses, and interprets both quantitative and qualitative data (closed- and open-ended information), integrates or combines the two approaches in various ways, and frames the study within a specific type of design

or procedure...Both strands need to be conducted using rigorous methods of data collection and analysis” (Creswell, 2015, p.4).

Mixed methods is the approach taken in this doctoral research. There is debate over what philosophical paradigm is best suited to mixed methods research (Morgan, 2007), however a popular view is that pragmatism provides the optimal philosophical basis for this approach (Hanson et al, 2005; Johnson et al, 2017; Tashakkori & Teddlie, 2003), and this is the philosophical position that has been taken.

A key principle of pragmatism is the compatibility of quantitative and qualitative methods (Azorin & Cameron, 2010; Mertens, 2012) and the belief that methods are not mutually exclusive, rather the most appropriate research method is selected to address a research question (Feilzer, 2010). The most important matter in pragmatism is whether the research answers the research question (Feilzer, 2010; Pelto, 2015), which in turn drives the choice of methods with the goal of getting useful answers (Johnson & Onwuegbuzie, 2004). The flexibility from using a combination of qualitative and quantitative methods can benefit researchers, including broadening the suite of tools or methods available and avoiding isolationist or limited thinking (Midgley et al., 2007).

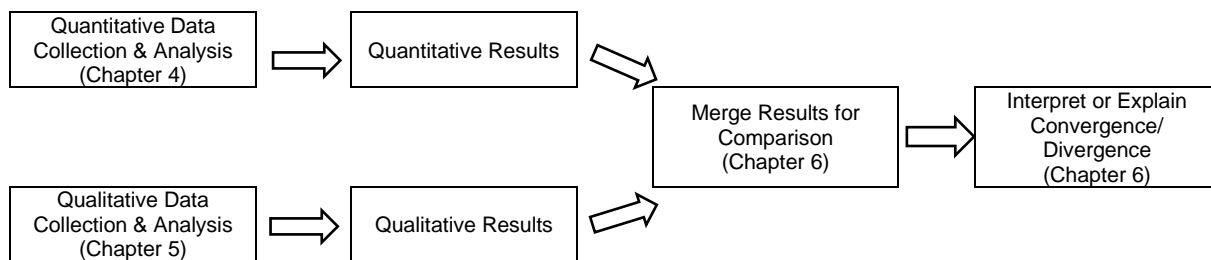
Qualitative approaches have historically been labelled as subjective, and quantitative approaches, objective, however all research methods and measurements are to some degree subjective, given they are shaped by the perception of the researcher (Gorard, 2015; Johnson et al., 2007; Pelto, 2015; Reichardt & Cook, 1980). There are strengths and weaknesses of mixed methods, however while it may be difficult for a single researcher to carry out both qualitative and quantitative research, by not being constrained by a single method or approach, a broader range of research questions may be answered (Johnson & Onwuegbuzie, 2004). Further, consciously developing methodological toolkits with different kinds of mixed methods designs makes for more versatile researchers (Greene, 2008; Morse & Chung, 2003).

The discussion will now move from the philosophical to the practical. Having discussed the pragmatic paradigm and mixed methods approach, a discussion about the implementation of the mixed methods research design for this doctoral research follows.

3.3 Implementation of a Mixed Methods Research Design

This doctoral research employs a convergent parallel design (Creswell & Plano Clark, 2018), collecting both quantitative and qualitative data to get a more complete understanding of the nature of the relationship between food safety culture and ethical leadership in Aotearoa New Zealand (Figure 6).

Figure 6: Convergent Parallel Mixed Methods Research Design (Source: Creswell & Plano Clark, 2018)



At a strategic level, the planned data collection steps for this doctoral research project, following the five-step framework of Creswell & Plano Clark (2018, p.174), are summarised in Table 10.

Table 10: Data collection 5 step process (Source: Creswell & Plano, 2018)

Data Collection Step	Workstream 1	Workstream 2
	Quantitative Data Collection	Qualitative Data Collection
Sampling procedures Different populations Unequal sample sizes Data collected from up to 17 sources	Fonterra Co-operative Group Ingredients business; 9000 staff; 26 sites nationwide	Up to 18 members of the NZ Food Safety Science & Research Centre Purposeful or purposive sampling
Permissions & recruitment	Institutional permissions; Massey University (ethics), NZFSSRC & Fonterra Co-operative Group Voluntary participation	Institutional permissions; Massey University (ethics), NZFSSRC, Individual businesses; Cross sector representation; Individual international researchers Voluntary participation
Data sources	Electronic, structured, standardised self-administered questionnaire; 7 point Likert scale	Face-to-face, semi-structured interviews Open-ended questions
Data recording	Data captured, stored and transmitted using secure systems (Massey University & Fonterra Co-operative Group)	Interview protocol including pre-circulated questions and agreed recording mechanism
Procedure administration	Massey University ethics approval Massey University PhD requirements; letter of introduction; purpose of the study; voluntary participation	Massey University ethics approval Massey University PhD requirements; letter of introduction; purpose of the study; voluntary participation

A global pandemic of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), the cause of the disease COVID-19, identified in China in late 2019, impacted this doctoral research. The effects of COVID-19 were many, from repeated and sometimes snap lockdowns, national and international border closures, supply chain disruptions, the rise of misinformation and disinformation, and of course impacts on the health sector due to burgeoning numbers of cases from an evolving virus. At a research level the pandemic affected the ability to progress data collection according to planned timeframes and modes of data capture, having initially planned to carry out the qualitative interviews face-to-face and to engage with Fonterra similarly during the planning and execution stages of the quantitative research strand.

Aotearoa New Zealand's food businesses grappled with ongoing myriad impacts including plant black-out periods where only designated staff were permitted to access sites, labour and materials shortages, and import and export complexities. As a consequence, all data collection and communication was carried out virtually, and was subject to significant disruption. This ultimately proved advantageous as the data collection phases for both the quantitative and qualitative research streams, once converted to electronic media, was

uninterrupted, and this allowed for recording of conversations by consent and made for efficient transcribing of those conversations.

Research proposals were developed for the quantitative research strand (Chapter 4) (Appendix 2) and qualitative research strand (Chapter 5) (Appendix 3) to provide clarity about the research’s; description, objectives, methods, expected outcomes, ethical requirements, potential risks and mitigations, reporting, communication, confidentiality, and intellectual property considerations. Before discussing the materials and methods for each of these workstreams, the ethical considerations for this research, including the management of risk, will be outlined.

3.4 Ethical Considerations

This research aligns with Massey University’s definition of a low-risk research project being “one in which the nature of the harm is minimal and no more than is normally encountered in daily life” (Massey University, 2015). A low-risk ethics approval was obtained for this doctoral research in June 2021.

A research ethics principles framework (Table 11) made up of the Belmont principles of Respect for Persons, Beneficence and Justice, supplemented by the Massey principle of Special Relationships or Whakapapa and the principle of Trust as identified distinctly by Kitchener & Kitchener (2013) guided the reflexive process to identify those principles pertinent to this doctoral research. Assumptions relating to the research were surfaced and articulated. A comprehensive risk assessment framework with mitigation strategies was developed to minimise potential risks to the researcher, the researched, and the ecosystem within which this research is embedded.

Table 11: The Interface Between Ethical Leadership & Food Safety Culture in Aotearoa New Zealand Food Businesses: Ethical Principles Framework

Belmont Report Ethical Principles	Massey University Code of Ethical Conduct Principles (2017)	Other Ethical Principles
Respect for persons	Autonomy <ul style="list-style-type: none"> • Agency • Information • Comprehension • Absence of pressure, coercion or manipulation 	
Beneficence	Benefit Avoidance of Harm Tika (Purposefulness) Manaakitanga (Cultural & Social Responsibility)	
Justice	Justice Mana (Justice & Equity)	
(Israel & Hay 2011; Friesen et al., 2017; Paxton, 2020; Yaw & Schwartz-Shea, 2018)	Special Relationships Whakapapa (Relationships)	Fidelity (Trust) (Kitchener & Kitchener, 2013)

The Massey Code of Ethical Conduct for Research, Teaching and Evaluations Involving Human Participants (2017) is premised on the universal principles of: autonomy; avoidance of harm; benefit/ beneficence; justice and special relationships; and whakapapa (relationships); tika (Purposefulness); manaakitanga (Cultural and social responsibility) and mana (Justice and equity); and takes a “deep consideration-high trust approach” (p.3). In addition, seven core researcher values guide the development and application of research in alignment with Treaty of Waitangi principles; Aroha ki te tangata (respect for people); He hanohi kitea (meeting face-to-face or fronting up); Titro whakarongo...koreo (looking and listening and then maybe speaking); Manaaki ki te tangata (sharing, hosting and being generous); Kia tupato (be cautious); Kaua e takahia te mana o te tangata (not trampling on the dignity of a person); and Kaua e mahaki (do not flaunt knowledge) (Massey, 2017).

Ethical considerations for this research related primarily to respect for persons; informed consent, confidentiality and anonymity and the principles of beneficence, justice/mana and to a lesser extent, fidelity. The key elements of each of these considerations are articulated in

Table 12, the risk assessment approach used to identify and propose mitigations for the ethical considerations. In addition, assumptions for each ethical principle were surfaced and articulated (Table 13). These risk assumptions and mitigations and surfaced assumptions were a means of providing assurance that robust strategies were in place to manage potential issues that may arise within this research. The key for the risk assessment framework is as follows (Figure 7):

Figure 7: The Interface Between Ethical Leadership & Food Safety Culture in Aotearoa New Zealand Food Businesses: Risk Assessment Framework Key

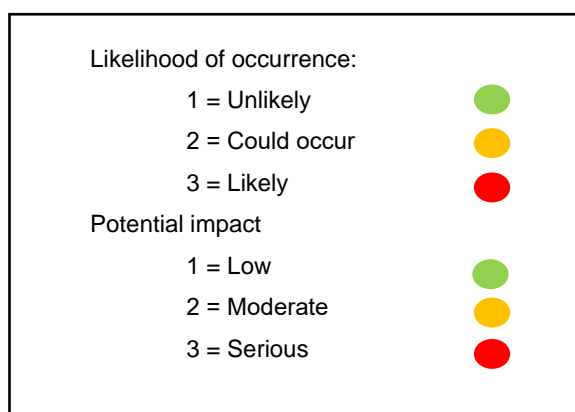


Table 12: The Interface Between Ethical Leadership & Food Safety Culture in Aotearoa New Zealand Food Businesses: Ethical Principles Risk Assessment Identification and Mitigations

Risk Assessment	Likelihood of occurrence	Potential Impact	Mitigation measures
1. Respect for Persons			
Informed consent is not forthcoming from research participants	●	●	Information sheet is developed prior to the survey that outlines What the research is about What the role of participants is Why their consent is needed How data will be collected That there is no requirement for them to participate: their participation is voluntary That they can withdraw at any time What outcomes will be shared at the end of the study
Confidentiality of participant data may be compromised	●	●	Discuss management communication with Fonterra workers regarding their support for worker participation in the research project Discuss the possibility of third-party data collection with Fonterra In the event that third-party data collection is not permissible, determine data de-identification strategies to maintain worker confidentiality In the event that Fonterra systems are used as the vehicle for data collection, get senior management assurances that worker confidentiality will be top priority Put appropriate confidentiality agreements in place that govern, for instance, access to raw data, storage of data and archiving or destruction of data Store data according to Massey University guidelines
2. Beneficence			
Harm may arise from data management or governance	●	●	Ensure confidentiality and anonymity issues are dealt with definitively to protect participant identity (see above)
Fonterra may not have a sense of ownership of the project	●	●	Continue to maintain the relationship including open lines of communication with Fonterra about the research project
3. Justice/Mana No risks identified			
4. Relationships/Whakapapa			
Confidential information may leak	●	●	Confidentiality agreements will articulate the conditions under which the researcher and supervisory team may access and manage data
Research outcomes may surface uncomfortable truths	●	●	Early discussions with Fonterra management will agree the approaches to be taken should research outcomes portray less than desirable staff opinions
5. Fidelity No risks identified			

Table 13: The Interface Between Ethical Leadership & Food Safety Culture in Aotearoa New Zealand Food Businesses: Assumptions by Ethical Principle

Number	Ethical Principle	Assumption
1	Respect for persons	Employees will have agency or capacity to make decisions about participation in the research process
2		Based on the information provided by the researcher, employees will understand the nature of the project, the voluntary basis for their participation and their ability to withdraw at any time
3		Staff participating in the survey will not be subject to coercion or pressure regarding their involvement in the research project by senior managers in the organisation
4		Based on engagement with Fonterra senior management to date, the researcher believes the intent of Fonterra personnel to support and encourage workers to participate in this research while maintaining worker confidentiality is genuine
5		The researcher believes there is a genuine desire on the part of Fonterra senior managers to understand the opinions of workers
6	Beneficence	There is negligible risk of harm or discomfort to research participants in this project as long as participant confidentiality is maintained
7		Benefits arising from this project will accrue to Fonterra as an organisation through better understanding of worker perceptions of ethical leadership and food safety culture; and to the researcher through having access to a significant population for the project
8		In terms of Manaakitanga, the project will treat all participants with sensitivity and dignity
9		In terms of Tika, the project is able to achieve its research aims. The research is not specifically targeted at or will impact on Māori, however there is an assumption that the Fonterra workforce may be multicultural, therefore manaakitanga is of paramount importance
10		Institutional safeguards have been strengthened in light of recent cyber-attacks at Massey University
11	Justice/Mana	Research participants will be invited to participate in the study, and will not be subject to discrimination
12	Relationships/Whakapapa	There are no assumptions to surface relating to relationships/whakapapa

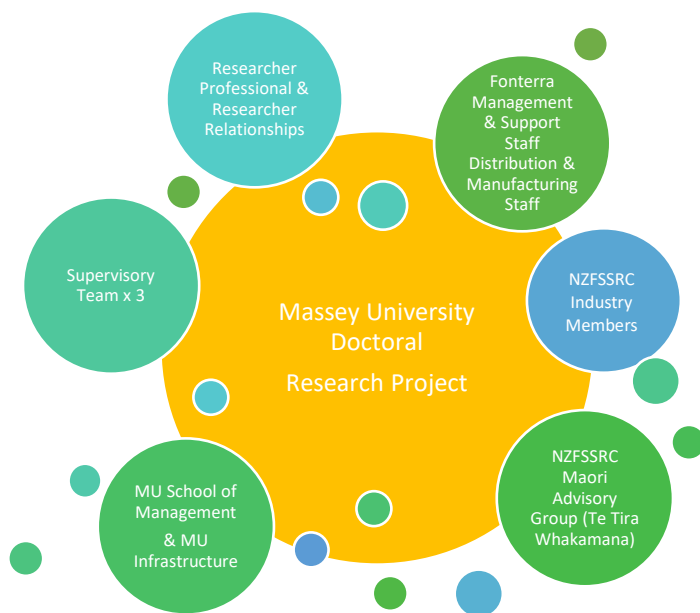
To mitigate potential conflicts of interest, special relationships associated with this doctoral research are articulated in Section 3.41.

3.4.1 Special Relationships/Whakapapa

The author is an employee of Massey, managing the NZFSSRC. Fonterra is one of the 26 industry partners of the NZFSSRC. A relationship of mutual trust and respect established over five years culminated in the opportunity to access both 9000 Fonterra staff over 26 sites nationally for the purposes of this doctoral research project; and senior food safety and quality personnel from the NZFSSRC Industry membership.

This doctoral research took an ecosystem approach to the implicit relationships represented in Figure 8 below.

Figure 8: The Interface Between Ethical Leadership & Food Safety Culture in Aotearoa New Zealand Food Businesses: Doctoral Research Project Relationship Ecosystem



The doctoral supervisory team is comprised of three researchers, two of whom have professional relationships with Fonterra; one has professional relationships with other NZFSSRC Industry members. One of the supervisors is the former Director and Chief Scientist and current Director Emeritus of the NZFSSRC. Any actual or perceived conflicts of interest were identified, declared and managed. For Massey, the quality of all research, including that completed by PhD students, is expected to follow the highest standards of research ethics. While these long-standing relationships have led to this unique opportunity, these standards were strictly adhered to, for protecting personal and institutional reputations of Fonterra, other NZFSSRC Industry members, Massey, NZFSSRC, and the Massey School of Management.

The principle of whakapapa has at its core the establishment and maintenance of authentic relationships (Massey, 2017). This principle is reflected in the commitment to fostering all relationships within this research ecosystem, and in mindfulness to the duty of care owed to Fonterra staff and to other Industry personnel who will participate in the research. All seven researcher values mentioned in section 3.4 underpin this principle (Massey, 2017). The approach used in the development of this research mirrors the recommendations of Wiles & Boddy (2013) whereby the researcher and industry partner have worked collaboratively. This approach is referred to as a democratisation of research whereby industry may choose its research focus with support by researchers (Wiles & Boddy, 2013).

It is important to note the the author's independence; there was neither financial recompense nor interference from Fonterra nor other Industry members, in the research quality or student objectivity in relation to this research.

3.5 Food Safety Culture & Ethical Leadership in New Zealand's Largest Food Business: Materials & Methods

3.5.1 Purpose of the Research

The purpose of this research was to provide data to inform a response to the doctoral research question, "What is the nature of the relationship between food safety culture and ethical leadership" by providing an understanding of the state of food safety culture and ethical leadership from workers and management within Aotearoa New Zealand's largest food company; insights that are the first of their kind in this country.

The research also allowed Fonterra to assess the efficacy of its food safety culture framework and to affirm or otherwise the degree to which its leaders align with its standards of ethical conduct. While there was no financial incentive or remuneration offered by Fonterra to undertake this work, in recognition of value of this independent research and the possible benefits for their ongoing pursuit of excellence in this area, Fonterra contributed \$5,000 toward consumable costs.

Fonterra Cooperative Group, the world's largest exporter of dairy products and the top New Zealand company by revenue, agreed to allow access to its manufacturing and distribution units for the purposes of gathering and analysing data about the status of food safety culture and ethical leadership from worker and management perspectives.

The beneficiaries of this research were identified as the student, food safety science researchers, Fonterra Co-operative Group, Aotearoa New Zealand food companies, and the Ministry of Business, Innovation & Employment (MBIE) and Ministry for Primary Industries (MPI).

3.5.2 Sampling frame

9000 (n=9000) Fonterra manufacturing and distribution employees, dispersed across 26 sites in Aotearoa New Zealand, were invited to participate voluntarily in a survey about the food safety culture and ethical leadership within Fonterra. Data collection was planned for November 2021 however the global pandemic resulted in this being delayed twice, finally taking place in May 2022. Given the size of the available population, a democratic, mass communication approach that leads to a structured, standardised, self-administered questionnaire was the most cost-effective and efficient means for data collection. This method was available across the breadth of company sites; involved minimal disruption to business operations for staff members to complete; had a perception of anonymity and allowed for rapid data collection (Cooper & Schindler, 2008). In addition, the practical realities of site contact during the global pandemic meant black-out periods where only designated staff were permitted to access Fonterra sites. As a result, the only access to Fonterra workers was via the Fonterra Food Safety & Quality team.

3.5.3 Survey Instrument Design & Delivery

The inaugural Fonterra New Zealand Food Safety Culture Survey was administered both electronically and in hard copy between 01 – 15 May 2022 and involved Fonterra's Ingredients business which incorporates Distribution Centres (DC) and Manufacturing. While it had originally been planned to administer the survey at two collection points separated by 12 months as part of this doctoral research, disruptions from the global

pandemic described in section 3.5.2 meant this was not possible. Fonterra did intend however, to repeat the survey on a biennial basis.

A briefing pack was sent to management at each of Fonterra's Ingredients business sites ahead of the survey administration date. The pack contained details of the survey timeline, publicity about the survey, paper surveys and instructions for their submission, and pre-, during- and post-survey tasks for completion. Talking points were also included in the briefing pack to enable management to share information with staff about the what, why and how of the survey process.

This was followed by a staff information pack, circulated to each site containing a QR code that staff could scan to access the survey then complete via mobile phone or email link. The pack advised staff that the survey was voluntary, anonymous, and short, taking 3-5 minutes to complete. A paper survey was available for those staff who were less technology-literate, with an envelope provided for ease of submission.

Section 4.2.2 describes the social-demographic variables captured in the survey. Each individual was asked to respond to 24, plain-English statements; 12 focused on food safety culture and 12 focused on ethical leadership using a seven point Likert scale anchored at points one, four and seven; one being low (for example 'never', 'rarely' 'disagree'), four, medium (for example 'sometimes', 'some evidence') and seven, high (for example 'consistently', 'always', 'agree'). The Likert Scale discriminates between extreme negative and extreme positive positions and allows for participant attitudes to be quantified (Acharya, 2010; Boynton & Greenhalgh, 2004).

The 12 food safety culture questions were Fonterra's own, developed as food safety and quality accountability goals and measures in 2018 in conjunction with an internationally-recognised authority on food safety culture researcher, Frank Yiannas, therefore there was no ability to influence these.

Fonterra's 12 cultural survey questions were supplemented with 12 ethical leadership questions developed after reviewing 15 tools for measuring ethical, servant and authentic leadership, and ethical and integrity climate and culture; across 21 publications. Ten of the 21 publications identified characteristics of ethical leadership (Table 14) and from those ten publications, nine groupings of characteristics emerged. Possible questions to interrogate those characteristics were developed using information drawn from four publications, otherwise known as recycling questions, re-worded using plain English for the Fonterra New Zealand context (Table 15).

The pressure or drive for originality is suggested as a rationale for researchers not using recycled or existing questions (Hyman et al., 2006). Recycled questions are cost effective in terms of both time and money, and have likely been trialled and validated in earlier research (Boynton & Greenhalgh, 2004; Hyman et al, 2006). Bearing in mind potential issues of copyright and the context within which questions were asked originally, recycling questions is a "perfectly feasible option" when designing a questionnaire (Hyman et al., 2006). In addition, another valid means of recycling survey questions is one of a number of question banks that exist in the UK, Europe and the United States. These have been established to allow access to questionnaires for

researchers, managers and teachers, one example being the UK Data Archive (UKDA) at the University of Essex which co-ordinates the Survey Question Bank (UK Data Archive, 2021).

Table 14: Ethical Leadership Characteristics Identified by Key Authors Between 2005 - 2020

Brown, Trevino & Harrison (2005)	Brown, Trevino & Harrison (2006)	De Hoogh & Den Hartog (2008)	Toor & Ofori (2009)	Mihelic , Lipicnik & Tekavcic (2010)	Zheng, Zhu, Yu, Zhang & Zhang (2011)	Sharif & Scandura (2013)	Yukl, Mahsud, Hassan & Prussia (2013)	Book: The Ethical Leader Morgen Witzel (2018)	Gemechu, West, Winner & Winston (2020)
<p>Care Citizenship Considering the ethical consequences of decision-making Ethical behaviour in personal and professional lives Ethics-related communication and reinforcement Honesty integrity and trustworthiness Making principled and fair choices Proactively influencing followers' ethical and unethical behaviour through rewards and discipline Setting ethical standards</p>	<p>Agreeableness; trust, kindness, cooperative Conscientious; dependable, dutiful, determined Employ moral reasoning Internal locus of control Self-monitoring Use power for others' benefit</p>	<p>Based on Brown et al Component power sharing (listening to followers and giving them a voice) Concern for morality and fairness (fair and moral) Role clarification (transparent, open communication, clarification of expectations and responsibilities)</p>	<p>Engage in acts and behaviours that benefit others Ethical standards Ethically principled, caring and altruistic Fair and just decision makers Fair treatment of employees Hold everyone to account Honest trustworthy & credible Integrity Practice and manage ethics Refrain from behaviours that cause harm to others</p>	<p>Concerned for the greater good Encourages and develops others Fulfils commitments Honest and straightforward Humble Serves others Shows courage to stand up for what is right Shows respect for each individual Strives for fairness Takes responsibility</p>	<p>Actions are consistent with his/her belief and ethical standards Clarify ethical principles Has a moral attitude Motivated by altruism rather than selfishness Set high ethical standards Visionary</p>	<p>Communicates clearly Demonstrating care Disciplining unethical behaviour Fairness Honesty Modelling behaviours; demonstrating ethical conduct Rewarding positive ethical behaviour Trustworthiness</p>	<p>Engage in acts and behaviours that benefit others Fair Hold everyone accountable Incorporate moral principles in beliefs, values and behaviours Making sacrifices to benefit others Open and honest communicators Practice and manage ethics Refrain from behaviours that cause harm to others Setting clear ethical standards Supportive and helpful Talking about the importance of values</p>	<p>Authentic Behaving correctly to people Being transparent Considers consequences of decisions Creating value Empathy and understanding Encourages others to be authentic Encouraging listeners Ensures failures are dealt with quickly and responsibly Generosity Humble Kindness, compassion Leading by example: walk the talk; talk the talk Moral courage Moral responsibility Self reflective Takes personal responsibility for decisions and actions Telling the truth; honesty Trustworthy Uses power with compassion and sympathy to benefit others Virtue Wisdom</p>	<p>Communicate about ethics and values Doing the right thing Follows ethical rules Having personal morality Integrity, honesty and trustworthiness Maintains values when making decisions Objective and fair Open Reward and discipline Role model Shows concern for people Shows concern for society</p>

Table 15: Ethical Leadership Characteristics; Authors & Possible Questions

	Characteristic	Authors	Possible Questions (MY BOSS...)
1.	Honesty, Trustworthiness & Integrity (+ straightforward, credible, fulfils commitments)	Brown et al, 2005; Brown et al., 2006; Gemechu et al, 2020; Mihelic et al, 2010; Sharif & Scandura, 2013; Toor & Ofori (2009); Witzel 2018;	<ul style="list-style-type: none"> • Is honest and can be trusted to tell the truth (Yukl et al) • Regards honesty and integrity as important personal values (Yukl et al) • Can be trusted (Brown et al) • Behaviour that inspires employee trust (Reed et al) • Promotes transparency and honesty (Reed et al) • Can be trusted to carry out promises and commitments (Yukl et al) • Keeps his/her promises (De Hoogh & Den Hartog) • Can be trusted to do the things he/she says (De Hoogh & Den Hartog) • Can be relied on to honour his/her commitments (De Hoogh & Den Hartog) • Always keeps his/her word (De Hoogh & Den Hartog) • Can be trusted to carry out promises and commitments (Yukl et al)
2.	Fairness	Brown et al, 2005; De Hoogh & Den Hartog (2008); Gemechu et al, 2020; Mihelic et al, 2010; Sharif & Scandura, 2013; Toor & Ofori (2009); Yukl et al, 2013	<ul style="list-style-type: none"> • Makes fair and balanced decisions (Brown et al) • Is fair and unbiased when assigning tasks to members (Yukl et al) • Insists on doing what is fair and ethical even when it is not easy (Yukl et al)
3.	Communication (+ encourages listeners; listening to followers & giving them a voice; comms re ethics & values; talking about the importance of values)	Brown et al, 2005; De Hoogh & Den Hartog (2008); Gemechu et al, 2020; Sharif & Scandura, 2013; Witzel 2018); Yukl et al, 2013	<ul style="list-style-type: none"> • Communicates clear ethical standards for members (Yukl et al) • Listens to what employees have to say (Brown et al) • Explains what is expected from employees in terms of behaving with integrity (De Hoogh & Den Hartog) • Explains what is expected of each group member; Explains what is expected of me and my colleagues (De Hoogh & Den Hartog) • Clarifies priorities; Clarifies who is responsible for what (De Hoogh & Den Hartog)
4.	Rewards & discipline (+ holds everyone to account; ensures failures are dealt with quickly and responsibly)	Brown et al, 2005; Gemechu et al, 2020; Sharif & Scandura, 2013; Toor & Ofori (2009); Witzel 2018	<ul style="list-style-type: none"> • Is fair and objective when evaluating member performance and providing rewards (Yukl et al) • Clarifies the likely consequences of possible unethical behaviour by myself and my colleagues (De Hoogh & Den Hartog) • Holds members accountable for using ethical practices in their work (Yukl et al) • Disciplines employees who violate ethical standards (Brown et al) • Compliments employees who behave according to the integrity guidelines (De Hoogh & Den Hartog)
5.	Citizenship (+ use power for others benefit; altruistic; serves others; concerned for the greater good; demonstrating care; sacrifices to benefit others)	Brown et al, 2005; Brown et al., 2006; Gemechu et al, 2020; Mihelic et al, 2010; Sharif & Scandura, 2013; Toor & Ofori (2009); Witzel 2018; Yukl et al, 2013; Zheng et al., 2011	<ul style="list-style-type: none"> • Cares about his/her followers (de Hoogh & Den Hartog) • Takes time for personal contact (de Hoogh & Den Hartog) • Puts the needs of others above his/her own self interest (Yukl et al) • Treating employees with dignity and respect (Reed et al) • Recognising when organisational morale is low (Reed et al) • Encouraging a spirit of co-operation (Reed et al) • Has the best interests of employees in mind (Brown et al)
6.	Setting ethical standards	Brown et al, 2005; Mihelic et al, 2010; Toor & Ofori, 2009; Yukl et al, 2013	<ul style="list-style-type: none"> • When making decisions, asks, "what is the right thing to do?" (Brown et al) • Refuses to use manipulation or deceit (Reed et al) • Values integrity over profit or material gain (Reed et al) • Discusses business ethics or values with employees (Brown et al)
7.	Refrain from behaviours that cause harm to others Behave in a way that promotes wellbeing for others Ethical behaviour, Considering ethical consequences Employ moral reasoning Practice and manage ethics, Shows courage to stand up for what is right Moral attitude, actions consistent with ethical standards	Brown et al, 2005; Brown et al., 2006; Gemechu et al, 2020; Mihelic et al, 2010; Sharif & Scandura, 2013; Toor & Ofori, 2009; Witzel,2018; Yukl et al, 2013	<ul style="list-style-type: none"> • Ensures that employees follow codes of integrity (De Hoogh & Den Hartog) • Shows a strong concern for ethical and moral values (Yukl et al) • Opposes the use of unethical practices to increase performance (Yukl et al) • Conducts his/her life in an ethical manner (Brown et al)

	Characteristic	Authors	Possible Questions (MY BOSS...)
	Incorporate moral principles in beliefs, values & behaviours; practice and manage ethics Behaving correctly to people; moral courage; moral responsibility; virtue Doing the right thing; follow ethical rules; having personal morality		
8.	Internal locus of control; self monitoring; Takes responsibility ; self-reflective	Brown, Trevino & Harrison, 2006; Mihelic et al, 2010; Witzel, 2018	<ul style="list-style-type: none"> • Acknowledges mistakes and takes responsibility for them (Yukl et al) • Freely admits mistakes (Reed et al)
9.	Role model , Leading by example: walk the talk; talk the talk; Modelling behaviours; demonstrating ethical conduct	Gemechu et al, 2020, Witzel, 2018; Zheng et al, 2011	<ul style="list-style-type: none"> • Keeps his/her actions consistent with his/her stated values (walks the talk) (Yukl et al) • Sets an example of how to do things in the right way in terms of ethics (Brown et al) • Sets an example of ethical behaviour in his/her decisions and actions (Yukl et al)

Table 16 below, contains the complete final set of survey questions used in this study.

Table 16: The Interface Between Ethical Leadership & Food Safety Culture in Aotearoa New Zealand Food Businesses: Quantitative Research Strand Food Safety Culture and Ethical Leadership Survey Questions

Fonterra Food Safety Culture Survey Questions		Ethical Leadership Survey Questions
Q1	We talk about Food Safety & Quality as part of our everyday work	My supervisor/manager is honest and can be trusted to tell the truth about FSQ
Q2	Everyone in my team knows what our Food Safety & Quality risks are, and how to keep the food safe	My supervisor/manager encourages staff to work together to achieve FSQ goals
Q3	When we have a Food Safety & Quality issue we learn from it and don't make the same mistake again	My supervisor/manager explains what is expected of me and my co-workers to keep our food safe
Q4	Food safety rules are never OK to bend or break, even if it saves time	My supervisor/manager acknowledges their mistakes and takes responsibility for them
Q5	If I saw something wrong or did something that impacts Food Safety & Quality, I'd feel comfortable telling my supervisor/manager or my team	My supervisor/manager listens to what people have to say about FSQ
Q6	I've seen someone recognised for doing Food Safety & Quality right	My supervisor/manager follows through on promises and commitments about FSQ
Q7	We discuss our Food Safety & Quality risks with other related teams on site	My supervisor/manager has explained what 'do what's right' means for our team
Q8	I could tell you exactly how my team is tracking against our Food Safety & Quality targets	My supervisor/manager makes fair and balanced FSQ decisions
Q9	Food Safety & Quality is viewed as an obstacle to making performance targets	When it comes to FSQ, my supervisor/manager stands up for what is right
Q10	Our leaders walk past Food Safety & Quality issues without taking action	My supervisor/manager 'walks the talk' for FSQ
Q11	How useful was the last Food Safety & Quality training you were part of?	My supervisor/manager follows through if someone breaks FSQ rules
Q12	I am comfortable eating food produced on my site or food made with ingredients from this site	My supervisor/manager treats me and my co-workers with dignity and respect

Following an iterative process with Fonterra Food Safety and Quality management to refine the questions to ensure they were fit-for-purpose for the Ingredients arm of the business across which this survey was intended to be disseminated, the survey was trialled with the entire Fonterra Food Safety & Quality team to ensure its efficacy, with this pre-testing step providing feedback as to whether the survey questions were likely to cause difficulty for participants. Presser et al. (2004) use the analogy of a dress rehearsal to describe the pre-test step, which is intended to surface any problems in a survey.

3.5.4 Risk Assessment

In addition to the risk assessment exercise conducted in relation to the ethics of this research (section 3.4), risk assessment specifically relating to this quantitative research strand was undertaken prior to commencement, with likelihood, impact and mitigations considered (Table 17).

Table 17: The Interface Between Ethical Leadership & Food Safety Culture in Aotearoa New Zealand Food Businesses: Investigation Risk Assessment

Risk	Likelihood L/M/H	Impact L/M/H	Mitigation
Adverse outcomes impact continuation or publication of research	L	H	Possibility discussed with Fonterra and written agreement of the way forward resolved prior to research commencing
Outcomes deemed to be commercially sensitive impact publication of research	L	H	Possibility discussed with Fonterra and written agreement of the way forward resolved prior to research commencing

Risk	Likelihood L/M/H	Impact L/M/H	Mitigation
Disruption from global pandemic	M	M	Unforeseeable consequences. Open lines of communication maintained between researcher and Fonterra with agreed, recorded strategies to manage if and where necessary
Fonterra staff choose to not participate in survey	M	H	Develop means to de-identify data to ensure participant privacy and anonymity, agreed in writing with Fonterra Effective communication with participants about management endorsement of the survey

3.5.5 Data Analysis

A form of multivariate analysis, Principal Component Analysis (PCA), a Geometric data analysis (GDA) method, was employed to analyse the dataset in this quantitative research strand.

The goal of GDA is threefold; to summarise and describe key information within a table; to represent this information geometrically; and to allow interpretation of the analysed data structures and associations (Hjellbrekke, 2018). The focus of GDA is on relationships between groups of categories and variables rather than associations between individual variables (Hjellbrekke, 2018). GDA methods construct Euclidian clouds of points (Le Roux & Rouanet, 2010), or dots in multidimensional space (Di Franco, 2015). Interpretation of GDA analysis is “*based on a simple, fundamental principle: each category will orient itself or be pulled in the direction of one or more categories of the other variable where its score is relatively high, and away from the categories where the score is relatively low*” (Hjellbrekke, 2018, p.4). There may be multiple explanations of observed GDA patterns, however these cannot be tested statistically (Hjellbrekke, 2018).

PCA is used for numerical variables and therefore considers the Lickert scale as a continuous rather than a categorical variable. It was chosen as it fulfilled multiple criteria used to determine the suitability of the data for PCA analysis (see below) and is a more parsimonious method than other similar approaches, such as Multiple Correspondence Analysis (MCA). As such it favours simpler explanations over more complex ones when multiple explanations exist, provided the data is suitable. This is in keeping with the principle known as Occam's Razor. PCA is a useful tool to capture the deeper patterns in the data, which are then overlaid with supplementary variables to understand how the variables such as gender and role are related to the responses.

PCA reduces the dimensionality of the data, by assuming an ordinal relationship between responses, at the same time keeping most of the variation in the dataset (Gupta et al., 2013; Ringner, 2008). It is the most common form of factor analysis where large numbers of variables are reduced into a fewer number of factors. A key advantage of PCA is the identification of patterns in data, whereby similarities and differences are accentuated (Gupta et al., 2013). The greatest variance in the data is displayed on the first axis (the first principal component or dimension) and the second greatest variance in the data is displayed on the second axis which is at right angles, or orthogonal, to the first (Gupta et al., 2013).

The software used in the data analysis was R Version 4.2.1, with the following libraries:

- FactoMineR

- psych
- ggplot2
- dplyr
- factoextra

Four tests were used to determine if the data were suitable for PCA analysis. Bartlett's test of co-correlation (sphericity); Correlation between variables; the Kaiser, Meyer, Olkin (KMO) measure of sampling adequacy; and a test of multicollinearity.

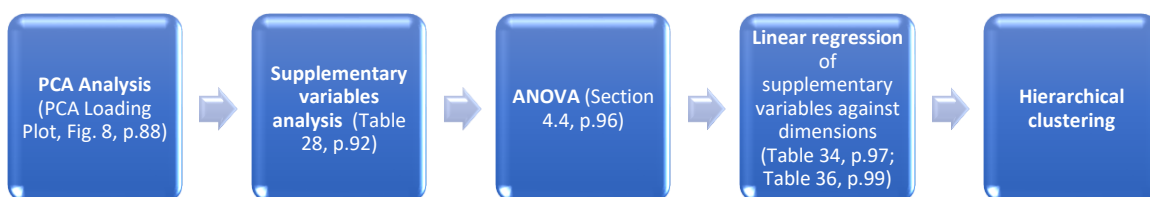
Bartlett's test of sphericity tests the null hypothesis, which if true, explains observed differences in relationships between variables as due to chance or experimental error (Helmenstine, 2019). The alternative hypothesis ascribes observed differences to an underlying relationship between variables (Helmenstine, 2019). Helmenstine (2019) suggests that the null hypothesis may be more helpfully thought of as a hypothesis which the researcher is seeking to nullify. In order to indicate that a dataset may be suitable for PCA analysis according to the Bartlett's test the resultant P-value should be < 0.05 .

For the KMO measure of sampling accuracy, resultant values between 0.8-1.0 indicate that a sample is adequate, with values below 0.6 indicating that a sample is not adequate (Shrestha, 2021).

Correlation between each pair of variables was determined using Pearson method which determines if two things tend to move together (positive correlation), move in opposite directions (negative correlation), or if there is no relationship at all (zero correlation). Shrestha (2021) suggests that there should be a correlation coefficient (linear relationship between two variables) of > 0.3 with the third being collinearity, that is, a close relationship between two or more predictor variables (Shrestha, 2021).

Following the determination of principal components, further analyses were performed. This included plotting the PCA coordinates as a PCA loading plot, an analysis of the location of supplementary variables in the PCA dimensions, an analysis of variance to determine supplementary variables significantly associated with PCA co-ordinates, and a multivariable linear regression analysis to determine the size and direction of these relationships. Finally hierarchical clustering was performed to determine the grouping of individuals into clusters that captured their responses to the food safety and ethical leadership questions. The analytical approach is summarised in Figure 9.

Figure 9: Principal Component Analysis Process



The following parameters were noted: There were no missing values in the qualitative supplementary variables. Three principal components were initially selected, and two were reported. The data met some assumptions for the analysis of variance, but not others. There was evidence of non-normality within the data which was not able to be corrected. However, this was considered less important given the size of the dataset.

The discussion now turns to the materials and methods relating to the qualitative research strand of this doctoral project, the results of which may be found in Chapter 5.

3.6 Food Safety Culture & Ethical Leadership in Aotearoa New Zealand's Food Businesses: Materials & Methods

3.6.1 Introduction & Research Objectives

The objectives of this research were threefold:

1. to understand the importance of ethical leadership to some of Aotearoa New Zealand's largest food producers and exporters
2. to understand if there are 'uniquely kiwi' characteristics of ethical leadership according to some of Aotearoa New Zealand's largest food producers and exporters
3. to supplement survey data captured in the quantitative research strand of this doctoral research (Chapter 4).

3.6.2 Study Population & Sampling Frame

To gain an understanding of food safety culture and ethical leadership characteristics from an Aotearoa New Zealand food industry perspective, managers responsible for food safety and quality from a broad range of New Zealand food businesses and entities were selected to interview for this research. Members of the NZFSSRC's Industry Advisory Group (IAG) were the identified group for the initial convenience sample. The author is the Associate Director Operations of the NZFSSRC and therefore had business connections with IAG members who were approached with the endorsement of the Centre Director and the Massey Provost whom the Centre reports to.

Role designations vary across these companies, and are contingent on many factors, not the least of which is company size. What mattered when identifying participants was the breadth of knowledge about food safety culture and ethical leadership within each food business, and the participant's ability and willingness to communicate these views to the researcher. The intention was to use a convenience sample of contacts in these food companies, however this approach morphed to snowball sampling due to personal referrals from the initial contacts and the researcher's curiosity (Parker, Scott & Geddes, 2019).

The initial tranche of interviews was followed by interviews with non-members of the NZFSSRC in order to extend the breadth of data. Non-members included new and emerging businesses and plant-based or alternative protein producers. Thirty-two interviews were carried out in total representing four industry associations, one entrepreneur and 26 food businesses. Table 18 details the 31 entities represented by the 32 participants.

Table 18: The Interface Between Ethical Leadership & Food Safety Culture in Aotearoa New Zealand Food Businesses; Food businesses represented in the research

NZFSSRC Member	Sector	Entity Est.	# Staff
Yes	Red Meat	1904	3000
Yes	Red Meat	1948	5000
No	Plant-based Protein	2006	7
Yes	Food Manufacturing & Processing	1990	150
Yes	Retail	1981	20000
No	Dairy	1984	200
Yes	Dairy	2001	21400
No	Pet Food	2020	1
Yes	Horticulture	1980	160
No	Whanau-based	N/A	N/A
No	Whanau-based	2017	5
Yes	Horticulture	1975	400
No	Plant-based Protein	2019	9
No	Dairy	2017	2
Yes	Dairy	2016	103
Yes	Red Meat	1974	N/A
Yes	Horticulture	2004	13
Yes	Seafood	2008	500
Yes	Dairy	2014	350
Yes	Seafood	1881	1400
Yes	Seafood	2012	N/A
Yes	Red Meat	1948	7000
No	Dairy	2015	50
Yes	Plant-based Protein	2018	11
Yes	Dairy	2005	1200
No	Supplement	2017	3
Yes	Poultry	1961	2300
Yes	Horticulture	1991	N/A
No	Plant-based Protein	2019	2
Yes	Whanau-based	1977	500
Yes	Red Meat	1998	644

Twenty-one of the entities represented in this research are NZFSSRC Members; ten are not. Seven represent the dairy sector; five the red meat sector; four the horticulture sector; four plant-based protein; three each from the seafood sector and iwi/Māori-based; and one food manufacturing and processing; one 'other'; one supplements; one retail; and one poultry. Eleven entities have existed for ten years or less; five for up to 20 years; six for up to 40 years; four for up to 60 years; two for over 70 years; one for over 120 years and one for 140 years. One participant did not represent an entity (#10). Of the 27 entities employing staff, ten entities have up to 100 staff; eight have between 100-500 staff; five have between 500-3000 staff; two have between 3000-7000 staff and two 20,000 or over. Industry association numbers are excluded from the staff count as is one entrepreneur.

According to the terms of the consent forms, all participant data has been de-identified. Once participants had agreed to participate in the research, interviews were arranged. Initial contact was made with each participant by email. An information sheet including a consent form was prepared and shared with each participant by email. The signed consent form was received prior to the commencement of each interview for all the participants (Appendix 4).

3.6.3 Survey Instrument Design & Delivery

In order to gain in-depth insight into ethical leadership in Aotearoa New Zealand food businesses, in-person, one-on-one, semi-structured interviews were used for data collection, given their versatility, flexibility (Kallio et al., 2016), feasibility (Denscombe, 2003), and appropriateness in seeking individual opinions or perceptions (Kallio et al., 2016). The qualitative interview, as a structured conversation, is a vehicle for participants to articulate their lived experiences, opinions and activities in their own words, and to explore the meanings behind these, and have become a commonly used research method in the social sciences, due in part to technological advances (Adams, 2010; Brinkman & Kvale, 2018). While guided by a pre-determined framework, semi-structured interviews allow flexibility for both the interviewer and the participant, to change the order of the questions, to seek clarification and to explore issues as they arise (Denscombe, 2003, Doody & Noonan, 2013).

The interviews were intended to elicit data based on both experiences and on privileged information, that is interviewing people with insights that others would not necessarily have; two key criteria for this approach (Denscombe, 2003). The NZFSSRC's network of food safety and quality managers were able to provide the requisite insights from Aotearoa New Zealand food businesses.

Careful planning is required to conduct successful qualitative interviews (Doody & Noonan, 2013). Secondary data analysis preceded each interview through reviewing participating organisations' publicly available artifacts concerning ethics or values including codes of conduct, sustainability, and food safety and quality (Mazhar et al., 2021). This analysis informed the introductory phase of each interview, as secondary data analysis was followed with purposeful and criterion-based primary data collection (Morrow, 2005).

It was initially intended that semi-structured interviews would be held face-to-face, however ongoing disruption from the global pandemic of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) necessitated changing to a virtual method of data collection, a cost-effective solution. All interviews were held using Zoom during October and November 2021, recorded for 31 of the 32 interviews according to the consent form permissions, and the resultant recordings transcribed verbatim by the researcher and verified by participants using email confirmation. Interviews ranged in length from 30 to 90 minutes with the average length being 60 minutes. Each transcription was of a commensurate length. All transcripts were collated alphabetically by participant surname and bound for reference. The data were then analysed manually. In consultation with the primary supervisor, it was decided to produce an anonymised report at the conclusion of the data analysis phase to provide to all participants for their information and interest. This was considered best practice given the researcher's professional relationship with the participants and in recognition of their willingness to and interest in participating in this research.

The primary objective of the interviews was to gain an understanding of the importance of ethical leadership to New Zealand food businesses, and to identify any uniquely 'Kiwi' characteristics of ethical leadership. Guiding ethical leadership questions (Appendix 5) were developed after reviewing 21 publications presenting 15 tools for measuring ethical, servant and authentic leadership, and ethical and integrity climate and culture. In this part of the interview, the importance of organisational and individual ethicality was explored, as was the relationship between ethical and sustainable positioning.

The second objective was to gain an understanding of food safety culture in New Zealand food businesses with questions structured according to Yiannas' Behaviour-Based Food Safety Management System Continuous Improvement Model (2009). This model was chosen as the basis for these guiding questions (Appendix 5) to augment the quantitative research undertaken across Fonterra's Ingredients Business (Chapter 4). Fonterra has developed and implemented a Cultural Maturity Framework in consultation with and based on Frank Yiannas' model upon which the Fonterra survey questions were based in part.

3.6.4 Risk Assessment

A risk assessment relating to this qualitative research strand was undertaken prior to its commencement with likelihood, impacts and mitigations considered (Table 19). Consistent with the approach taken to the quantitative research proposal development described in section 3.4.5, project-specific risks were assessed.

Table 19: The Interface Between Ethical Leadership & Food Safety Culture in Aotearoa New Zealand Food Businesses; Qualitative Research Strand Risk Assessment

Risk	Likelihood L/M/H	Impact L/M/H	Mitigation
Outcomes deemed to be adverse impact publication of research	L	H	Possibility discussed with participating organisations and agreement reached prior to research commencing
Disruption from global pandemic	M	M	Unforeseeable consequences. Convert face-to-face meetings to Zoom
NZ food businesses choose to not participate in interviews	M	H	Communicate purpose of research Ensure disruption from participation is minimised

3.6.5 Data Analysis

Thematic analysis is a widely-used tool for analysing qualitative research data (Braun & Clarke, 2006; Braun & Clarke, 2019; Wilshire & Ronkainen, 2021). It is intuitive, practical, accessible, and theoretically flexible (Braun & Clarke, 2006; Kiger & Varpio, 2020; Wiltshire & Ronkainen, 2021).

Reflexive thematic analysis is the branch of thematic analysis used in this research due to its appropriateness in understanding the experiences and ideas of the 32 participants interviewed for this research; and describing and categorising the data generated through these interviews (Braun & Clarke, 2020).

Having prepared for, conducted and transcribed each of the 32 interviews, and having subsequently become intimately acquainted with the data, the choice was made to continue the close relationship with the data by using a manual process for its analysis. This was carried out solely by the researcher with mentorship, review and feedback provided by the supervisory team. While this may be considered a limitation, this approach is consistent with that espoused by Byrne (2021) who focuses on the individual researcher's involvement with and reflection on their data and analysis, however acknowledges that more than one researcher may be helpful in testing ideas, assumptions or interpretations through a collaborative approach. In addition, while it is possible that themes or codes developed by one researcher could be reproduced by

another, there should be no presumption that this should happen (Byrne, 2021). Neither should the intention be to provide the right answer (Byrne, 2021).

While time-consuming, the evolutionary nature of thematic analysis, and in particular manual thematic analysis, can result in new interpretations of data and iterations of themes, and is useful in enabling a depth of involvement in the data, particularly if the researcher has also been responsible for gathering and transcribing the data (Byrne, 2021).

Each interview question was analysed in turn by extracting the verbatim transcript for each participant into A3-sized documents for pattern identification. To generate initial data codes, participant quotation patterns were colour-coded on the A3 documents (Appendix 6, Step 1). A series of key points raised by participants were written onto Post-it notes, then loosely collated onto A4 sheets of paper, an “organic and unstructured process” consistent with the coding process articulated by Braun and Clarke (2020, p.39) (Appendix 6, Step 2). An inductive, data-driven method was employed, rearranging the Post-it notes on the page and organising them into what were perceived as logical patterns. Personal subjectivity was brought to this imprecise process, ungrouping and regrouping the Post-it notes as the codes and themes were firmed up for the research data using a semantic or overt approach to meaning (Braun & Clarke, 2020). The initial themes were transposed onto A3 sheets of paper and key points extracted from the synthesised Post-it notes were mapped back to the themes (Appendix 6, Step 3).

An iterative process resulted in the emergence of 21 codes which were underpinned by the five themes - *“meaningful, recurring patterns that researchers first develop from the data, and then use to interpret that data for an audience”* (Morgan & Nica, 2020, p.2). The identified themes guided the analytic activity, consistent with the pragmatic perspective (Morgan & Nica, 2020).

The five themes: Values; Responsible Stewardship of Natural Resources; Māori Worldview; Ecosystem Pressures and Leadership and 21 codes are summarised in Table 20.

Table 20: The Interface Between Ethical Leadership & Food Safety Culture in Aotearoa New Zealand Food Businesses: Thematic Analysis Summary of Themes

Themes	Codes
Values	<ul style="list-style-type: none"> ▪ Individual Values ▪ Aligned Values ▪ Company Values <ul style="list-style-type: none"> ▪ Characteristics ▪ People ▪ Supply Chain Leadership
Responsible Stewardship of Natural Resources	<ul style="list-style-type: none"> ▪ Custodianship (Waste Reduction/Minimising Harm/Recycling) ▪ Resource Use ▪ Ethical/Responsible Sourcing
Māori Worldview	<ul style="list-style-type: none"> ▪ Intergenerational value creation ▪ Whanau ▪ Kaitiakitanga ▪ Business with a purpose
Ecosystem Pressures	<ul style="list-style-type: none"> ▪ Social Licence ▪ Future Focus

Themes	Codes
	<ul style="list-style-type: none"> ▪ Packaging ▪ Ethical Sourcing ▪ Regulations/Standards ▪ Risk Management
Leadership	<ul style="list-style-type: none"> ▪ Characteristics ▪ Standards

Four of the six questions that related to ethical leadership lent themselves to this thematic analysis:

- What are the drivers for your organisation positioning itself as an ethical organisation? What does that mean for you?
- How does a focus on an ethical position differ from a focus on a sustainable position?
- How does your ecosystem (network) reflect your company's ethical values?
- Why does ethical leadership matter to you?

Two questions did not lend themselves to this type of analysis given that they generated a list of characteristics or qualities:

- What do you consider the key characteristics of ethical leadership are?
- Do you think there are unique features or characteristics of ethical leadership in Aotearoa New Zealand? If so, what would these be?

Braun & Clarke (2019) emphasise the role of the researcher in the production of knowledge through reflexive thematic analysis and propose that themes are “analytic outputs” which are “actively created” through “analytic work” (p.594). This stage of data analysis was an inherently creative, messy, iterative, and reflective process, interpreting data for sense-making and looking for patterns of shared meaning. Interviews are only a data collection site which is separate from the data analysis process (Brinkman & Kvale, 2018). The metaphor of the interviewer as a miner (Brinkman & Kvale, 2018) is an apt description for the researcher's role in this process; a collector of knowledge which is buried and must be unearthed.

3.6.6 Validity of the research data

Ensuring rigour in qualitative research is an increasingly prominent issue for two reasons; the increase in qualitative research and the lack of consensus about quality assessment criteria (Johnson et al., 2020; Bryman et al., 2008). Standards of quality in qualitative research include credibility, rigor, trustworthiness or validity (Morrow, 2005). Historically, the paradigmatic basis of research has driven the application of such standards (Bryman, 2006; Malterud, 2001; Morrow, 2005; Sale & Brazil, 2004; Tashakkori & Teddlie, 2021) and has resulted in development of a range of frameworks to guide thinking about validity (Dellinger & Leech, 2007; Tashakkori & Teddlie, 2021).

Validity is the term often used in reference to quality of ‘qualitative’ research (Johnson, 2019), and is a point of commonality within the literature (Bryman et al., 2008; Dellinger & Leech, 2007; Johnson, 2019; Malterud, 2001; Mays & Pope, 1995; Morrow, 2005). Validity in this context refers to “qualitative research that is plausible, credible, trustworthy and defensible” (Johnson, 2019, p.2). However, others propose that there is

no consensus either about the definition of validity for qualitative research, or the criteria to measure it (Dellinger & Leech, 2007). So, it can also include other descriptors of validity: dependable, generalisable, legitimate, authentic and having truth value (Dellinger & Leech, 2007, p.312).

Strategies to assist qualitative research validity, of which there are several, include low inference descriptors, for example verbatim quotes; participant feedback; peer review; and reflexivity or self-reflection by the researcher (Johnson, 2019; Johnson, 1997). Reflexivity is a key strategy in minimising the risk of researcher bias, a threat to validity (Johnson, 2019; Malterud, 2001; Morrow, 2005). Mays & Pope (1995) emphasise the need for reflexivity in the design, collection, interpretation and communication of qualitative research to ensure rigour.

For the emerging researcher, the issue is compounded through categorisations of validity throughout the literature: internal validity; external validity; descriptive validity; interpretive validity; theoretical validity; and construct validity. To further complicate the issue, this doctoral research is mixed methods. There are three ways of approaching the assessment of quality of mixed methods research: using one of the generic tools that have been developed for the purpose of assessing the quality of mixed methods research in its entirety; assessing each component of the research against the quality criteria for that particular methodology; or using a bespoke approach (Tashakkori & Teddlie, 2021). In other words, “convergent criteria; separate criteria and bespoke criteria” (Bryman, 2006, p.122). This doctoral research used the second approach; that of speaking to the quality of each component of the research, that is, using separate quality criteria for each of the qualitative and quantitative components (Bryman, 2006, p.122).

A range of strategies have been used in this qualitative research to ensure research validity, employing a holistic interpretation of the term, ‘validity’ according to the discussion above.

Low inference descriptors to ensure alignment with participant input were used by way of verbatim quotations throughout to accurately reflect participant accounts. Transcripts were sent to the participants for review and modification where necessary, to ensure the transcript accurately reflected the conversations that had taken place. The doctoral supervisors provided peer review throughout the planning, surveying, data analysis and reporting phases of this research. Meticulous records were maintained through the research process. All interviews were recorded on Zoom, transcribed and saved on a Massey server. The analytical process has been articulated and supported by photographs of the manual process documenting evidence of record-keeping. This approach has also ensured transparency through the process.

While selecting participants for this research with food safety and quality expertise, diversity of perspectives was introduced through differing participant role designations, representative food sectors, product differentiation, and individual and company demographics. Reflexivity as a researcher and in relation to the design, collection, interpretation and communication of research has been inherent in the researcher’s practice. The research process has been an iterative and months-long one, constantly reflecting, questioning, testing and fine-tuning ideas and approaches, in concert with the supervisory team who have challenged thinking throughout. Objectivity has been maintained while recognising that the researcher is an active part of the research process and therefore brings a degree of subjectivity to it. The doctoral research

process is one of transformation and the researcher subscribes to the idea of Shulamit Reinharz (1997, p.3) whereby in addition to bringing “the self to the field” we “create the self in the field”.

3.7 Summary

This chapter has outlined the research philosophy and approach taken for this doctoral research project. The overarching methodology of and ethical considerations for mixed methods was discussed, followed by discrete discussions of the methods used in the quantitative research strand and qualitative research strand. Having considered the sampling frame, survey instrument design and delivery, risk assessment and methods of data analysis discretely, Chapter 4, Food Safety Culture & Ethical Leadership in New Zealand’s Largest Food Business, will discuss the findings of the quantitative research strand.

Chapter 4: Food Safety Culture & Ethical Leadership in New Zealand's largest food business

This chapter focusses on the results of the quantitative research strand undertaken with the permission of Fonterra Cooperative Group, Aotearoa New Zealand's largest food business, the world's largest exporter of dairy products and the top Aotearoa New Zealand company by revenue, in order to understand the nature of the relationship between food safety culture and ethical leadership.

4.1 Results

A total of 1315 survey responses were received, a 15% response rate; 1000 electronic records received by email file from Fonterra on 17 May 2022, and 315 manual surveys received by courier mail from 31 individual Fonterra sites between 18 – 31 May 2022. To be within 95% certainty that the sample statistics reflect the population statistics, the sampling size for a randomly sampled population of ~9000 is 368 (Krejcie & Morgan, 1970). While the sample size of 1315 was pleasing, there was no way of determining how representative the respondees were of the entire population as no data were available on the characteristics of the non-responders.

The breakdown of survey responses by Ingredients business type is in Table 21; a count of paper-based and electronic survey responses by site, ordered from the largest to the smallest number, is in Table 22; and the demographic data is in Table 23. Noted is the demographic data category, 'Length of service at Fonterra' contained an error on the survey; options provided were the non-mutually exclusive categories 'Between 5-10 years' and "Between 10-20 years'.

Table 21: Food Safety Culture & Ethical Leadership in New Zealand's Largest Food Business: Inaugural Food Safety & Quality (FSQ) Survey Responses by Ingredients Business Type

Ingredients Business Type	Number Responses	Percentage Responses
Distribution Centre	124	9.43%
Manufacturing	1140	86.69%
Not Given	51	43.88%
Total	1315	100.00%

Table 22: Food Safety Culture & Ethical Leadership in New Zealand's Largest Food Business: Inaugural FSQ Survey Responses by Site (Count)

Site	Number of surveys (Paper-based)	Number of surveys (electronic)	Total Surveys by Site
Whareroa	36	92	128
Kauri	48	70	118
Edendale	0	93	93
Darfield	24	64	88
Clandeboye	3	75	78
Te Rapa	5	72	77
Kapuni	9	66	75
Hautapu	3	69	72
Eltham	23	43	66
Edgecumbe	25	40	65
Waitoa UHT	59	4	63
Reporoa	32	24	56
Canpac	0	54	54
Te Awamutu	1	51	52

Site	Number of surveys (Paper-based)	Number of surveys (electronic)	Total Surveys by Site
Stirling	14	25	39
Waitoa	0	28	28
Maungaturoto	0	22	22
Studholme	14	7	21
Pahiatua	0	20	20
Morrinsville	0	17	17
Tauranga Port Stores (TPS)	14	3	17
Waharoa	0	15	15
Trieu	1	10	11
Lichfield	0	10	10
Longburn / FRDC	0	10	10
Crawford Street	4	2	6
Mosgiel	0	6	6
Blank	0	6	6
Takaka	0	1	1
Timaru	0	1	1
Brightwater	0	0	0
	315	1000	1315

Table 23: Food Safety Culture & Ethical Leadership in New Zealand's Largest Food Business: Inaugural FSQ Survey Demographic data

Demographics	Values	N	%
Age	Up to 35 years	229	17.68%
	36-45 years	292	22.55%
	46-55 years	390	30.12%
	56 and over	245	18.92%
	Prefer not to say	139	10.73%
Gender	Female	265	20.46%
	Male	885	68.34%
	Other	27	2.08%
	Prefer not to say	118	9.11%
Role	Staff	480	36.87%
	Supervisor or above	388	29.80%
	Not specified	309	23.73%
	Prefer not to say	125	9.60%
Length of service at Fonterra	Less than 5 years	298	22.96%
	Between 5-10 years	262	20.18%
	Between 10-20 years	391	30.12%
	Over 20 years	278	21.42%
	Prefer not to say	69	5.32%
Length of Service in current or similar role	Less than 2 years	287	22.35%
	2-5 years	351	27.34%
	6-10 years	241	18.77%
	Over 10 years	326	25.39%
	Prefer not to say	79	6.15%

Following this initial analysis of demographic variables, survey category response levels were analysed and represented as percentages for each site for which there were ten responses or more, and as an aggregated data set, a total of 26 tables. Responses were grouped into three categories:

- Level 1-3 (Low agreement)
- Level 4-5 (Some agreement)

- Level 6-7 (High agreement)

Each resultant table was ordered from the highest to the lowest scored question. The aggregated data results are shown below in Table 24.

Table 24: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey Ingredients Business (Manufacturing & Distribution) Aggregated Data

Survey Question		Category Response Level (Percentage)				
		# Responses	% Responses	1-3 ☹	4 & 5 ☺	6 & 7 😊
1.	If I saw something wrong or did something that impacts Food Safety & Quality, I'd feel comfortable telling my supervisor/manager or my team	1311	99.70%	1.07	5.80	93.14
2.	Food safety rules are never OK to bend or break, even if it saves time	1300	98.86%	2.15	5.38	92.46
3.	I am comfortable eating food produced on my site or food made with ingredients from this site	1298	98.71%	3.16	10.40	86.44
4.	My supervisor/manager is honest and can be trusted to tell the truth about Food Safety & Quality	1309	99.54%	3.28	10.62	86.10
5.	Our leaders walk past Food Safety & Quality issues without taking action	1275	96.96%	1.88	12.31	85.80
6.	When it comes to Food Safety & Quality, my supervisor/manager stands up for what is right.	1287	97.87%	3.89	13.91	82.21
7.	My supervisor/manager 'walks the talk' for Food Safety & Quality.	1295	98.48%	5.25	16.14	78.61
8.	My supervisor/manager makes fair and balanced Food Safety & Quality decisions	1295	98.48%	4.40	17.14	78.46
9.	My supervisor/manager listens to what people have to say about Food Safety & Quality	1293	98.33%	4.95	17.32	77.73
10.	My supervisor/manager treats me and my co-workers with dignity and respect	1296	98.56%	5.56	16.74	77.70
11.	My supervisor/manager follows through on promises and commitments about Food Safety & Quality	1290	98.10%	5.43	19.38	75.19
12.	My supervisor/manager clearly explains what is expected of me and my co-workers to keep our food safe	1301	98.94%	5.30	19.52	75.17
13.	My supervisor/manager encourages staff to work together to achieve Food Safety & Quality goals	1304	99.16%	5.29	21.09	73.62
14.	Everyone in my team knows what our Food Safety & Quality risks are, and how to keep the food safe	1311	99.70%	4.35	22.12	73.53
15.	My supervisor/manager acknowledges their mistakes and takes responsibility for them.	1293	98.33%	9.20	19.64	71.15
16.	My supervisor/manager follows through if someone breaks Food Safety & Quality rules	1288	97.95%	6.44	22.98	70.57
17.	My supervisor/manager has explained what "do what's right" means for our team	1295	98.48%	6.95	23.01	70.04
18.	Food Safety & Quality is viewed as an obstacle to making performance targets	1306	99.32%	6.89	24.58	68.53
19.	We talk about Food Safety & Quality as part of our everyday work	1313	99.85%	7.92	27.11	64.97
20.	When we have a Food Safety & Quality issue we learn from it and don't make the same mistake again	1309	99.54%	5.81	34.53	59.66
21.	How useful was the last Food Safety & Quality training you were part of?	1298	98.71%	9.94	33.67	56.39
22.	We discuss our Food Safety & Quality risks with other related teams on site	1307	99.39%	14.77	34.05	51.19
23.	I've seen someone recognised for doing Food Safety & Quality right	1309	99.54%	17.04	32.47	50.50
24.	I could tell you exactly how my team is tracking against our Food Safety & Quality targets	1301	98.94%	24.90	36.51	38.59

In entering data from the manually completed surveys, it became clear that participants scored Question # 20, 'Our leaders walk past Food Safety & Quality issues without taking action', in reverse. On the survey, 1 was 'Little evidence' (There is little evidence that our leaders walk past Food Safety & Quality issues without taking action) through to 7 being 'Strong evidence' (There is strong evidence that our leaders walk past Food Safety & Quality issues without taking action). 222 participants scored a 7 on this question, and then a 7 on the subsequent question, #21, 'My supervisor follows through if someone breaks Food Safety & Quality rules', effectively contradicting participant response to Question 20. This apparent anomaly was discussed with Fonterra personnel with the consensus being that, for Fonterra's purposes, it would make sense that when a person has answered '7 – strong evidence' to Q21, that when a response of '7 – strong evidence' is seen for Question 20 it should be recognized as having been answered in the wrong way and instead was meant to be '1 – Little evidence'. For Fonterra's purposes, 222 entries were corrected to reflect this reversal; 7=1; 6=2; 5=3. In consultation with the supervisory team, this question was removed from the subsequent doctoral research analysis.

4.2 Findings: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey

4.2.1 Reviewing and Cleansing the Data

Having completed the initial data analysis (Section 4.1), the dataset was reviewed and modified for the purposes of this doctoral research. Sites with fewer than ten responses were removed, as were those records where the site was not specified, leaving a total of 1181 records, a reduction of 134 records. Blank fields were notated NG (not given). The categories of 'group (Region, Distribution or Specialty Products)' and 'division (Manufacturing or Distribution)' were removed for the purpose of this analysis as they did not provide any additional information for the purposes of geometric data analysis (GDA), the technique used to analyse this large dataset. Specialty products are produced at specific sites, captured by the 'site' variable.

4.2.2 Socio-demographic Variables

The socio-demographic variables collected in the survey were age, gender, role, length of service at Fonterra, length of service in the current or a similar role, site, group and division. Age brackets were used to capture data about the Age variable (up to 35; 36-45; 46-55; 56 and over; prefer not to say). Gender options were male, female, other and prefer not to say.

Options for length of services at Fonterra were: Less than 5 years; 5-10 years; 10-20 years, over 20 years; prefer not to say, noting the overlap of the two categories that specified 10 years in this category in the survey document. For the length of service in the current or similar role, the options were: Less than 2 years; 2-5 years; 6-10 years; over 10 years; prefer not to say. For the survey participants who used technology-based solutions to respond to the survey, role options were Staff, Supervisor or above, or Prefer not to say. For the 315 survey participants who used paper-based solutions to respond to the survey, an error on the printed survey meant that these three options were not made available. As a result, 309 responses did not specify the role and these were coded NG or not given; three identified as staff and three identified as supervisor.

4.2.3 Assessing Data Suitability for PCA

The Bartlett's test of sphericity for the dataset provided evidence of co-correlation between variables in the dataset, therefore rejecting the null hypothesis and indicating the data are suitable for PCA. The KMO measures the sampling adequacy. The KMO measure for this dataset was larger than 0.9, indicating all variables could be used in the analysis therefore the dataset was suitable for PCA. Correlation analysis (see below) indicated Pearson correlations >0.3, again indicating suitability.

The data were then analysed using PCA (summarised in Figure 9) and described in Section 4.2.4.

4.2.4 PCA Analysis Process

A PCA Loadings Plot was generated to graphically depict the ethical leadership and food safety questions on their respective dimension (Figure 10). It is possible to infer correlation between variables from the loadings plot as variables that are closer together are more correlated with each other.

A supplementary variables analysis was then undertaken with a series of graphs generated to depict these variables against Dimensions 1 and 2. Individual graphs help to interpret the data given the number of variables (Section 4.2.7).

An Analysis of Variance (ANOVA) was performed to understand if there is a difference between means. This test asks if there is a significant relationship between the variables (within and between groups); to see if a supplementary variable is associated with co-ordinates in the first or second dimension. For example, what is the relationship between a supplementary variable such as gender or site, and the dimension? ANOVA F Tests were used to test for significance (Section 4.3)

Linear regression, which helps to predict or estimate the value of one variable (for example role) based on the value of another variable (such as site), was generated using the base package in R (Table 34 and Table 36) (Section 4.4).

The final step in the process was hierarchical clustering. Using the Factoshiny Interface the clustering function categorised individuals into four groups that shared similar characteristics with both ethical leadership and food safety culture. These were mapped against Dimensions 1 and 2, noting that the programme termed this a Factor map (Figure 16). Categorising individuals in this way enabled a better understanding of which sites, genders, age groups and tenures were positively or negatively associated with each of the four groups (Table 41).

- Generally dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Generally satisfied

with both ethical leadership and food safety culture.

4.2.5 Dataset Correlations

Table 25 shows the correlations between each pair of variables (n=1181). All correlations were positive, reflecting the tendency for individuals, on average, to consistently give a similar Likert score for all variables. There is a moderate correlation (0.4-0.59) between the food safety culture variables and the ethical

leadership variables, with the exception of the association between two food safety culture variables and most ethical leadership variables:

- Food safety rules are never ok to bend or break, even if it saves time
- I am comfortable eating food produced on my site or food made from ingredients on this site

The ethical leadership variable that did not follow this pattern was: 'My supervisor is honest and can be trusted to tell the truth about FSQ'. This was moderately correlated with the two food safety culture variables listed above.

Correlations over 0.5 for these two sets of variables (Ethical Leadership and Food Safety Culture) are shown as bold. It appears from Table 25 that the relationship between the food safety culture and ethical leadership variables, while moderate, is stronger than between the pairs of food safety culture variables. There is one strong correlation between food safety culture variables; 'We discuss FSQ risks with other related teams on site' and 'I could tell you exactly how our team is tracking against our FSQ targets'. All but four of the ethical leadership variables are strongly or very strongly related to each other.

Those that are very strongly related are:

- My supervisor listens to what people have to say about FSQ/My supervisor follows through on promises and commitments about FSQ
- My supervisor follows through on promises and commitments about FSQ/My supervisor makes fair and balanced FSQ decisions
- My supervisor follows through on promises and commitments about FSQ/When it comes to FSQ my supervisor stands up for what is right
- My supervisor follows through on promises and commitments about FSQ/My supervisor walks the talk for FSQ

Table 25: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey Correlation between Quantitative Variables

Abbreviated Question	FS_Talk	FS_Know	FS_Learn	FS_Break	FS_Tell	FS_Recognise	FS_Discuss	FS_Track	FS_Obstacle	FS_Train	FS_Eat	EL_Honest	EL_Explain	EL_EI	EL_Listen	EL_Follows	EL_Means	EL_Fair	EL_Standards	EL_Walks	EL_Followup	EL_Respect	
FS_Talk	1.00																						
FS_Know	0.51	1.00																					
FS_Learn	0.45	0.53	1.00																				
FS_Break	0.24	0.31	0.32	1.00																			
FS_Tell	0.36	0.34	0.31	0.37	1.00																		
FS_Recognise	0.50	0.34	0.36	0.17	0.31	1.00																	
FS_Discuss	0.59	0.46	0.45	0.22	0.33	0.58	1.00																
FS_Track	0.56	0.41	0.39	0.21	0.28	0.59	0.63	1.00															
FS_Obstacle	0.42	0.47	0.50	0.33	0.35	0.37	0.43	0.44	1.00														
FS_Train	0.41	0.40	0.39	0.26	0.30	0.36	0.39	0.46	0.43	1.00													
FS_Eat	0.29	0.27	0.29	0.25	0.29	0.21	0.24	0.22	0.31	0.26	1.00												
EL_Honest	0.49	0.49	0.49	0.41	0.53	0.39	0.48	0.43	0.49	0.42	0.41	1.00											
EL_Explain	0.56	0.51	0.47	0.34	0.44	0.46	0.55	0.55	0.49	0.49	0.36	0.66	1.00										
EL_EI	0.53	0.45	0.44	0.26	0.40	0.51	0.54	0.52	0.44	0.41	0.30	0.65	0.69	1.00									
EL_Listen	0.53	0.50	0.47	0.33	0.48	0.49	0.52	0.48	0.51	0.46	0.38	0.70	0.71	0.77	1.00								
EL_Follows	0.53	0.49	0.48	0.33	0.46	0.49	0.56	0.52	0.51	0.47	0.37	0.70	0.73	0.78	0.81	1.00							
EL_Means	0.55	0.49	0.50	0.33	0.41	0.50	0.57	0.57	0.47	0.45	0.33	0.64	0.74	0.71	0.69	0.75	1.00						
EL_Fair	0.54	0.50	0.51	0.34	0.45	0.48	0.55	0.51	0.50	0.46	0.37	0.71	0.74	0.76	0.76	0.80	0.76	1.00					
EL_Standards	0.53	0.52	0.50	0.37	0.51	0.45	0.52	0.48	0.51	0.45	0.39	0.75	0.75	0.73	0.77	0.82	0.74	0.82	1.00				
EL_Walks	0.53	0.51	0.48	0.34	0.49	0.47	0.54	0.49	0.51	0.45	0.40	0.73	0.76	0.74	0.77	0.81	0.76	0.81	0.86	1.00			
EL_Followup	0.45	0.46	0.47	0.25	0.38	0.41	0.44	0.46	0.40	0.43	0.31	0.54	0.62	0.59	0.57	0.64	0.65	0.64	0.64	0.65	1.00		
EL_Respect	0.43	0.44	0.39	0.27	0.42	0.44	0.46	0.41	0.41	0.35	0.35	0.67	0.60	0.69	0.71	0.69	0.62	0.68	0.68	0.69	0.52	1.00	

0.0-0.19 Very weak correlation

0.2-0.39 Weak correlation

0.4-0.59 Moderate correlation

0.6-0.79 Strong correlation

0.8-1.00 Very strong correlation

The correlation analysis in Table 25 therefore provides evidence of a moderate positive correlation between most pairs of food safety culture and ethical leadership variables. This is in contrast to the relatively weak correlations between pairs of food safety culture variables, and the strong correlations between ethical leadership variables.

4.2.6 Principal Components

Eigenvalues were estimated for each dimension. These provide an estimate of the proportion of the total variation in the dataset captured by each orthogonal dimension. As can be seen from Table 26, Dimension 1 represents 53.99% of variance in the data; and Dimension 2, 5.96% variance. The first two dimensions of PCA therefore express 59.95% of the total variance in the dataset and will be used to report the outcomes of this analysis.

Table 26: Food Safety Culture & Ethical Leadership in New Zealand’s largest food business: Inaugural FSQ Survey Eigenvalues of the Dataset represented by PCA

Eigenvalues	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5	Dim 6	Dim 7	Dim 8	Dim 9	Dim 10	Dim 11	Dim 12	Dim 13	Dim 14	Dim 15	Dim 16	Dim 17	Dim 18	Dim 19	Dim 20	Dim 21	Dim 22
Variance	11.88	1.311	1.144	0.781	0.757	0.667	0.603	0.581	0.53	0.475	0.436	0.399	0.354	0.33	0.31	0.282	0.253	0.235	0.214	0.179	0.155	0.126
% of var	53.99	5.961	5.201	3.549	3.44	3.033	2.741	2.639	2.411	2.16	1.98	1.814	1.61	1.501	1.411	1.28	1.148	1.068	0.974	0.812	0.707	0.571
Cumulative % of var	53.99	59.95	65.15	68.7	72.14	75.17	77.92	80.55	82.97	85.13	87.11	88.92	90.53	92.03	93.44	94.72	95.87	96.94	97.91	98.72	99.43	100

Table 27 summarises the PCA Variable Coordinates for Dimensions 1, and 2, otherwise known as principal components 1 and 2. This summary shows that the first principal component has large positive associations with the ethical leadership variables and less so with food safety culture variables and therefore is more strongly associated with ethical leadership than food safety culture. The second component has strong positive associations with food safety culture and less so with ethical leadership, and is, therefore, more strongly associated with food safety culture than ethical leadership.

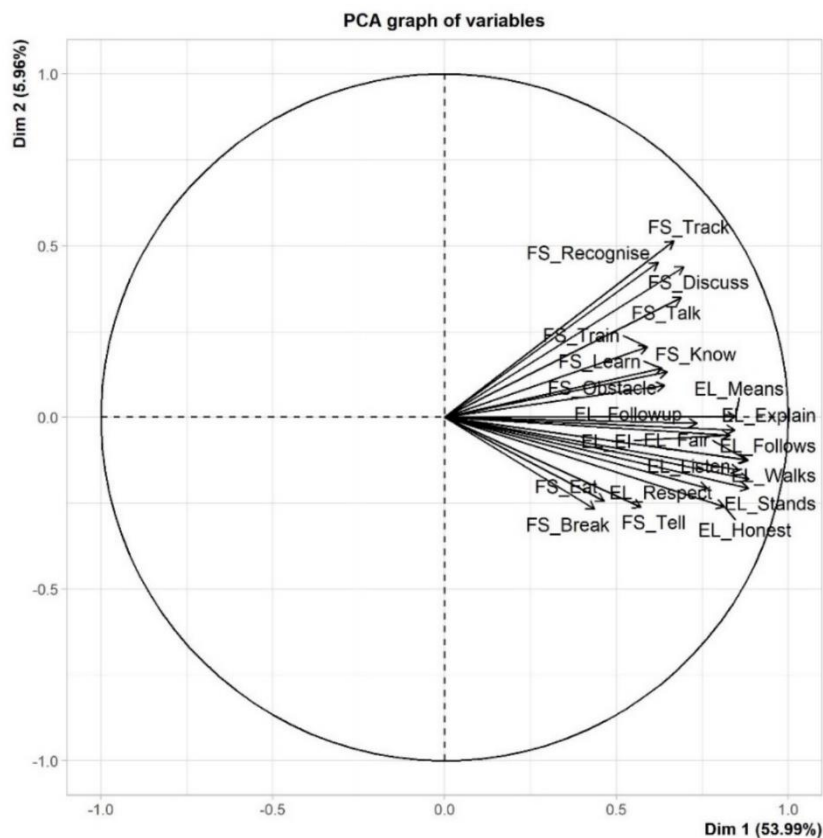
Table 27: Food Safety Culture & Ethical Leadership in New Zealand’s largest food business: Inaugural FSQ Survey PCA Variable Coordinates (R); Dimensions 1, 2 & 3. The prefix EL refers to ethical leadership variables, and the prefix FS refers to food safety variables. The shaded rows correspond to the positive associations for each of the EL and FS variables..

Dimension 1		Dimension 2	
Elstons	0.89	FS_Track	0.51
EL_Walks	0.89	FS_Recognise	0.45
EL_Follows	0.88	FS_Discuss	0.44
EL_Fair	0.88	FS_Talk	0.35
EL_Listen	0.86	FS_Train	0.20
EL_Means	0.85	FS_Learn	0.14
EL_Explain	0.84	FS_Know	0.13
EL_EI	0.83	FS_Obstacle	0.09
EL_Honest	0.81	EL_Means	0.00
EL_Respect	0.77	EL_Followup	-0.02
EL_Followup	0.74	EL_Explain	-0.04
FS_Discuss	0.70	EL_EI	-0.05
FS_Talk	0.69	EL_Follows	-0.12

Dimension 1		Dimension 2	
FS_Track	0.67	EL_Fair	-0.12
FS_Know	0.65	EL_Listen	-0.15
FS_Obstacle	0.64	EL_Walks	-0.18
FS_Learn	0.63	EL_Stand	-0.21
FS_Recognise	0.62	EL_Respect	-0.21
FS_Train	0.59	FS_Eat	-0.24
FS_Tell	0.57	EL_Honest	-0.26
FS_Eat	0.47	FS_Tell	-0.26
FS_Break	0.44	FS_Break	-0.27

Figure 10 shows the PCA loadings plot or graph of variables for Dimensions 1 and 2. The positive association on Dimension 1 for ethical leadership variables, and on Dimension 2 for food safety culture variables is graphically displayed.

Figure 10: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey Principal component analysis graph of variables: Dimensions 1 & 2



4.2.7 Analysis of Categorical (supplementary) Variables

Using Principal Component Analysis Table 28 examines the relationship between categorical (supplementary) variables and each of the two dimensions or components. Considering those variables with co-ordinates of 0.5 or greater, Table 28 shows the coordinates for each variable in each dimension. This shows that:

- For Dimension 1, which is primarily related to ethical leadership, there is a strong positive association with the variables of Site, the role of supervisor, respondents with less than two years in their role, and workers aged 56 and over
- For Dimension 2, which is primarily related to food safety culture, there is also a strong association with the Site variable. Variables categorised as NG or Not Given by respondents (years worked at Fonterra, years in the role; age; gender and role) appear to be positively associated with this dimension.

Gender female appears most positively in Dimension 1 at 0.43 and within that dimension negatively for NG (not given) (-1.13) and other (-1.62). Gender NG (0.21) and Gender other (0.16) appear in Dimension 2.

The role of supervisor is positively associated with Dimension 1 (0.87) with the role of staff negatively associated (-0.54). The role of supervisor has a positive association with Dimension 2 (0.13) and that of staff negatively associated (-0.15). This outcome aligns with the analysis of variance (ANOVA) in section 4.3.

Table 28: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey PCA Categorical (supplementary) Variable Coordinates (R); Dimensions 1 & 2. Shading represents groupings of categorical (supplementary) variables eg pink for Role; blue for Years in the Role etc.

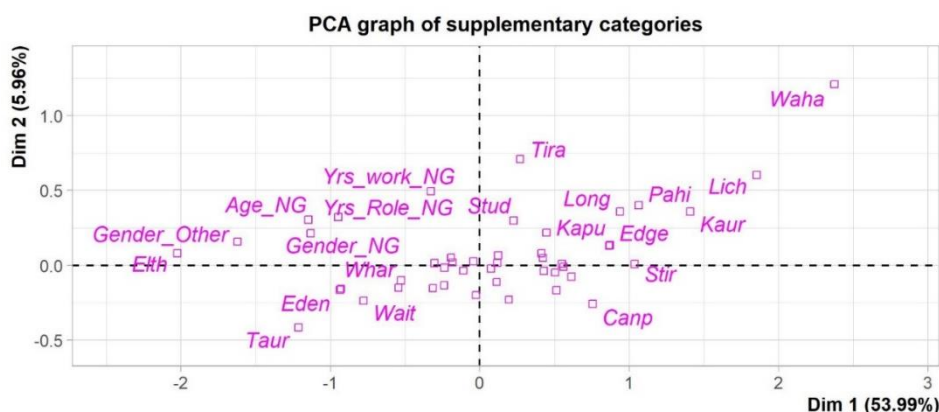
Dimension 1		Dimension 2	
Waha	2.37	Waha	1.21
Lich	1.85	Tira	0.71
Kaur	1.41	Lich	0.6
Pahi	1.06	Yrs_work_NG	0.49
Stir	1.04	Group2_DC	0.42
Long	0.94	Pahi	0.4
Edge	0.87	Kaur	0.36
Role_Sup	0.87	Long	0.36
Group2_Spec	0.84	Yrs_Role_NG	0.32
Group2_CN	0.81	Stud	0.3
Canp	0.75	Age_NG	0.3
Repo	0.61	Kapu	0.22
Morr	0.56	Gender_NG	0.21
Haut	0.55	Gender_Other	0.16
Yrs_Role_<_2_yr	0.51	Group2_CN	0.16
Age_56+	0.5	Edge	0.13
Kapu	0.45	Role_Sup	0.13
Gender_F	0.43	Division_DC	0.12
Maun	0.42	Yrs_work_>_20_yr	0.08
Yrs_work_>_20_yr	0.41	Elth	0.08
Group2_UN	0.39	Yrs_Role_6-10_yr	0.07
Tira	0.27	Maun	0.05
Stud	0.23	Role_NG	0.05
Division_DC	0.2	Group2_Spec	0.04
Yrs_work_<_5_yr	0.19	Yrs_Role_2-5_yr	0.03
Yrs_Role_6-10_yr	0.12	Group2_UN	0.02
Age_46-55	0.12	Age_46-55	0.02
Age_<=35	0.11	Yrs_work_10-20_yr	0.02
Gender_M	0.07	Stir	0.01
Division_Man	0.01	Haut	0.01
Te R	-0.03	Yrs_work_5-10_yr	0.01
Yrs_Role_2-5_yr	-0.04	Morr	-0.01
Age_36-45	-0.11	Division_Man	-0.01
Yrs_work_10-20_yr	-0.18	Gender_M	-0.02
Role_NG	-0.19	Yrs_Role_>_10_yr	-0.02
Te A	-0.24	Gender_F	-0.04
Yrs_Role_>_10_yr	-0.24	Age_36-45	-0.04
Yrs_work_5-10_yr	-0.3	Age_56+	-0.05
Clan	-0.31	Group2_LN	-0.05
Yrs_work_NG	-0.33	Repo	-0.08
Group2_CUS	-0.36	Group2_CUS	-0.08
Group2_LS	-0.4	Darf	-0.1
Darf	-0.53	Age_<=35	-0.11
Role_Sta	-0.54	Group2_LS	-0.12

Dimension 1		Dimension 2	
Group2_LN	-0.54	Te A	-0.13
Division_NG	-0.63	Division_NG	-0.14
Group2_Spec	-0.77	Clan	-0.15
Wait	-0.78	Role_Sta	-0.15
Whar	-0.93	Whar	-0.16
Eden	-0.94	Yrs_Role < 2_yr	-0.17
Yrs_Role_NG	-0.95	Eden	-0.17
Gender_NG	-1.13	Te R	-0.2
Age_NG	-1.15	Yrs_work < 5_yr	-0.23
Taur	-1.21	Wait	-0.24
Gender_Other	-1.62	Canp	-0.26
Elth	-2.02	Group2_Spec	-0.27
Group2_DC	-3.18	Taur	-0.42

Table 28 is depicted as a cloud map (Figure 11) which maps all categorical variables (supplementary categories) as summarised in Table 28 by Dimensions 1 and 2.

Taking an example from Figure 11, the Dimension 1 co-ordinate for Age NG is -1.15 and on Dimension 2, 0.05. Looking at Figure 11, Age NG can be seen mapped at the intersect of these two points.

Figure 11: Food Safety Culture & Ethical Leadership in New Zealand’s largest food business: Inaugural FSQ Survey: PCA Graph of categorical (supplementary) variables, mapped onto Dimensions 1 and 2



For the purposes of clarity, a series of cloud maps follow to demonstrate the contribution of each of four key categorical supplementary variables; Site, Role, Gender, and Age to each of the two Dimensions.

a) Site

Table 29 summaries the co-ordinates for the Site categorical variable by Dimensions 1 and 2. This is followed by Figure 14 which maps these co-ordinates by Dimensions 1 and 2

Dimension 1 Ethical Leadership-associated -2.02

Dimension 2 Food Safety Culture-associated 0.08

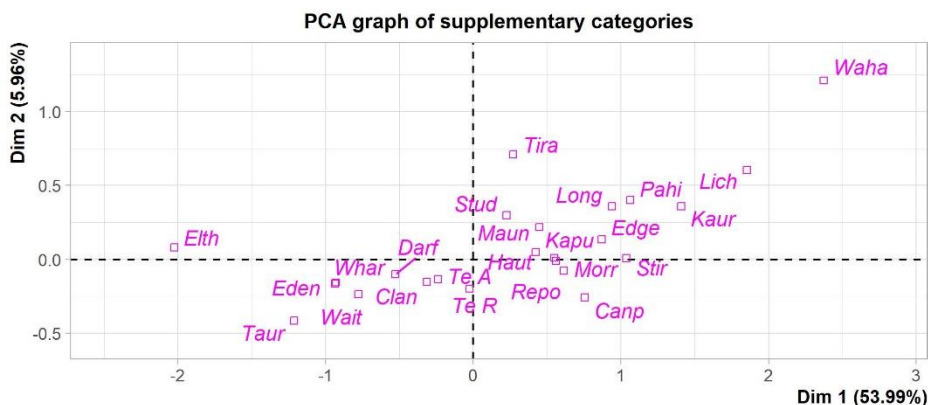
As an example,

Figure 12 maps Eltham at the intersect of -2.02 (Dimension 1) and 0.08 (Dimension 2).

Table 29: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey PCA Categorical Variable Coordinates (Site); Dimensions 1 & 2

Supplementary Categories by Site: Dimensions 1 & 2		Supplementary Categories by Site: Dimensions 1 & 2	
Dimension 1		Dimension 2	
Waha	2.37	Waha	1.21
Lich	1.85	Tira	0.71
Kaur	1.41	Lich	0.60
Pahi	1.06	Pahi	0.40
Stir	1.04	Kaur	0.36
Long	0.94	Long	0.36
Edge	0.87	Stud	0.30
Canp	0.75	Kapu	0.22
Repo	0.61	Edge	0.13
Morr	0.56	Elth	0.08
Haut	0.55	Maun	0.05
Kapu	0.45	Stir	0.01
Maun	0.42	Haut	0.01
Tira	0.27	Morr	-0.01
Stud	0.23	Repo	-0.08
Te R	-0.03	Darf	-0.10
Te A	-0.24	Te A	-0.13
Clan	-0.31	Clan	-0.15
Darf	-0.53	Whar	-0.16
Wait	-0.78	Eden	-0.17
Whar	-0.93	Te R	-0.20
Eden	-0.94	Wait	-0.24
Taur	-1.21	Canp	-0.26
Elth	-2.02	Taur	-0.42

Figure 12: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey PCA Graph of Categorical (Supplementary) Variables (Site) Mapped onto Dimensions 1 & 2



Role

Table 30 summarizes the co-ordinates for the Role categorical variable by Dimensions 1 and 2. This is followed by Figure 13 which maps these co-ordinates by Dimensions 1 and 2. The co-ordinates for the variable Role Supervisor by Dimension are:

Dimension 1 Ethical Leadership associated 0.87

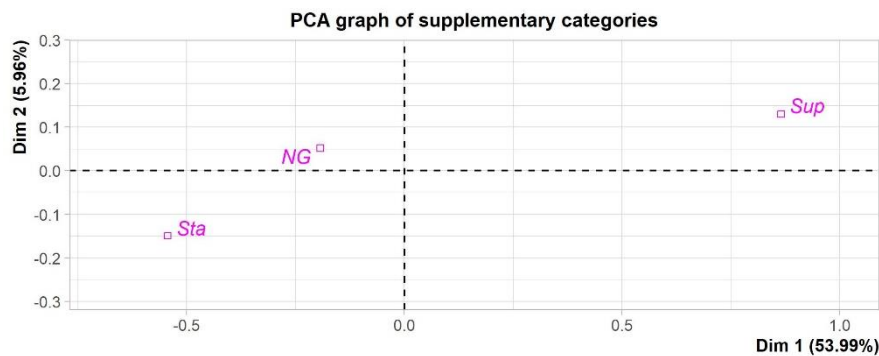
Dimension 2 Food Safety Culture associated 0.13

Figure 13 maps Role Supervisor at the intersect of 0.87 (Dimension 1) and 0.13 (Dimension 2).

Table 30: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey PCA Categorical Variable Coordinates (Role); Dimensions 1 & 2

Supplementary Categories by Role: Dimensions 1 & 2			
Dimension 1		Dimension 2	
Role_Sup	0.87	Role_Sup	0.13
Role_NG	-0.19	Role_NG	0.05
Role_Sta	-0.54	Role_Sta	-0.15

Figure 13: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey PCA Graph of Categorical (Supplementary) Variables (Role) Mapped onto Dimensions 1 & 2



b) Gender

Table 31 summaries the co-ordinates for the Gender categorical variable by Dimensions 1 and 2. This is followed by Figure 14 which maps these co-ordinates by Dimensions 1 and 2. The co-ordinates for the variable Gender Female by Dimension are:

Dimension 1 Ethical Leadership associated 0.43

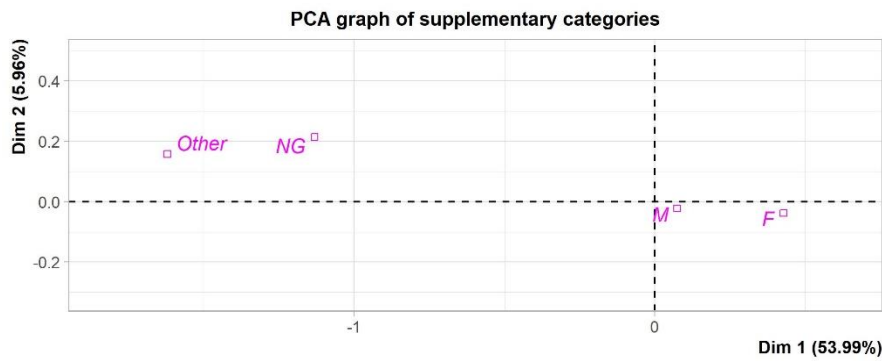
Dimension 2 Food Safety Culture associated -0.04

Figure 14 maps Gender Female at the intersect of 0.43 (Dimension 1) and -0.04 (Dimension 2).

Table 31: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey PCA Categorical Variable Coordinates (Gender); Dimensions 1 & 2

Supplementary Categories by Gender: Dimensions 1 & 2			
Dimension 1		Dimension 2	
Gender_F	0.43	Gender_NG	0.21
Gender_M	0.07	Gender_Other	0.16
Gender_NG	-1.13	Gender_M	-0.02
Gender_Other	-1.62	Gender_F	-0.04

Figure 14: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey PCA Graph of Categorical (Supplementary) Variables (Gender) Mapped onto Dimensions 1 & 2



c) Age

Table 32 summaries the co-ordinates for the Age categorical variable by Dimensions 1 and 2. This is followed by Figure 15 which maps these co-ordinates by Dimensions 1 and 2. The co-ordinates for the variable Age 56+ by Dimension are:

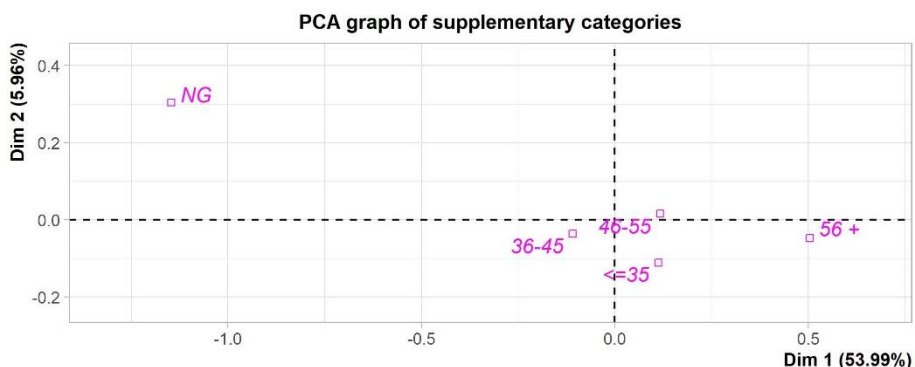
- Dimension 1 Ethical Leadership associated 0.50
- Dimension 2 Food Safety Culture associated -0.05

Figure 15 maps Age 56+ at the intersect of 0.50 (Dimension 1) and -0.05 (Dimension 2).

Table 32: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey PCA Categorical Variable Coordinates (Age); Dimensions 1 & 2

Supplementary Categories by Age: Dimensions 1 & 2			
Dimension 1		Dimension 2	
Age_56 +	0.5	Age_NG	0.3
Age_46-55	0.12	Age_46-55	0.02
Age_<=35	0.11	Age_36-45	-0.04
Age_36-45	-0.11	Age_56 +	-0.05
Age_NG	-1.15	Age_<=35	-0.11

Figure 15: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey PCA Graph of Categorical (Supplementary) Variables (Age) Mapped onto Dimensions 1 & 2



4.3 Analysis of Variance

The purpose of ANOVA or analysis of variance is to determine whether there are significant differences between the means of two or more groups. The following analysis of variance examines the relationships between the coordinates in each dimension and supplementary variables.

4.3.1 Dimension 1

In undertaking an analysis of variance for Dimension 1 (ethical leadership) using PCA, the F values in Table 33 affirm that Site, Gender and Role are significantly associated with that Dimension. Looking at the Probability or P values associated with Dimension 1, what can be seen is that the association between the Site, Gender and Role variables is significant and cannot be attributed to chance. Significant codes are notated as follows: <0.0001 '***' <0.001 '**' <0.01 '*'

Table 33: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey Analysis of Variance Dimension 1

Variable	Df3	Sum Sq	Mean Sq	F value	Pr(>F)
Site2	23	1047.6	45.55	4.321	6.450e-11 ***
Gender	3	295.3	98.43	9.33	4.228e-06 ***
Role	2	449.1	224.52	21.29	8.296e-10 ***
Yrs_work	4	57.8	14.45	1.37	0.24
Yrs_Role	4	66.4	16.61	1.57	0.17
Age	4	93.5	23.36	2.21	0.06

4.3.2 Dimension 2

In undertaking an analysis of Variance for Dimension 2 (Food safety culture) using PCA, what can be seen from the F value in Table 34 is that Site, and Role and to a lesser extent, Years worked at Fonterra are significantly associated with Dimension 2. Looking at the Probability or P values associated with Dimension 2, what can be seen is that the association between the Site, and Role, and to a lesser extent Years worked at Fonterra variables is not by chance, or in other words, these variables show a significant difference that cannot be attributed to chance. Significant codes are notated as follows: 0 '****' 0.001 '**' 0.01 '*'

Table 34: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey Analysis of Variance Dimension 2

Variable	Df3	Sum Sq	Mean Sq	F value	Pr(>F)
Site2	23	75.70	3.29	2.65	3.827e-05 ***
Gender	3	4.37	1.45	1.17	0.318
Role	2	22.70	11.35	9.15	0.000 ***
Yrs_work	4	22.09	5.52	4.45	0.001 **
Yrs_Role	4	4.48	1.11	0.90	0.46
Age	4	5.24	1.31	1.05	0.37

4.4 Linear Regression

Table 35 and Table 36 represent multivariable linear regression generated from R in order to understand the difference between means.

Table 35 presents the relationships between each supplementary variable and the outcome variable (co-ordinate in Dimension 1). The "Intercept" against which all other coefficient data is compared represents:

Site2 = Canpac
 Gender = Female
 Role = Staff
 Age = up to 35 years
 Years in the role = < 2 years
 Years worked @ Fonterra = Less than 5 years

Table 35 shows the coefficients and P values for:

The Eltham, Waitoa and Whareroa sites when compared to Canpac (negatively correlated with Dimension 1);

Role: Supervisor and Role:Not Given when compared to Staff (positively correlated with Dimension 1);

Gender: Male, Other and Not Given compared to Female (negatively correlated with Dimension 1)

Table 35: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey Dimension 1 Coefficients

Variable	Estimate	Std. Error	t value	Pr(> t)
(Intercept) (SiteCanp)	1.19	0.54	2.18	0.029*
SiteClan	-1.30	0.60	-2.15	0.032 *
SiteDarf	-1.18	0.58	-2.01	0.044 *
SiteEden	-1.48	0.58	-2.55	0.011*
SiteEdge	0.15	0.62	0.25	0.80
SiteElth	-2.66	0.63	-4.11	3.00e-05 ***
SiteHaut	-0.24	0.63	-0.38	0.70
SiteKapu	0.10	0.63	0.16	0.88
SiteKaur	0.64	0.58	1.11	0.27
SiteLich	1.47	1.13	1.30	0.19
SiteLong	0.45	1.14	0.39	0.69
SiteMaun	-0.37	0.85	-0.44	0.66
SiteMorr	0.10	0.92	0.11	0.92
SitePahi	-0.02	0.87	-0.03	0.98
SiteRepo	-0.27	0.67	-0.40	0.69
SiteStir	-0.19	0.75	-0.25	0.80
SiteStud	-0.58	0.91	-0.64	0.53
SiteTaur	-2.33	1.06	-2.20	0.028*
SiteTe A	-1.03	0.66	-1.57	0.12
SiteTe R	-0.75	0.60	-1.24	0.22
SiteTira	-0.03	1.09	-0.03	0.98
SiteWaha	2.07	0.99	2.10	0.036 *
SiteWait	-1.74	0.61	-2.86	0.004 **
SiteWhar	-1.75	0.55	-3.16	0.002 **
GenderM	-0.80	0.25	-3.21	0.001 **
GenderNG	-1.38	0.51	-2.71	0.007 **
GenderOther	-2.29	0.70	-3.29	0.001 **
RoleNG	0.88	0.26	3.39	0.0007***

Variable	Estimate	Std. Error	t value	Pr(> t)
RoleSup	1.49	0.25	5.93	4.02e-09 ***
Yrs_work>_20_yr	0.15	0.39	0.38	0.71
Yrs_work10-20_yr	0.15	0.33	-0.44	0.66
Yrs_work5-10_yr	0.46	0.33	-1.40	0.16
Yrs_workNG	0.81	0.59	1.37	0.17
Yrs_Role>_10_yr	0.61	0.35	-1.72	0.09
Yrs_Role2-5_yr	-0.19	0.29	-0.64	0.52
Yrs_Role6-10_yr	-0.23	0.35	-0.67	0.50
Yrs_RoleNG	-1.10	0.54	-2.05	0.040*
Age36-45	-0.17	0.32	-0.55	0.58
Age46-55	-0.16	0.33	-0.49	0.62
Age56 +	0.50	0.38	1.34	0.18
AgeNG	-0.79	0.52	-1.54	0.12

Table 36 presents the relationships between each explanatory variable and the outcome variable (co-ordinate in Dimension 2). The "Intercept" against which all other coefficient data is compared represents:

Site2 = Canpac

Gender = Female

Role = Staff

Age = up to 35 years

Years in the role = < 2 years

Years worked @ Fonterra = Less than 5 years

Table 36 shows the P values for:

The Waharoa, Tirau, Kauri and Litchfield sites when compared to Canpac (positively correlated with Dimension 2);

Role:Supervisor when compared to Staff (positively correlated with Dimension 2);

Years worked @ Fonterra Not Given compared to Years worked @ Fonterra = Less than 5 years (positively correlated with Dimension 2).

Table 36: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey Coefficients Dimension 2

Variable	Estimate	Std. Error	t value	Pr(> t)
(Intercept) (SiteCanp)	-0.56	0.19	-2.99	0.003**
SiteClan	0.10	0.21	0.48	0.63
SiteDarf	0.17	0.20	0.84	0.40
SiteEden	0.08	0.20	0.39	0.70
SiteEdge	0.39	0.22	1.83	0.07
SiteElth	0.33	0.22	1.49	0.14
SiteHaut	0.31	0.22	1.44	0.15
SiteKapu	0.26	0.22	1.23	0.22
SiteKaur	0.64	0.20	3.25	0.001 **
SiteLich	1.06	0.39	2.74	0.006 **
SiteLong	0.57	0.39	1.45	0.15

Variable	Estimate	Std. Error	t value	Pr(> t)
SiteMaun	0.26	0.29	0.89	0.38
SiteMorr	0.21	0.31	0.66	0.51
SitePahi	0.65	0.30	2.17	0.030*
SiteRepo	0.18	0.23	0.76	0.45
SiteStir	0.26	0.26	1.00	0.32
SiteStud	0.54	0.31	1.72	0.09
SiteTaur	-0.18	0.36	-0.50	0.62
SiteTe A	0.18	0.23	0.81	0.42
SiteTe R	0.05	0.21	0.22	0.83
SiteTira	1.02	1.02	2.71	0.006 **
SiteWaha	1.58	0.34	4.67	3.32e-06 ***
SiteWait	0.01	0.21	0.04	0.97
SiteWhar	0.06	0.19	0.33	0.74
GenderM	-0.08	0.09	-0.91	0.37
GenderNG	-0.19	0.17	-1.07	0.29
GenderOther	0.01	0.24	0.03	0.98
RoleNG	0.17	0.09	1.91	0.06
RoleSup	0.29	0.09	3.38	0.000***
Yrs_work>_20_yr	0.34	0.13	2.53	0.012*
Yrs_work10-20_yr	0.26	0.11	2.24	0.025 *
Yrs_work5-10_yr	0.17	0.11	1.48	0.14
Yrs_workNG	0.56	0.20	2.76	0.006 **
Yrs_Role>_ 10_yr	0.03	0.12	0.23	0.82
Yrs_Role2-5_yr	0.14	0.10	1.42	0.16
Yrs_Role6-10_yr	0.11	0.12	0.93	0.35
Yrs_RoleNG	0.15	0.18	0.81	0.42
Age36-45	-0.05	0.11	-0.50	0.62
Age46-55	-0.10	0.11	-0.87	0.39
Age56 +	-0.15	0.13	-1.13	0.26
AgeNG	0.19	0.18	1.07	0.28

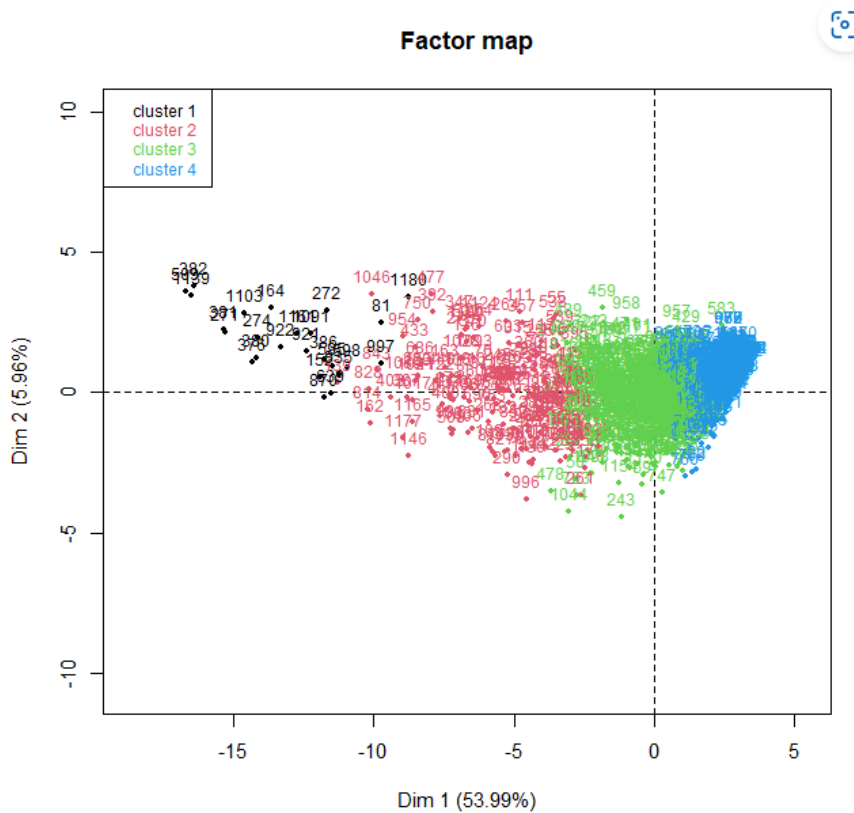
4.5 Hierarchical Clustering of Individuals

Applying the clustering function using the R Factoshiny Interface categorises individuals into groups that share typical characteristics. Four groups were identified, each of which is allocated a distinct colour for ease of recognition. The clustered factor map of individuals by Dimensions 1 (Ethical Leadership - associated) and 2 (Food Safety Culture associated) can be seen in Figure 16.

In general, most of the variation between Clusters is determined by their location in Dimension 1 (Ethical Leadership - associated), with Cluster 1 (black) showing the strongest negative association with Dimension 1 and Cluster 4 showing the strongest positive association with Dimension 1. Associations between Clusters and Dimension 2 (Food Safety Culture-associated) are more subtle. On average Cluster 2 (red) and Cluster 3 (green) are more negatively associated with Dimension 2 (Food Safety Culture-associated) than Clusters 1 (black) and 4 (blue). Cluster 1 individuals were therefore a group most likely to provide negative responses

for ethical leadership questions, but not as negative for food safety questions. In contrast Cluster 4 individuals were most likely to be positive for both ethical leadership and food safety questions.

Figure 16: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey PCA Clustered Factor Map, showing the location of Individuals in Dimensions 1 & 2, coloured by their hierarchical cluster membership.



Paragons, or individual records within the dataset which typify the characteristics of each cluster, were identified. The responses to each of the survey questions by these individuals are provided in Tables 37-40.

Cluster 1: Generally Dissatisfied (especially with ethical leadership)

Table 37: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey PCA Cluster 1 Paragons Typifying the Cluster Characteristics

Individual	FS_Talk	FS_Know	FS_Learn	EL_Honest	FS_Break	FS_Tell	FS_Recognise	FS_Discuss	FS_Track	FS_Obstacle	EL_Explain	EL_EI	EL_Listen	EL_Follows	EL_Means	EL_Fair	EL_Standards	EL_Walks	EL_Followup	EL_Respect	FS_Train	FS_Eat
1091	4	3	3	1	4	4	2	2	1	4	3	1	1	1	1	3	2	1	3	1	1	7
274	1	2	3	3	2	3	1	1	1	2	1	1	1	1	2	3	1	1	1	2	1	4
921	4	5	1	1	5	5	3	1	1	1	2	1	4	1	1	1	1	1	4	1	1	7
380	1	4	1	1	7	4	1	1	1	4	1	1	1	1	1	1	1	1	1	1	1	4
376	1	2	1	1	7	4	2	1	1	3	1	1	1	1	1	1	1	1	1	2	1	4

Individuals representative of Cluster 1, the generally dissatisfied, (Table 37) are more likely to score the questions from 1-7 with the majority of responses scored as 1 indicating dissatisfaction with food safety culture and ethical leadership at Fonterra.

Cluster 2: Somewhat Dissatisfied (with both ethical leadership and food safety culture)

Table 38: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey
PCA Cluster 2 Paragons Typifying the Cluster Characteristics

Individual	FS_Talk	FS_Know	FS_Learn	EL_Honest	FS_Break	FS_Tell	FS_Recognise	FS_Discuss	FS_Track	FS_Obstacle	EL_Explain	EL_EI	EL_Listen	EL_Follows	EL_Means	EL_Fair	EL_Stand	EL_Walks	EL_Followup	EL_Respect	FS_Train	FS_Eat
371	3	4	5	5	5	6	2	4	3	4	4	4	4	4	4	4	4	4	4	5	4	4
1120	4	7	1	4	6	6	1	4	4	2	6	4	4	4	5	4	1	7	6	4	4	6
210	4	3	4	4	7	7	4	4	1	4	5	3	5	4	4	5	5	4	4	2	4	6
440	1	6	6	4	6	5	2	3	3	2	4	2	3	3	3	3	3	3	6	4	4	6
450	4	4	6	6	6	7	1	2	1	4	3	3	3	3	2	2	2	2	5	6	4	5

Individuals representative of Cluster 2, the somewhat dissatisfied, (Table 38) are more likely to score the survey questions from 1-7, with the majority of responses sitting between 3-4. These individuals are indicating they are somewhat dissatisfied with the food safety culture and ethical leadership at Fonterra.

Cluster 3: Somewhat Satisfied (with both ethical leadership and food safety culture)

Table 39: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey
PCA Cluster 3 Paragons Typifying the Cluster Characteristics

Individual	FS_Talk	FS_Know	FS_Learn	EL_Honest	FS_Break	FS_Tell	FS_Recognise	FS_Discuss	FS_Track	FS_Obstacle	EL_Explain	EL_EI	EL_Listen	EL_Follows	EL_Means	EL_Fair	EL_Stand	EL_Walks	EL_Followup	EL_Respect	FS_Train	FS_Eat
1087	4	6	5	5	7	7	5	4	4	5	5	5	5	5	6	6	6	6	5	7	5	7
853	5	5	6	7	6	7	3	4	4	4	6	6	4	4	5	4	6	6	6	6	4	6
1153	4	5	5	7	7	7	4	4	3	5	5	4	5	5	6	6	6	6	6	5	4	7
764	4	6	5	6	7	7	4	5	4	6	5	6	5	6	4	5	7	6	6	6	5	7
463	5	7	5	6	7	6	4	5	3	4	6	5	5	6	6	6	5	6	5	5	6	7

Individuals representative of Cluster 3, the satisfied, (Table 39) are more likely to score the questions from 3 - 7 with the majority of responses sitting between 4-6. These individuals are somewhat satisfied with the food safety culture and ethical leadership at Fonterra.

Cluster 4: Generally Satisfied (with both ethical leadership and food safety culture)

Table 40: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey
PCA Cluster 3 Paragons Typifying the Cluster Characteristics

Individual	FS_Talk	FS_Know	FS_Learn	EL_Honest	FS_Break	FS_Tell	FS_Recognise	FS_Discuss	FS_Track	FS_Obstacle	EL_Explain	EL_EI	EL_Listen	EL_Follows	EL_Means	EL_Fair	EL_Stand	EL_Walks	EL_Followup	EL_Respect	FS_Train	FS_Eat
811	6	7	6	7	7	7	6	5	6	7	6	7	6	6	7	7	7	7	7	7	6	7
145	7	7	7	7	7	7	7	5	4	4	7	7	7	7	7	7	7	6	7	5	6	7
756	7	7	6	7	7	7	5	6	5	7	7	7	7	7	7	7	6	6	6	7	6	7
447	7	7	6	7	7	7	5	6	5	6	6	6	6	7	7	7	7	7	6	7	6	7
723	6	6	7	7	7	7	7	5	4	7	7	7	7	7	6	7	7	7	6	6	6	7

Individuals representative of Cluster 4, the generally satisfied, (Table 40) are more likely to score the questions from 4-7, however the majority of individuals are more likely to score food safety culture and ethical leadership within Fonterra at 6-7 and are therefore generally satisfied with the food safety culture and ethical leadership at Fonterra. Responses to ethical leadership questions appear to be less variable for each of the clusters.

Each of the four clusters of individuals can be considered by reviewing the associations between cluster membership and the supplementary categorical variables determined by the v-test (the quantile of a normal distribution) associated with the p-values, with the sign indicating over or under representation in the cluster. Note these parameter estimates are independent of the effects of other variables and are therefore adjusted for confounding. (Table 41).

Table 41: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey Description of 4 Clusters by Quantitative Variables and Categories

Cluster 1		Cluster 2		Cluster 3		Cluster 4	
Site2=Elth	3.42	Role=Role_Sta	3.36	Role=Role_Sup	3.38	Site2=Kaur	5
Age=Age_NG	2.82	Yrs_work=Yrs_work_5-10_yr	2.73	Site2=Maun	2.66	Site2=Waha	4.29
Gender=Gender_Other	2.47	Gender=Gender_NG	2.3	Site2=Clan	1.55	Site2=Edge	2.37
Site2=Whar	2.38	Site2=Wait	2.17	Yrs_work=Yrs_work_>_20_yr	0.804	Role=Role_Sup	2.15
Role=Role_Sta	2.09	Site2=Eden	1.77	Site2=Whar	0.712	Site2=Lich	2.07
Site2=Eden	1.62	Group2=Group2_CUS	1.57	Site2=Eden	0.118	Yrs_Role=Yrs_Role_<_2_yr	1.97
Gender=Gender_NG	1.56	Age=Age_56 +	1.26	Age=Age_56 +	-0.104	Yrs_work=Yrs_work_NG	1.79
Yrs_work=Yrs_work_NG	1.23	Site2=Elth	1.42	Site2=Wait	-0.123	Yrs_work=Yrs_work_>_20_yr	1.6
Site2=Wait	1.1	Site2=Clan	1.4	Site2=Canp	-0.166	Age=Age_56 +	0.789
Yrs_work=Yrs_work_5-10_yr	0.0583	Site2=Canp	0.968	Site2=Edge	-0.235	Site2=Canp	0.529
Site2=Maun	-0.434	Site2=Whar	0.632	Yrs_Role=Yrs_Role_<_2_yr	-0.385	Site2=Elth	-1.06
Site2=Lich	-0.781	Group2=Group2_LS	0.617	Age=Age_NG	-0.42	Yrs_work=Yrs_work_5-10_yr	-1.13
Yrs_work=Yrs_work_>_20_yr	-0.849	Gender=Gender_Other	0.232	Gender=Gender_Other	-0.528	Site2=Maun	-1.2
Site2=Edge	-0.934	Age=Age_NG	0.152	Site2=Kaur	-1.2	Gender=Gender_Other	-1.3
Site2=Waha	-1.01	Site2=Lich	-0.108	Gender=Gender_NG	-1.25	Age=Age_NG	-1.44
Site2=Clan	-1.23	Yrs_Role=Yrs_Role_<_2_yr	-0.161	Yrs_work=Yrs_work_5-10_yr	-1.34	Gender=Gender_NG	-1.77
Site2=Kaur	-1.68	Yrs_work=Yrs_work_NG	-0.509	Site2=Lich	-1.55	Site2=Clan	-2.12
Site2=Canp	-2.45	Site2=Maun	-1.43	Role=Role_Sta	-1.62	Site2=Wait	-2.5
Yrs_Role=Yrs_Role_<_2_yr	-2.71	Site2=Edge	-1.95	Site2=Waha	-2.16	Role=Role_Sta	-2.55
Age=Age_56 +	-3.45	Site2=Waha	-2.19	Yrs_work=Yrs_work_NG	-2.17	Site2=Eden	-2.7
Role=Role_Sup	-4.18	Yrs_work=Yrs_work_>_20_yr	-2.24	Site2=Elth	-2.59	Site2=Whar	-2.73
		Site2=Kaur	-3.79				
		Role=Role_Sup	-3.89				

Cluster 1, the generally dissatisfied especially with ethical leadership, is positively correlated with four sites (Eltham, Whareroa, Edendale and Waitoa), with the role of staff, and with age, years worked or gender either not given or identified as 'other'. All quantitative variables are negatively correlated. If these correlations are considered within the context of Figure 16, PCA Factor Map, which maps individuals to Dimension 1 (ethical leadership) and Dimension 2 (food safety culture), individuals are more likely to be dissatisfied with ethical leadership but are less dissatisfied with the food safety culture.

Cluster 2, the somewhat dissatisfied with both ethical leadership and food safety culture, is positively correlated with six sites (Waitoa, Edendale, Eltham, Clandeboyne, Canpac, Whareroa), with the role of staff, with having worked at Fonterra for 5-10 years, aged over 56, with gender and age, either not given or categorised as 'other'. All quantitative variables are negatively correlated, but to a lesser degree than Cluster 1. Referring to Figure 16 and considering Cluster 2 individuals by Dimension 1 (ethical leadership) and Dimension 2 (food safety culture), individuals are also more likely to be dissatisfied with the ethical

leadership albeit less so than Cluster 1 individuals. Individuals in this group are slightly less dissatisfied with food safety culture than individuals in Cluster 1.

Cluster 3, the somewhat satisfied with both ethical leadership and food safety culture, is positively correlated with most quantitative variables, with the role of supervisor, with four sites (Maungaturoto, Clandeboyne, Whareroa, Edendale) and with individuals who have worked for Fonterra for longer than 20 years. Four quantitative variables and seven sites (Waitoa, Canpac, Edgecumbe, Kauri, Lichfield, Waharoa, Eltham) are negatively correlated, as is the role of staff, and gender, age, and years worked not given or 'other'. The four quantitative variables negatively correlated in Cluster 3 are related to food safety culture: FS learn, FS recognise, FS track and FS train. The survey questions which individuals in Cluster 3 are negatively associated with were:

- When we have a Food Safety & Quality issue we learn from it and don't make the same mistake again
- I've seen someone recognised for doing Food Safety & Quality right
- I could tell you exactly how my team is tracking against our Food Safety & Quality targets
- How useful was the last Food Safety & Quality training you were part of?

Examining Cluster 3, the somewhat satisfied individuals in the context of Figure 16 and Dimension 1 (ethical leadership associated) and Dimension 2 (food safety culture associated), this group is largely positive about ethical leadership with the majority of individuals positive about food safety culture.

Cluster 4, the generally satisfied with both ethical leadership and food safety culture, is positively correlated with all quantitative variables, with five sites (Kauri, Waharoa, Edgecumbe, Lichfield, Canpac) and with the role of supervisor. It is also positively correlated with individuals aged 56+ and with years worked in the role being less than two years, and length of time worked at Fonterra either not given or more than 20 years. Cluster 4 is negatively correlated with six sites (Whareroa, Edendale, Waitoa, Maungaturoto, Clandeboyne, Eltham). There are also negative correlations with gender and age either not given or other, the role of staff, and having worked at Fonterra for between 5-10 years.

Examining Cluster 4, the generally satisfied individuals in the context of Figure 16 and Dimension 1 (ethical leadership) and Dimension 2 (food safety culture), this group is positive about ethical leadership and largely positive about food safety culture.

Supervisors at three of the four sites positively correlated in Cluster 3 (Clandeboyne, Whareroa, Edendale) have a more positive view of food safety culture and ethical leadership at Fonterra than do the staff at those sites represented in Clusters 1 and 2. Waitoa, Canpac and Eltham sites and the role of staff are negatively correlated in Cluster 3. Staff at these sites are also represented in Clusters 1 and 2. Likewise supervisors at Canpac represented in Cluster 4 have a more positive view that do their staff represented in Cluster 2. With the exception of Maungaturoto, the five sites negatively correlated in Cluster 4 are all represented in Clusters 1 and 2.

Staff whose age, years worked or gender are either not given or identified as 'other' are positively correlated with Clusters 1 and 2 and negatively correlated with Clusters 3 and 4. It may be inferred that staff are

unwilling to provide demographic information that may lead to individuals who are dissatisfied with food safety culture or ethical leadership at Fonterra being identified.

It may also be inferred that there is a disparity between the views of staff and supervisors represented by these data. Clusters 1 and 2 represent staff who are dissatisfied with the ethical leadership and largely dissatisfied with the food safety culture at Fonterra, and Clusters 3 and 4 represent supervisors who are satisfied with the food safety culture and ethical leadership at Fonterra.

4.6 Survey Responses (Average) By Role (n=1181)

Table 42 contains the average survey statement scores by role; Staff, Supervisors and Role Not Given. With one exception (When we have a FSQ issue we learn from it and don't make the same mistake again) the average score by Supervisors is higher than that of Staff for all survey statements.

With the exception of three survey statements, the average score by Role Not Given is also higher than that of Staff. The three exceptions are:

- My supervisor/manager is honest and can be trusted to tell the truth about FSQ
- If I saw something wrong or did something that impacts FSQ, I'd feel comfortable telling my supervisor/manager or my team
- FS rules are never OK to bend or break, even if it saves time

With the exception of one survey statement (When we have a FSQ issue we learn from it and don't make the same mistake again) the average score by Supervisor is higher than that of Role Not Given.

Table 42: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey Average Survey Statement Response by Role (n=1181)

Full Survey Statement	Abbreviated Survey Statement	Average Staff n=445	Average Supervisors n=363	Average NG n=373
Percentage of responses (n=1181)		37.68%	30.74%	31.58%
We talk about FSQ as part of our everyday work	FS_Talk	5.44	6.28	5.66
Everyone in my team knows what our FSQ risks are, and how to keep the food safe	FS_Know	5.98	6.14	5.98
When we have a FSQ issue we learn from it and don't make the same mistake again	FS_Learn	5.60	5.50	5.76
FS rules are never OK to bend or break, even if it saves time	FS_Break	6.74	6.75	6.58
If I saw something wrong or did something that impacts FSQ, I'd feel comfortable telling my supervisor/manager or my team	FS_Tell	6.65	6.89	6.63
I've seen someone recognised for doing FSQ right	FS_Recognise	4.68	5.60	4.98
We discuss our FSQ risks with other related teams on site	FS_Discuss	4.87	5.69	4.98
I could tell you exactly how my team is tracking against our FSQ targets	FS_Track	4.16	5.29	4.54
FSQ is viewed as an obstacle to making performance targets	FS_Obstacle	5.74	5.98	5.80
How useful was the last FSQ training you were part of?	FS_Train	5.42	5.53	5.44
I am comfortable eating food produced on my site or food made with ingredients from this site.	FS_Eat	6.36	6.66	6.38
My supervisor/manager is honest and can be trusted to tell the truth about FSQ	EL_Honest	6.34	6.66	6.29
My supervisor/manager clearly explains what is expected of me and my co-workers to keep our food safe.	EL_Explain	5.87	6.35	6.00

Full Survey Statement	Abbreviated Survey Statement	Average Staff n=445	Average Supervisors n=363	Average NG n=373
My supervisor/manager acknowledges their mistakes and takes responsibility for them.	EL_EI	5.50	6.18	5.82
My supervisor/manager listens to what people have to say about FSQ	EL_Listen	5.97	6.43	6.10
My supervisor/manager follows through on promises and commitments about FSQ	EL_Follows	5.82	6.26	5.97
My supervisor/manager has explained what "do what's right" means for our team	EL_Means	5.67	6.17	5.88
My supervisor/manager makes fair and balanced FSQ decisions	EL_Fair	5.96	6.40	6.03
When it comes to FSQ, my supervisor/manager stands up for what is right.	EL_Stand	6.12	6.51	6.22
My supervisor/manager 'walks the talk' for FSQ.	EL_Walks	5.96	6.45	6.04
My supervisor/manager follows through if someone breaks FSQ rules	EL_Followup	5.73	6.07	5.91
My supervisor/manager treats me and my co-workers with dignity and respect	EL_Respect	5.94	6.45	6.03

Table 43 examines the data in more detail by Role (Staff, Supervisor and Not Given) for each survey statement for each site.

Table 43: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey Average scores by Role (Staff, Supervisor and Not Given) for each survey statement for each site)

Total # by Role	Site & Role	FS_Talk	FS_Know	FS_Learn	FS_Break	FS_Tell	FS_Recognise	FS_Discuss	FS_Track	FS_Obstacle	FS_Train	FS_Eat	EL_Honest	EL_Explain	EL_EI	EL_Listen	EL_Follows	EL_Means	EL_Fair	EL_Standis	EL Walks _	EL_Followup	EL_Respect
		We talk about FSQ as part of our everyday work	Everyone in my team knows what our FSQ risks are, and how to keep the food safe	When we have a FSQ issue we learn from it and don't make the same mistake again	FS rules are never OK to bend or break, even if it saves time	If I saw something wrong or did something that impacts FSQ, I'd feel comfortable telling my supervisor/manager or my team	I've seen someone recognised for doing FSQ right	We discuss our FSQ risks with other related teams on site	I could tell you exactly how my team is tracking against our FSQ targets	FSQ is viewed as an obstacle to making performance targets	How useful was the last FSQ training you were part of?	I am comfortable eating food produced on my site or food made with ingredients from this site.	My supervisor/manager is honest and can be trusted to tell the truth about FSQ	My supervisor/manager clearly explains what is expected of me and my co-workers to keep our food safe.	My supervisor/manager acknowledges their mistakes and takes responsibility for them.	My supervisor/manager listens to what people have to say about FSQ	My supervisor/manager follows through on promises and commitments about FSQ	My supervisor/manager has explained what "do what's right" means for our team	My supervisor/manager makes fair and balanced FSQ decisions	When it comes to FSQ, my supervisor/manager stands up for what is right.	My supervisor/manager 'walks the talk' for FSQ.	My supervisor/manager follows through if someone breaks FSQ rules	My supervisor/manager treats me and my co-workers with dignity and respect
28	Canpac Staff	6.07	6.50	5.89	6.89	6.89	4.79	4.96	4.79	6.29	5.93	6.21	6.86	6.25	5.96	6.46	6.46	6.00	6.39	6.50	6.11	5.57	6.39
19	Canpac Super	6.37	6.21	5.21	6.89	7.00	5.42	5.37	5.11	5.68	5.84	6.26	6.74	6.58	6.32	6.42	6.32	6.21	6.53	6.68	6.63	6.16	6.53
3	Canpac NG	4.67	6.00	5.00	7.00	7.00	2.00	3.00	2.33	4.67	7.00	5.00	7.00	6.67	7.00	7.00	6.00	6.00	6.00	6.67	7.00	7.00	7.00
24	Clandeboyne Staff	5.21	6.00	5.67	6.92	6.63	4.17	4.38	3.46	5.67	4.96	5.96	6.29	5.63	4.83	5.63	5.38	5.29	5.67	5.75	5.63	5.38	5.46
39	Clandeboyne Super	6.28	5.95	4.95	6.51	6.92	5.31	5.49	4.82	6.23	4.92	6.54	6.64	6.10	5.87	6.33	6.18	5.79	6.23	6.31	6.15	5.74	6.31
9	Clandeboyne NG	5.33	6.22	5.89	6.78	6.78	4.56	4.67	4.78	5.56	5.78	6.67	6.56	6.22	6.56	6.56	6.56	5.89	6.44	6.56	6.11	6.56	6.33
36	Darfield Staff	5.58	5.92	5.72	6.72	6.75	5.03	5.22	3.75	5.86	5.47	6.61	6.22	5.50	5.22	5.92	5.53	5.47	5.92	5.92	5.75	5.47	5.83
22	Darfield Super	6.23	6.64	6.09	7.00	7.00	6.00	5.86	5.64	6.82	5.45	6.86	6.73	6.59	6.45	6.73	6.50	6.14	6.59	6.68	6.50	6.45	6.77
26	Darfield NG	4.38	5.46	5.23	5.85	6.54	4.23	3.69	3.15	5.08	5.23	6.31	6.15	5.50	5.12	5.42	5.50	5.27	5.31	5.88	5.50	5.46	5.85
45	Edendale Staff	4.67	5.42	4.84	6.60	6.36	3.96	4.09	3.44	5.38	5.04	6.20	6.04	5.42	4.89	5.47	5.11	5.13	5.53	5.84	5.62	5.24	5.47
31	Edendale Super	6.19	5.97	5.48	7.00	6.87	5.68	5.71	5.55	6.23	5.87	6.84	6.58	6.23	6.03	6.42	6.19	6.19	6.35	6.61	6.42	5.74	6.26
10	Edendale NG	6.00	6.10	6.30	6.30	6.60	3.90	4.00	3.80	5.30	5.60	6.00	5.90	5.50	5.00	5.70	5.50	5.30	5.80	6.20	5.80	5.40	6.40
21	Edgecumbe Staff	6.19	6.24	6.05	6.81	6.81	5.48	5.33	4.48	6.38	5.62	6.67	6.52	6.33	6.05	6.24	6.14	6.24	6.43	6.43	6.24	5.86	6.33
14	Edgecumbe Super	6.50	6.71	5.93	6.93	7.00	5.79	6.36	5.93	5.57	5.07	7.00	6.93	6.57	6.57	6.71	6.50	6.36	6.57	6.71	6.71	6.29	6.86
28	Edgecumbe NG	5.89	6.04	5.89	6.71	6.71	5.93	5.14	5.00	6.07	5.75	6.61	6.54	6.46	6.36	6.29	6.11	6.14	6.36	6.39	6.18	5.96	6.18
23	Eltham Staff	3.91	5.13	4.26	6.39	5.87	3.04	3.48	2.74	4.65	5.09	5.52	5.00	4.57	4.39	4.96	4.65	4.22	4.83	4.70	4.74	4.09	4.87
10	Eltham Super	6.40	6.00	5.00	6.30	6.90	4.20	5.70	4.50	4.90	5.20	6.70	6.60	5.90	5.60	5.80	5.60	5.20	5.80	5.90	5.80	5.00	5.80
27	Eltham NG	5.56	5.74	5.37	6.33	6.52	5.04	5.22	4.81	5.67	5.56	6.33	6.37	5.89	5.63	6.07	5.67	6.00	6.11	6.15	5.96	5.59	6.04
28	Hautapu Staff	5.57	5.86	6.21	6.79	6.86	4.57	5.36	4.25	5.82	5.18	6.86	6.64	6.32	5.82	5.82	6.00	5.89	5.86	6.32	6.18	6.21	6.36
24	Hautapu Super	6.13	6.04	5.75	6.58	6.50	5.79	5.92	5.25	5.46	5.67	6.79	6.67	6.42	6.33	6.33	6.29	6.25	6.33	6.54	6.38	6.42	6.46
8	Hautapu NG	6.13	6.38	5.88	5.50	7.00	5.50	6.63	5.00	6.25	5.50	6.88	6.88	5.88	6.25	6.63	6.63	6.13	6.38	6.75	6.75	6.63	6.63
19	Kapuni Staff	6.21	6.32	5.84	6.68	6.79	4.79	5.58	4.74	6.05	5.58	6.37	6.68	6.11	5.84	6.37	6.00	6.21	6.37	6.32	6.37	6.32	6.21
16	Kapuni Super	6.13	6.44	5.50	6.63	7.00	5.25	6.38	4.75	6.00	5.06	6.63	6.88	6.69	6.63	6.75	6.56	6.63	6.75	6.88	6.94	5.75	6.81
31	Kapuni NG	5.68	5.94	5.74	6.39	6.35	5.26	5.58	5.03	5.74	5.48	6.06	6.03	6.00	6.06	6.10	6.13	6.00	6.13	6.13	6.06	6.10	5.94
33	Kauri Staff	6.03	6.48	6.24	6.91	6.64	5.39	5.64	4.82	6.06	5.88	6.85	6.45	6.24	6.03	6.30	6.21	6.06	6.24	6.27	6.12	5.97	6.06
23	Kauri Super	6.52	6.43	6.00	6.70	7.00	6.39	5.87	5.83	6.61	6.00	6.96	6.65	6.70	6.65	6.87	6.43	6.43	6.74	6.70	6.65	6.52	6.52

		We talk about FSQ as part of our everyday work	Everyone in my team knows what our FSQ risks are, and how to keep the food safe	When we have a FSQ issue we learn from it and don't make the same mistake again	FS rules are never OK to bend or break, even if it saves time	If I saw something wrong or did something that impacts FSQ, I'd feel comfortable telling my supervisor/manager or my team	I've seen someone recognised for doing FSQ right	We discuss our FSQ risks with other related teams on site	I could tell you exactly how my team is tracking against our FSQ targets	FSQ is viewed as an obstacle to making performance targets	How useful was the last FSQ training you were part of?	I am comfortable eating food produced on my site or food made with ingredients from this site.	My supervisor/manager is honest and can be trusted to tell the truth about FSQ	My supervisor/manager clearly explains what is expected of me and my co-workers to keep our food safe.	My supervisor/manager acknowledges their mistakes and takes responsibility for them.	My supervisor/manager listens to what people have to say about FSQ	My supervisor/manager follows through on promises and commitments about FSQ	My supervisor/manager has explained what "do what's right" means for our team	My supervisor/manager makes fair and balanced FSQ decisions	When it comes to FSQ, my supervisor/manager stands up for what is right.	My supervisor/manager 'walks the talk' for FSQ.	My supervisor/manager follows through if someone breaks FSQ rules	My supervisor/manager treats me and my co-workers with dignity and respect
48	Kauri NG	6.56	6.65	6.42	6.94	6.73	5.75	5.92	5.71	6.50	5.90	6.73	6.73	6.65	6.54	6.69	6.52	6.60	6.48	6.65	6.63	6.67	6.56
7	Maungaturoto Staff	6.86	5.71	6.14	7.00	6.71	5.57	5.71	4.57	5.71	5.43	6.86	6.71	6.29	5.71	6.71	6.43	5.86	6.29	6.71	6.71	6.43	6.71
10	Maungaturoto Super	5.70	6.10	5.10	6.80	6.90	5.80	5.90	6.00	5.90	5.90	6.70	6.90	6.60	6.50	6.80	6.40	6.30	6.50	6.60	6.60	5.90	6.80
4	Maungaturoto NG	5.25	4.50	4.75	6.50	6.75	5.75	4.75	3.25	4.25	4.25	4.50	5.50	5.50	5.50	5.50	4.75	5.25	5.50	5.50	5.50	4.00	5.50
7	Pahiatua Staff	6.14	6.71	6.43	6.86	6.71	5.71	6.29	5.00	6.14	6.14	7.00	6.43	6.57	5.43	6.43	5.86	5.71	6.00	6.71	6.57	6.43	6.57
12	Pahiatua Super	5.83	6.17	6.42	6.33	6.83	6.08	6.00	5.33	6.42	5.75	6.92	6.58	6.42	5.92	6.25	6.25	5.83	6.50	6.58	6.67	6.25	6.25
1	Pahiatua NG	5.00	7.00	7.00	7.00	7.00	6.00	7.00	5.00	7.00	4.00	7.00	7.00	7.00	6.00	7.00	7.00	6.00	7.00	7.00	7.00	7.00	7.00
8	Reporoa Staff	5.25	6.00	6.13	6.50	6.63	4.50	5.50	5.50	6.13	5.75	6.75	6.75	6.50	6.50	6.75	6.75	6.88	6.63	6.63	6.75	6.50	6.88
12	Reporoa Super	6.25	6.50	5.92	6.83	7.00	5.17	5.50	5.58	6.25	4.50	6.67	6.75	6.25	6.75	6.08	6.58	6.58	6.75	6.83	6.75	6.58	6.67
29	Reporoa NG	5.86	6.14	6.34	6.55	6.52	4.90	4.90	4.41	5.83	5.34	6.38	6.38	6.17	5.93	6.21	6.03	6.17	6.28	6.31	6.10	5.93	6.14
7	Stirling Staff	6.86	6.43	6.14	7.00	6.86	4.43	5.86	5.14	6.71	6.43	7.00	7.00	6.71	6.29	6.71	6.71	6.14	6.57	7.00	6.71	6.43	6.00
14	Stirling Super	6.64	6.86	5.86	7.00	7.00	5.50	6.50	5.14	6.79	6.00	6.93	6.86	6.64	6.64	6.79	6.43	6.64	6.64	6.71	6.57	6.29	6.64
11	Stirling NG	5.82	5.91	5.73	6.73	6.45	4.27	5.09	3.91	5.82	5.64	6.55	6.27	5.91	5.73	6.27	6.18	5.64	5.64	6.09	6.09	5.91	5.73
4	Studholme Staff	6.50	6.75	6.25	7.00	7.00	6.25	6.25	6.00	6.75	5.50	6.50	7.00	6.75	6.75	6.75	6.50	6.75	6.75	6.75	6.75	6.50	6.75
3	Studholme Super	6.33	6.67	6.33	7.00	7.00	5.67	5.67	5.67	6.67	6.00	6.33	6.67	7.00	5.67	6.00	6.00	4.67	7.00	6.67	6.67	6.33	6.67
11	Studholme NG	5.09	6.18	5.73	6.64	6.55	5.00	5.27	4.64	5.91	5.27	6.00	6.09	5.55	5.73	5.73	5.73	5.64	5.82	6.09	5.91	5.00	6.27
28	Te Awamutu Staff	5.29	5.96	5.64	6.57	6.82	5.00	4.25	3.96	5.50	5.68	6.57	6.32	5.82	5.79	6.07	5.86	5.64	5.82	6.18	6.11	5.64	5.86
17	Te Awamutu Super	6.06	6.41	5.76	6.82	7.00	5.88	5.47	5.76	6.35	5.59	6.53	6.76	6.24	6.47	6.41	6.29	6.47	6.41	6.59	6.59	6.24	6.71
4	Te Awamutu NG	4.25	5.50	4.00	7.00	6.25	4.75	3.25	2.75	5.25	3.25	6.25	5.00	4.50	3.75	4.50	4.50	4.50	4.25	5.00	4.25	4.50	4.50
30	Te Rapa Staff	5.50	6.03	5.57	6.87	6.80	4.50	4.53	4.17	5.73	5.10	6.90	6.53	6.20	5.37	5.97	6.03	5.77	6.17	6.37	6.13	6.13	6.27
27	Te Rapa Super	5.96	5.67	4.93	6.78	6.67	5.15	4.89	5.11	5.56	5.15	6.93	6.30	6.11	5.67	6.11	5.89	6.04	6.07	6.11	6.22	5.93	6.15
14	Te Rapa NG	6.14	5.64	5.93	6.86	6.86	5.29	5.93	5.64	6.21	5.71	6.43	6.57	5.79	6.00	6.36	6.29	6.21	6.14	6.29	6.07	6.36	5.64
11	Waharoa Staff	6.73	6.91	6.55	7.00	7.00	6.55	6.18	5.91	6.82	6.73	3.09	7.00	6.91	7.00	7.00	7.00	6.82	6.91	7.00	6.91	6.91	6.91
3	Waharoa Super	7.00	6.33	6.33	7.00	7.00	6.33	7.00	6.67	7.00	6.67	1.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
0	Waharoa NG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	Waitoa Staff	4.92	5.85	5.08	6.77	6.77	4.62	4.46	3.31	4.92	4.85	6.38	6.54	5.62	5.69	6.23	6.00	5.62	6.23	6.00	6.08	5.77	6.54
17	Waitoa Super	6.53	5.88	4.88	6.41	6.88	5.41	5.35	5.18	5.06	5.29	6.41	6.71	6.29	6.12	6.47	6.06	5.94	6.29	6.53	6.41	5.59	6.41
50	Waitoa NG	5.24	5.76	5.16	6.84	6.60	4.50	4.64	4.22	5.54	5.06	6.34	5.96	5.82	5.24	5.68	5.66	5.42	5.80	6.02	5.56	5.62	5.80
45	Whareroa Staff	4.49	5.56	4.89	6.53	6.40	3.80	4.22	3.60	5.27	4.87	5.93	5.93	5.31	4.84	5.53	5.56	5.24	5.49	5.71	5.47	5.42	5.36
32	Whareroa Super	6.38	5.59	5.00	6.88	6.78	5.59	4.97	4.78	5.31	5.78	6.63	6.44	6.09	5.84	6.09	6.03	6.09	6.09	6.09	6.22	5.94	6.19
45	Whareroa NG	5.60	5.93	5.80	6.62	6.69	4.93	4.60	4.18	5.82	5.36	6.36	6.16	5.87	5.73	6.18	5.96	5.78	6.00	6.27	6.24	5.71	5.67

4.7 Summary

In this chapter, the results of the quantitative research project to respond to the research question, "What is the nature of the relationship between food safety culture and ethical leadership?" were presented. Using a Principal Component Analysis, supported by ANOVA, multiple regression and hierarchical clustering, the following inferences can be made from the results:

- The first two dimensions or principal components represent 59.95% of the total variability of the data (Dimension 1, 53.99%; Dimension 2, 5.96%)
- The first principal component has large positive associations with ethical leadership variables, and the second with food safety culture
- The first principal component, ethical leadership - associated, is strongly associated with four variables including site and supervisor; supervisor has a positive association and staff a negative association
- The second principal component, food safety culture, has a strong association with site and variables categorised as NG (not given). Again, the role of supervisor has a positive association and staff a negative association
- The results suggest that supervisors are more likely to give positive responses to questions concerning ethical leadership and food safety culture than staff; and role NG (not given) is more likely to give negative responses to questions concerning ethical leadership and food safety culture
- The results also suggest that role female is more likely to give positive responses to questions concerning food safety culture and less so with ethical leadership than gender male. Gender NG (not given) and Other are more likely to give negative responses to questions concerning food safety culture and ethical leadership than either gender female or gender male
- Age NG is also more likely to give negative responses to questions concerning food safety culture and ethical leadership with older age groups more likely to give positive responses to each of these
- Analysis of the site variables reveals those sites more positively and more negatively associated with ethical leadership and food safety culture
- The Principal Component Analysis clustering function categorised individuals into four groups that shared typical characteristics. Most of the variation between Clusters was determined by their location in Dimension 1 (Ethical Leadership - associated), with Cluster 1 showing the strongest negative association with Dimension 1 and Cluster 4 showing the strongest positive association with Dimension 1. Associations between Clusters and Dimension 2 (Food Safety Culture-associated) were more subtle. Cluster 1 individuals were a group most likely to provide negative responses for ethical leadership questions, but not as negative for food safety questions. In contrast Cluster 4 individuals were most likely to be positive for both ethical leadership and food safety questions.

Overall, in response to the research question posed to which this research sought to investigate, principal component analysis has provided evidence of a positive correlation between food safety culture and ethical leadership. The correlation is moderate, indicating individuals who responded positively to statements about the organisation's ethical leadership, did not necessarily respond positively to statements about the organisation's food safety culture. Further, the relationships and responses were dependent on the demography and location of respondents.

The next chapter, Chapter 5, discusses the results of the qualitative strand of this doctoral research which explores the views of 32 representatives of 31 Aotearoa New Zealand food businesses on ethical leadership and food safety culture.

Chapter 5: New Zealand Food Business's Views on Food Safety Culture & Ethical Leadership

This Chapter presents the findings from the qualitative strand of this doctoral research and is in two parts: firstly, presentation of the findings regarding ethical leadership in New Zealand food businesses; and secondly, presentation of the findings regarding food safety culture in New Zealand food businesses. The voices of the participants (participant quotes) are used throughout to provide an in-depth understanding of the views of senior food safety and quality managers in New Zealand food businesses in this novel research.

This section is presented in two parts: part one begins with recapitulation of the thematic analysis utilised in this research as detailed in Chapter 3, followed by a summary of publicly available artifacts for each of the food businesses represented in the qualitative interviews. Findings from the qualitative interviews are ordered by each interview question. Part two follows a similar format. The chapter concludes by briefly summarising the findings in the context of the three research foci.

5.1 Findings Part One: Ethical Leadership in New Zealand Food Businesses

5.1.1 Thematic Analysis Revisited

The process of thematic analysis of the qualitative interviews generated five themes and 20 codes as shown in Table 20: the themes being Values; Responsible Stewardship of Natural Resources; Māori Worldview; Ecosystem Pressures and Leadership. Word counts have been used as the basis for ranking in this chapter; a useful tool to recognise patterns in, and make generalisations from data by looking at how often a target word is used (Sandelowski, 2001). Counts are more meaningful than descriptors such as some, many, or most, for example, and can be used to ascribe the value assigned to frequently-used words (Leech & Onwuegbuzie, 2008) and to understand dominant topics. While a word count simply counts the occurrence of words in narratives, the intimate knowledge the researcher has with the data given the manual thematic analysis process provides valuable insights into the context for and importance of these words.

5.1.2 Results of Analysis of Publicly Available Artifacts

A review of publicly available artifacts relating to the values of companies represented by participants involved in this research was undertaken as part of the preparatory process for each interview. This involved visiting respective websites and reviewing information contained within web pages and embedded documentation. Nine (30%) of the food businesses represented by participants subscribe to some or all of the United Nations Sustainable Development Goals. Eleven food businesses represented in this research have published values on their websites in a variety of ways. For example, one business publishes a Code of Conduct; while another focusses on its 'Advantages', and the 'Way' of the company. The values of these eleven companies were analysed to look for commonalities, with the results shown in Table 44.

Table 44: The Interface Between Ethical Leadership and Food Safety Culture: Qualitative Research Strand: Analysis of Publicly Available Company Values

Value	# Companies	Value	# Companies
Co-operative/Collaboration/Achieving together/Teamwork/Whanau/Family	07	People/Treat others like you want to be treated	02
Integrity/Straight up/Trust	06	Putea, sustain and grow resources/Be sustainable/Taiao, environment, kaitiakitanga; Papa Whenua, land as taonga	02
Quality/Great taste	04	Expertise	01
Do the right thing/Fair deal	04	Listen and learn	01
Continuous improvement/Innovation/Lead with greatness	04	Lead with foresight	01
Dig deep/Challenge boundaries/Performance/Push yourself	03	Maximisation of value	01
Care deeply/Passion/Ngākau Hihiko, strength, energy, courage	02	Own it	01
Care	02	Safety is for keeps	01

5.2 Findings: Ethical Leadership

Findings from interviews with 32 participants from 31 Aotearoa New Zealand food businesses are presented in order of the guiding ethical leadership question posed to each participant, within which findings are delineated into each of the appropriate themes for that question as outlined in Table 20 **Error! Reference source not found.**

5.2.1 Does your organisation position itself as an ethical organisation?

Of the 32 responses, 28 participants indicated that their respective organisations position themselves as ethical organisations: *“In terms of food safety, definitely. Ethics covers a broad range of issues. In terms of people, not all Chief Executives act ethically. It’s about what filters down from the top”* (participant # 3). One participant indicated that their organisation ‘believes’ it is an ethical organisation; a stated position due to the perception that *“the quoted values aren’t always adhered to”*. Another participant indicated that their (three-year-old) organisation aspires to being an ethical organisation. Two participants indicated that their organisations do not position themselves as ethical, rather they use alternative terminology such as open, honest and trustworthy. Participant # 4 theorised that participants would respond to this question in the affirmative. *“Every single company in the world would say they are an ethical company”*. Despite this, participant narratives and publicly available artifacts support ethical positioning of the food businesses represented in this research:

“The organisation doesn’t overtly position itself as an ethical business – it doesn’t use that terminology. It considers itself to be a better business; better for the planet, consumers, and animals. As far as farming systems go, they are probably the most ethical in the country. But it’s not terminology that the organisation uses”. The organisation *“knows they do animal welfare better than anyone in New Zealand. However “it’s not wise to put your head above the parapet. Anyone who comes onto the farm hears it, sees it and knows it”* (participant # 4).

Three businesses represented in these interviews, each of which was launched within the last three years, have a goal of achieving B Corporation (B Corp) certification; a standard that *“resonates with who they want*

to be" (participant # 31). Businesses with this certification aspire to accelerate a worldwide move to redefine business success through increased accountability, transparency, and social and environmental performance (B.Lab, 2023).

5.2.1.1 What does it mean to work for an ethical food business?

Values (Individual, Aligned & Company Values)

Working for a company that positions itself as ethical has meaning. The values and purpose of these kinds of organisations matter – they resonate with and influence staff: "*flowing into their personal lives*" (participant # 2). "*It's like oxygen*" according to participant # 31; and "*it's not about the me; it's about the we and the us*" according to participant # 9.

At an individual level, a sense of satisfaction and pride, of contributing to something larger than oneself, maintaining a good personal reputation and being able to sleep at night were views expressed by participants. Alignment of personal values with company values arose as a common thread among participants, minimising the risk of being put in a position where an individual is morally compromised. For participants who are also the founders and/or owners of the business: "*it's part of my philosophy; it's always been who I am*" (participant # 27). Another participant similarly expressed: "*To aspire to, and to do little things daily, weekly, or monthly towards being more than making more money and stuff as an end in itself and making the world a better place is an easier purpose to subscribe to*" (participant # 31).

At a company level, according to the participants, businesses who position themselves ethically focus on people; valuing them, treating them with respect and fairness, remunerating them adequately, ensuring their safety and security, building capability, using honest, open communication, embracing diversity, setting high expectations, acting with integrity and building and maintaining connections and partnerships.

"It's knowing that things will always be fair, just, staff will be paid, there will be a safe working environment; someone to go talk to; honest communication; continuous improvement. There is not an attitude of, 'this is the way we've always done it, so this is the way it's going to be'. Things need to change sometimes. Being open to that change is important" (participant # 20).

Other participants expressed similar views: "*People are the asset, and the business wants to look after them. The business wants the story to be a good story – a place where you would want your children to come to work*" (participant # 18). The net result was the positive impact on building: "*trust and a good culture*" (participant # 29). This ethos extends beyond employees to suppliers, shareholders, and customers.

"Across the business, anytime any decision is made, there is consideration about what the impact of the decision will be for the business and its customers. There hasn't been a decision made that was unethical or wrong. Have the boundaries been pushed sometimes? Probably. The simple reality is that everyone who sits on the senior leadership team is there because they have pride in what they do. They know that the industry, despite its perceived size, is run by a relatively small group of people who all know each other. If they poop in their own nest, they would never work in the industry again. It's about the type of people that have been recruited; unethical people would not be tolerated" (participant # 24).

The need to make a profit was acknowledged, with one company expressing an interest in reallocation of profit or a mechanism for redistribution (participant # 10), however others expressed that it's not just about the money (participants # 10, 31, 32), and that these types of companies also think about their impact on the community (participant # 11). Participants views also included company values being reflected in approaches to animal welfare, and importantly, to food safety: *"It's satisfying to work for a company taking this position. You don't want to be the person answering the bad questions about why you have single-handedly ruined the planet, been cruel to animals, or pumped out food that makes people sick"* (participant # 7); *"Corporate Social Responsibility is not the basis for a point of difference. That's just the standard people expect these days"* (participant # 8).

For larger companies, showing leadership given their scale was important. Supply chain leadership, particularly in relation to raising awareness of the topical issue of modern slavery emerged strongly:

"Treating people with respect; equity; ensuring diversity – those sorts of values. The industry has those values and that comes from the Board and CE. It also makes good sense. If you treat people fairly, they treat you fairly in return. Now overseas markets ask questions about ethical practices, for example modern slavery. It's not just driven by the consumer. Sometimes it's good business sense – whether food safety or people and culture. People want to feel good about what they are buying" (participant # 28).

Responsible Stewardship of Natural Resources (Custodianship - Waste Reduction/Minimising Harm/Recycling; Resource Use)

The sense of custodianship of the planet emerged strongly in the interviews: *"being sustainable is about being ethical"* (participant # 9). Making the world a better place, minimising waste, benefitting people and the planet, minimising harm, and doing business sustainably in its holistic sense were all cited by participants as what ethical positioning means for natural resources: *"There wouldn't be a business if there wasn't a genuine desire to do things right – to treat both people and the environment well. If the business doesn't "look after what they've got, they will shoot themselves in the foot"* (participant # 14). Participant # 27 expressed similar views, *"You don't want to be the person answering the bad questions about why you have single-handedly ruined the planet... It's very easy to pollute in the name of jobs creation, it's harder to sit back and think about how to get rid of things that leave a stain the industry creates"*.

Food waste was raised as a concerning issue. One of the businesses represented in the research uses technology that produces quick and nutritious food that could be applied to food rescue and/or food aid: *"Positioning the business as an ethical organisation is about looking after the staff; having integrity in the product; what is being created is for the betterment of people and the planet. Food waste is a big issue"* (participant # 27).

Packaging, plastic and moves to plant-based or non-dairy food products were raised by participants in the context of organisational ethical behaviour. *"Eating a plant-based diet is better for the environment, human health, equitable access to healthy food, and better for animals". The company tries to do their best to minimise packaging – this is a challenging issue given the lack of alternatives to plastic"* (participant # 22). For another participant, as the business scaled the participant has *"been aware of having dairy-free*

alternatives, sourcing local suppliers where possible, focusing on continuous improvement with the goal of becoming a B Corp" (participant # 32).

Māori Worldview (Intergenerational Value Creation, Whanau, Kaitiakitanga, Business with a Purpose)

The uniqueness of the Māori worldview and its value to New Zealand Inc emerged as a theme in this research. Three participants self-identified as tangata whenua, with roles as owner, or as senior management and/or governance in iwi-based businesses.

The foci for these participants included the importance placed on creating intergenerational value; the impact on people and the wider community; and the shouldering of responsibility to leave the planet and people better. Participant # 25 and her cousins "*don't work, they have purpose; they are there for a lifetime, so they want to make a difference*". For participant # 6, the company is positioned ethically: "*with both a Māori and an indigenous lens. Having lived in Canada for some time, (the participant) had first-hand experience of the potential for collaboration between Māori and First Nations for example and the alignment of the values of Māori peoples – including the importance placed on creating inter-generational value*".

Participant # 25 talked about the responsibilities and expectations of being elected to the Board: "*Especially when you think about our history and what they want to do for their families; a 500 year vision. It's scary and exciting*".

Leadership (Characteristics, Standards)

According to participants, ethical organisation positioning meant values-driven leadership, doing the right thing and taking difficult decisions – exhibiting courage. It imbued staff with confidence. Other participants emphasised that senior leaders must lead, and lead by example; they must walk the talk; honest, open communication is essential. The relatively small population in New Zealand impacts on leaders and keeps them honest according to participant # 24. Participant # 12 sees herself as values-led leader: "*It's about being ethical in the decisions that are made*". There have been a few times in the past six months when the participant has challenged the company. "*What is done needs to be done with integrity. The values need to guide daily decisions. It reminds people that this is what we've committed to as a business. The other aspect in leadership that's important is walking the talk. Values can't be delegated. As a manager you must model them*". Participant # 16 expressed similar views "*When faced with dilemmas there is confidence that management will 'do the right thing'*".

Ecosystem Pressures (Social Licence, Future Focus, Packaging, Ethical Sourcing, Regulations & Standards, Risk Management)

Sustainability from the perspectives of both the businesses represented in this research, and their consumers, and awareness of issues related to packaging were highlighted by participants.

"A limited proportion of the market are buying from a position of sustainability. In five years it will become the expectation for brands that are not commodity items". (participant # 15). This business placed sustainability front and centre.

For participant # 32: *“The mission of the business is to make a product that everyone can enjoy; that meets a variety of dietary requirements and is good for people and the planet. From the outset this was not just about making money;. It was on doing business sustainably; using compostable cups, making sure compost bins were available”*.

Participants revealed that while every attempt is being made to minimise packaging or the use of plastic, this is posing a challenge across the board, with food safety and shelf-life driving decisions about packaging. At this point, no viable alternative to plastic is available for most industries, despite a significant level of research and development nationally and internationally.

5.2.1.2 What are the drivers for organisational ethical positioning?

Values (Individual, Aligned & Company Values)

The findings showed that values are a key driver for an organisation’s ethical positioning. The values or ethics of governing bodies, senior management, industry associations, owners and family as expressed by various participants drive organisational values or ethics. *“It’s been in the DNA from the inception”* (participant # 31). *“It feels like the right thing to do”* according to participant # 10; *“doing the right thing for consumers and customers”* (participant # 12). *“The culture of the owners is reflected in the business. They do it for their community”* (participant # 21). *“The drivers for the business being an ethical organisation stem from the founder. Their family values have filtered through the business. The family are good honest people and that’s how they want the company to be”* (participant # 26). The same is true for participant # 32. *“We must start taking care of the environment”*. The owner *“has a faith and wants to do her best for the creation we have. It’s personal”*.

Recognising that people are the company’s most important asset was a key aspect of values-based ethical positioning: *“if they can get that right they can conquer anything”* (participant # 18); *“it’s about looking after the staff, having integrity in the product”* (participant # 27); *“treating people with respect, ensuring equity and diversity”* (participant # 28). The focus on people extended to the communities within which food businesses operate. One participant was proud to highlight the focus on people, product, customers, shareholders: *“You can only look those people in the eye if you are straight up and down”* (Participant # 24).

Repairing organisational reputation as a consequence of actual or perceived negative past events was cited as a key driver for one industry organisation to reflect on and improve its ethical practices. Values also influenced legacy thinking. Participant # 31 spoke about the business founders’ values as a consideration about: *“what they wanted to invest in, be involved with and the type of legacy they wanted to leave”*.

Producing a commodity product such as milk powder for the world’s most vulnerable consumers is a driver for organisations involved in that sector. One dairy producer takes a novel approach to its ethical positioning. The head animal is called Susan, and the company mantra was, ‘what would Susan say?’

“When any decision is made, the question is, ‘what would Susan say?’ Susan is your mother, the most maternal animal on the farm. In every decision you make, you have to be able to look your mother in the eye. When you make a choice about ingredients, animals, what you do, could you look

your mother in the eye and justify your decision? What would Susan say, is integral to the way the company is run, it's the fabric of the decision-making" (participant # 4).

Several of the organisations according to participants, took a leadership position in their supply chain concerning the issue of modern slavery, developing programmes and systems to support workers in the industry. Participant # 23 talked about his organisation's supply chain leadership in relation to two issues, namely, modern slavery and a goal for production of a carbon-zero product by the end of 2021.

Participant # 14 described the leadership stance taken by her organisation in relation to animal and environmental welfare:

"The industry expects a set of standards and lives up to them themselves. They are supportive of people living up to those standards and honour people. The industry is dealing with animals that need to be treated ethically; and with the environment that needs to be managed ethically. The industry could be perceived as being evil, so the industry has to show that they are the guardians and leaders. There's a very strong culture. There are economic drivers but there wouldn't be a business if there wasn't a genuine desire to do things right – to treat both people and the environment well".

In fact, according to participant # 30, the food business' driver for ethical positioning came from the top:.

"The decision was to move to more ethical and responsible sourcing. Strong ethical backgrounds by senior management. From Board level, they give equal voice to the commercial and emotive side of the business – hearts and minds as well as the wallet. The business believes in consumer trust. Food safety is a given for consumers. It is also brand trust. They try to do more than the right thing", for example food safety testing regimes that exceed standards. *"This is done because it's the right thing to do. Food safety is a given but the business makes sure it's a given".*

Responsible Stewardship of Natural Resources (Custodianship - Waste Reduction/Minimising Harm/Recycling; Resource Use)

According to several participants initiatives by respective businesses were underway to make better use of resources. Converting to electricity from other fuels was cited as an example by participants. This theme may be associated with Ecosystem Pressures, and more specifically, social licence to operate, however that is not to say businesses are not undertaking initiatives to make better use of resources as a goal in and of itself as opposed to being motivated by consumer or market perceptions or pressure. According to participant # 7: *"Getting rid of the boilers, despite them having twenty years of life remaining, means getting rid of 5720 tonnes of carbon per annum. If they can eliminate gas in the rendering plant, that becomes 9500 tonnes of carbon per annum".*

Māori Worldview (Intergenerational Value Creation, Whanau, Kaitiakitanga, Business with a Purpose)

Business as a mechanism to benefit their communities was a driver identified by participants for organisations that have a Māori worldview at their heart. Building capability, value and intellectual property for his people were key drivers for participant # 6 who positioned his business as ethical:

“The business was started for ethical reasons – to do good in the community utilising the business as the mechanism to do so. Social licence is a good way of labelling the community view. Achieving social licence is the indicator of how well the business is doing to achieve its primary objective of doing good in the community” (participant # 11).

Findings suggested that the businesses took a leadership position, articulating values, expectations, and responsibilities. For the largest of the three organisations underpinned by a Māori worldview, a 500 year intergenerational plan established the vision for the organisation and its 400 whanau members.

Participant # 25 was: *“very mindful of the responsibility to leave the planet better, to leave her people better”, and so she “feels privileged to be working for the family – 400 whānau members”*. According to this participant, recognition of the essential elements of whanau, kaitiakitanga, preservation of tribal lands and resources, and the characteristics required to undertake such a journey informed the organisation’s guiding objectives that is the epitome of legacy planning.

Leadership (Characteristics & Standards)

Representatives from two large organisations talked about their leadership responsibilities. Large corporates: *“are in the global arena and reflecting New Zealand’s position. The company has a moral and ethical obligation to reflect itself and New Zealand in an international arena where, if you get it wrong, the result is harsh”* (participant # 23). Another participant identified that the company:

“has a role in the greater good; not just thinking internally but thinking externally about their impact on New Zealand and globally” through the way they choose to do business; for example, *“partnering with suppliers that meet requirements and expectations about being ethical; the way the company conducts itself; how ingredients are sourced; care for workers within the supply chain. There is a recognition and respect for the scale of the business – nationwide; one of the biggest employers in New Zealand; the business interacts with people in their everyday lives; they have a role to play in terms of showing leadership given their scale”* (participant # 9).

Ecosystem Pressures (Social Licence, Future Focus, Packaging, Ethical Sourcing, Regulations & Standards, Risk Management)

Findings suggested that ecosystem pressures were a key driver for organisations positioning themselves as ethical, including: social licence to operate and consumer trust (positive) and avoidance of greenwashing (negative); taking a future focus/survival; and other drivers such as regulatory, economic, and retailers and supplier pressures as expressed by various participants:

“There are a number of drivers for positioning the business ethically; regulatory and legislative, brand and reputation – social licence to operate”. They want to *“be seen as a business that is doing good and doing the right thing, being transparent and holding itself to account; future stability and security around looking after resources in a sustainable way. We won’t be able to continue to eat if we don’t care for the environment and its capacity to provide food”* (participant # 9).

According to participant # 15, the company has two options; *“green-washing or competitive advantage, opting for the latter. A limited proportion of the market are buying from a position of sustainability, however in five years’ time, say, it will become the expectation for brands that are not commodity items; that is, social licence”*.

Participants indicated that there are several issues facing food businesses today: protein alternatives, for example plant and animal proteins; animal rights, and the debate about sustainability of animal production: *“The world is a more discerning protein producer. Businesses need to adapt to a generation that is morally and sustainability conscious. If you want to grow the brand and do what’s right for the company and the country, there must be good ethics”* (participant # 23).

Organisations involved in killing animals *“need to present themselves as ethically and as environmentally friendly as they can because they will rapidly lose their social licence to operate if they don’t”* (participant # 7), and that *“It’s a ticket to the game for the big markets”* (participant # 19).

The focus on the consumer in the context of ethical behaviour was also highlighted by participants: (acting ethically is) *“what the consumer wants”* (participant # 10); *“people want to feel good about what they are buying”* (participant # 28); *“the trust of their customers in the brand is fundamental”* (participant # 30). Another participant revealed that actors in the supply chain are also placing pressure on organisations through requiring certifications or audits – verification of issues from how well employees are paid through to ethical sourcing of ingredients (participant # 20).

5.2.2 Does your organisation place importance on being a sustainable business and if so, what does that mean for you?

Nine (30%) of the food businesses represented in this research subscribe to the United Nations Sustainable Development Goals. Several others have statements about their commitment to sustainability publicised on their websites. Typical statements that New Zealand businesses, including food businesses, make about sustainability, sourced from each business’s website, can be found in Table 45.

Table 45: Public statements about organisational commitment to sustainability from Aotearoa New Zealand businesses

Yealands Wines “At Yealands our vision is to create nature positive, carbon positive and beautifully biodiverse wines. This includes a commitment to share what nature teaches us. Nature positive sustainability nurtures ecosystems, restoring balance and fostering harmony, ensuring a flourishing planet for present and future generations. Carbon positive sustainability goes beyond neutrality, actively removing carbon, healing Earth, and pioneering a brighter, greener future for all. Sustainability is at the core of everything we do and it’s something that we work at every day”. <https://www.yealands.co.nz/sustainability/>

Synlait “People and planet underpin all we do. Sustainability isn’t a catchphrase for us. It’s at the core of what we’re doing everyday – all of us”. <https://www.synlait.com/>

The Warehouse Group “Our vision is to make sustainable living easy and affordable for everyone. Increasing product and packaging sustainability for our customers and reducing our waste and emissions is no longer a nice to have – it is a must-do. Learn more about the action we’re taking for our people, our customers, and the planet”. <https://www.thewarehouse.co.nz/here-for-good>

Sanford “Sustainability sits at the heart of our business – it is fundamental to our connection with New Zealand and the growth of our business. We understand our environmental, economic and social choices have an impact, now and in the future. We are committed to a sustainable future for our business and stakeholders, our people, customers and communities. Sanford’s vision is to be the best seafood company in the world through the sustainable growth of our business, and we embrace the contribution we will make towards achieving the United Nations Sustainable Development Goals”. <https://www.sanford.co.nz/sustainability/>

Villa Maria Wines “We believe in living life to the fullest while making sure we are protecting the earth for future generations. Our love for this land guides us to put sustainability at the forefront of all that we do, taking care to preserve our resources so they last well into the future”. <https://villamariawines.com/nz/sustainability/>

Bakels Edible Oils “Bakels Edible Oils is committed to the procurement of raw materials from suppliers who utilise and support the development of Sustainable Production Processes. This philosophy also extends into minimising the utilisation of natural resources such as water, electricity and gas to ensure Bakels Edible Oils reduces any environmental impacts”. <https://www.beobakels.co.nz/sustainability>

DB Breweries “Our purpose is underpinned by our three company Values: Respect for People and Planet, Passion for Quality, and Enjoyment of Life. Through our Purpose and Values, we are committed to leading in sustainability, growing our people, and enabling their success and enjoyment of life, and brewing products that delight our consumers”. <https://www.db.co.nz/brewing-a-better-aotearoa>

Xero “Xero operates sustainably, respecting the planet, and supporting our communities and our people to thrive”. <https://www.xero.com/nz/sustainability/>

Alliance Meats “Our farmers care deeply about their land and their environment, their farming practices have focused on care for nature for generations. They are committed to a low carbon future”. <https://www.alliance.co.nz/a-sustainable-future/>

Fisher & Paykel Healthcare “We see corporate social responsibility and sustainability as inextricably linked to the way we do business. We know that strong financial performance cannot be achieved without looking after our people, suppliers and customers”. <https://www.fphcare.com/nz/corporate/sustainability/>

Mercury Energy “At Mercury we take an integrated approach to the way we create value, and believe that environmental, societal and commercial considerations are deeply interconnected. For this reason, we place sustainability at the centre of what we do. It is core to our strategic framework and shows up across each of our value drivers.”. <https://www.mercury.co.nz/about-us/sustainability>

Goodman Fielder “Committed to sustainability. Our pathway to living our purpose and taking action to ensure food is a force for good”. <https://goodmanfielder.com/sustainability/>

Te Rūnanga o Ngāi Tahu Environmental Kaitiakitanga “Our dream is that our ancestral landscape is protected and our people have living relationships with their whakapapa and traditions through the environment. The goal is that Ngāi Tahu is a principled kaitiaki (steward) of our takiwā (tribal territory)”. <https://ngaitahu.iwi.nz/te-runanga-o-ngai-tahu/our-work-pou/strategy-and-environment/environment/>

According to participant # 21, some businesses chose to operate beneath the radar therefore a focus on sustainability was not always obvious from publicly available artifacts and/or outward facing tools like websites. His company is “*not great about publicising the good work they are doing, but are aware of their responsibility to leave the planet in a better position than we found it*”. Another participant (participant # 8) discussed details of how he runs his business that highlighted what is not evident from the company website. Business as usual for this participant included not using single use plastic; using popcorn packaging (for the glass jars), cornstarch tape for his business to business (B to B) products, and not using tape on his boxes, trusting that they won’t be tampered with. Boxes were replaced if they got damaged – although that had not happened thus far.

According to participant # 25, sustainability constitutes “*a journey that stretches beyond the horizon*” manifested through five paddles to achieve intergenerational goals; Papa Whenua, Taiao, Whanau, Putea and Ngākau Hikio. Another participant also focused on intergenerational goals: “*The owners view the business as inter-generational. They are not building the business up to sell to an international buyer. The exit strategy is passing it onto the next generation*” (participant # 7).

The food businesses represented by the 32 participants placed importance on being or becoming sustainable. “*This is a challenge though due to the demands placed on the business by customers and regulatory authorities alike. The business is trying to demonstrate continual improvement*” but “*can only do so much at any one time*” (participant # 26), a sentiment echoed by participant # 8. “*The business does what*

it can. It sources ingredients sustainably. That means: no battery farming; no cage farming, grass fed. Ethically sourced or responsibly sourced may be better terminology” (than sustainably sourced). He is suspicious of a “*company promoting how sustainable it is, quoting a Māori saying, “Kāore te kūmara e kōrero mō tōna ake reka, the kumara doesn’t speak of its own sweetness*”. He can’t say how sustainable he is because there is always someone who will point the finger – he drives a petrol-powered car for example.

The challenges for younger businesses can seem overwhelming, encapsulated by comments from participant # 27 who struggled with wanting to address nutrition, sustainability, and food waste which she saw as equally important. She wanted people to be healthier, look after growers; have sustainable packaging; and for people to better understand food waste.

For participant # 24, “*This thinking is in the business’s DNA. It’s part of what it does. They don’t want to have to front up to the community with bad environmental news*”. Concern for the community within which the business operates was also talked about by participant # 29.

“Having the support of the community is important to the company being able to operate in the way it does. There is a need to ensure that is not lost through a lack of integrity on the company’s part, for example permits for wastewater treatment. It’s important that things are done in the right way - properly and well thought through”.

Similar views were echoed by several other participants: “*At a personal level, it’s a positive move. We all live here and would all like NZ to live up to its clean, green image*” (participant # 3). It was also a source of personal pride according to participants # 5 and #14.

The sense of community extended into supporting local organisations and charities. Participant # 5: “*is on the company committee for social responsibility; the company supports Ronald McDonald house for instance and partners with a local low-decile school*”. A business accelerator programme to support up to five small businesses including those owned by Māori, Pasifika, youth, women, LGBTQIA+ people and people with disabilities through a 12 month tailored programme has been launched by the business represented by participant # 9 who is: “*excited about working for an organisation that does this kind of good*”.

Participant #14 expressed how she was able to hold her head up in a conversation because she genuinely knew she was representing people who wanted to do things well. She had not yet met a farmer or a processor who wasn't proud of what they were able to achieve and the product that was being made, and who didn't value the land and animals they were working with.

Ecosystem Pressures (Social Licence, Future Focus, Packaging, Ethical Sourcing, Regulations & Standards, Risk Management)

Sustainability is defined as “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (UN, 2023). Consistent with the UN definition, a future focus emerged strongly from participants.

“There will be 8 billion consumers on the planet in the next 20 years; 2 billion are subsistence living. Only 1 billion will be able to afford animal protein. That’s the current traditional New Zealand food

sector. If you are the best of the best, there is a market and it will work, if you are mediocre there is no future. Every country in the world is chasing those 1 billion consumers". In relation to animal-based dairy, If their company is the best in their category "they will have a right to play. Dairy is not sustainable. There will be less dairy globally in the future; plant will take over; only the best will survive and best doesn't mean financial. There is financial, economic and social licence. If you don't have social licence, you won't have a business. Commodity milk will get nailed on social licence " (participant # 4).

These sentiments were echoed by several participants: *"a limited proportion of the market are buying from a position of sustainability. In five years' time, say, it will become the expectation for brands that are not commodity items (social licence). For his business, there are two options; green-washing or competitive advantage. They opt for the latter"* (participant # 15).

"There are two aspects to sustainability; the environment we work in and doing our bit to reduce impact; and the other part is the sustainability of the company. If it's not sustainable, the future doesn't matter. To enable a business to be sustainable it must make money, or it won't survive" (participant # 23). Participant # 7 suggested that: *"sustainability is an interesting word".* He gets into trouble because his position is, *"in order to be sustainable, it's necessary to be profitable"*. Participant # 27 agreed that the business needed to be profitable, but she didn't want to compromise her standards while generating revenue. She wanted to look after her people and the environment in the long term.

The company represented by participant # 16: *"exists to nurture future generations; to give suppliers long-term security. It is not a fly-by-night organisation and takes into consideration all three components of 'sustainability'; people, planet and profits."* Participant # 31: *"subscribes to the philosophy that society thrives when old men plant trees under whose shade they will not sit"*. She liked to think she's part of something that she won't see come to fruition but that really changed gear on sustainability. According to this participant. it's not about getting rid of the rubbish that's been generated it's about creating a food system where the rubbish isn't created in the first place, for example, looking at carbon positive rather than negative or neutral. In terms of green-washing, and in terms of the outward facing publicity including the website, the business was doing research to ensure their actions and words align, for example appropriate energy usage once product is scaled, with appropriate metrics.

A mindset of future thinking has been the impetus for one business to positively respond to the global pandemic:

"If the company is not sustainable, the future doesn't matter. To enable a business to be sustainable it must make money, or it won't survive. Three years ago, the company set a lofty goal to achieve \$150M net profit in five years. That wouldn't have been achieved in the previous 10-15 years. That goal has been surpassed in three years. It refines the ability to be able to engage in future thinking and have the confidence to make change under the company's own design rather than bank direction (participant # 23).

The issue of packaging and plastic specifically was raised by businesses throughout these interviews:

“Business as usual includes not using single use plastic; using popcorn packaging; they don’t make a song and dance about it, they prefer to have consumers experience it for themselves. For any consumer brand, it’s about the value for the consumer. The consumer is the hero of the story. If his products and behaviours help that consumer align better with their own perceptions of sustainability that’s brilliant” (participant # 8).

Taking a food safety and quality lens to sustainability: *‘if the company doesn’t provide a good, safe product to consumers there won’t be sustainability in terms of people buying the product; and the promises and commitments made to consumers’* (Participant # 12).

Conversely, Aotearoa New Zealand was not trying very hard according to participant # 4: *“Turkeys don’t vote for Christmas and those in charge don’t have the appetite to change”*.

Māori Worldview (Intergenerational Value Creation, Whanau, Kaitiakitanga, Business with a Purpose)

Participant # 6 talked about a regenerative rather than a sustainable focus, meaning restoration through changed practices. He talked about the importance of tuna to his people and the environmental degradation that has led to the lakes drying up, the tuna numbers diminishing, the contamination of the waterway in his rohe (tribal boundary) and the consequential health of the tuna and the people eating it. He suggested that in order to restore, it’s necessary to first understand the loss:

“Every generation loses the taste of something. His daughter and grandchildren have never tasted toheroa for instance. They will never mourn the loss of that because they don’t have a taste for it”. He has never eaten kereru so he doesn’t mourn the loss. “As the taste is lost, the motivation is lost to bring it back”. He would: “love for his people to know the taste of kereru in order to mourn it and have the desire to bring it back” (participant # 6).

Responsible Stewardship of Natural Resources (Custodianship - Waste Reduction/Minimising Harm/Recycling; Resource Use)

A range of strategies were being employed by New Zealand food businesses to improve their stewardship of natural resources. These included a move to fully recycled packaging for rigid plastics, and recycled cardboard where possible (participant #7) and exploring viable alternatives to plastic, bearing in mind the need to maintain shelf life. *“Food safety cannot be compromised”* (participants #10, 26). Initiatives outlined by participant # 17 include *“using less water, creating less waste, non-recyclable plastics, waste to landfill; creating fence posts out of plastic bottles, using tetra to make building materials; experimental zero bobbie calves and experimental farms”*; taking a *“stepwise approach to achieving net carbon zero”*.

Improving energy & resource efficiency was top of mind for several businesses. Strategies identified by participants included: reducing energy and water usage, having as little impact as possible (participants # 10, # 26, # 32), sourcing milk within an 80km radius of the factory so the tankers aren’t driving for hundreds of kilometres around the countryside (participant # 24), purchasing electricity from electricity companies that provide 100% renewable electricity (participant #7), replacing coal-fired boilers with better solutions (participants # 21, # 24) exploring or using biofuel initiatives (participants # 17, 24, 21), using methane from the effluent treatment system for the boiler (participant # 21), partnering with local government and investing

in council's effluent management system (participant # 24), investing in state of the art technology and facilities to enhance the sustainability of the business (participant # 26), and sourcing a PhD to map their carbon footprint (participant # 26).

Environmental considerations included reducing paper usage (participant # 20), consideration of food miles (participant # 10), taking supply chain leadership to address the issue of PLU stickers (fruit stickers) (participant # 1), and supply chain leadership on food waste in partnership with food rescue organisations (participant # 9). Being explicit about environmental impacts was flagged as important. *"The business had a dilemma re biodegradable, compostable. A lot of consumers think if that's on a package, it can be home-composted but it can't"*. Now the company specifies commercial composting (participant # 30).

Participant # 29 front-footed concerns that have been raised about the impact of dairy farming on the environment:

The issue is "not harming the environment; finding ways to mitigate issues in a way that is acceptable to the local community. Dairy has a bad reputation environmentally and there are some areas where that is valid. Environmental change doesn't happen overnight. A lot of the water quality issues that are being dealt with now arose because New Zealand was an agricultural nation before the dairy industry grew to the extent it has. A lot was not understood, for example the impacts of fertilising, and now we are seeing the consequences. Drastic change often has unforeseen consequences therefore care needs to be taken in managing these issues. Getting the response right so that communities aren't harmed but environmental outcomes are improved is important".

5.2.2.1 What are your thoughts about the relationship between an ethical approach and a focus on sustainability?

Twenty-two participants (88%) who responded directly to this question agreed that a company's ethical approach and a focus on sustainability go hand-in-hand. One indicated they are one and the same; one that there is no future without it and one that it can't be any other way in 2021. *"It would be hard to claim an ethical position without also looking at a sustainable approach to business"* (participants # 7, 19, 23, 24, 28, 29, 30). *"Perhaps you could be sustainable and not ethical – but not for long. They support each other"* (participant # 24). Participant # 30 encapsulated the general approach to this question:

"If you are acting ethically, it's toward people planet and everything else; doing the right thing by all stakeholders including the environment; doing the right thing by every part of the ecosystem. There is a cost involved, but the goal is to ensure everything they do is minimised for the end consumer. The company needs to make profit; they are a commercial business. There is no point having ethical values if the business goes under. The right balance is needed".

Participant # 23 discriminated between ethics and sustainability. Ethics is about *"where the company's or an individual's heart and mind is. Ethics run deep and are reflected in actions and everything you do. Sustainability is an output of some of those actions and the direction you want to take in relation to your business practices and position. If you have good ethics, you have wider reach into things like sustainability because it's the morally right thing to do"*. Participant # 10 also discriminated between beliefs and actions:

"Sustainability is about having an operation whereby renewable resources and practice are used as much as possible (to enable the business to survive, which ultimately profits the environment via

employment, nutrition, and replacement of dirtier practices). Ethics focuses on the human component. Improving the natural environment is perceived to be improving the lot for humans” (participant # 10).

“Traditionally ‘ethical’ related to how we treat people. Now it’s also about how we treat the planet. We are custodians” (participant # 26). “As a business there is greater recognition that the business can’t be separated out from New Zealand and New Zealanders; people and planet” (participant # 9). Recognising what is not ethical is easy; recognising what is ethical is not easy (participant # 10), however “why would you do anything else?” was a challenge laid down by participant # 17. Making a profit in order to maintain business viability without compromising standards was another challenge flagged by several participants: “It’s necessary to make money – to have fun tickets. You can’t have fun if you don’t have your fun tickets. Making money, being ethical and socially responsible have to go hand in hand” (participant # 8).

In terms of the tension between responsible use of natural resources and ecosystem pressures, industry and organisations face significant challenges and are: *“trying to manage it all. The drive is to corporatisation because small farmers and growers can’t manage all the requirements: food safety, ethical issues, carbon zero, and waste minimisation” (participant # 13). This participant emphasised the important role Industry bodies play in developing resources and tools to assist members (participant # 13). Balance is needed between social and environmental sustainability, however according to participant # 20, “acting in the best interests of your people will lead to acting in the best interests of the environment”. The potential clash between environment and food safety concerns was flagged by participant # 26:*

“Good quality water is needed to irrigate crops, but the amount of available water is reducing; consumers don’t want plastic but plastic is a big part of food safety; change could have unintended food safety consequences. Public see the front-facing plastic – they don’t see what has to be worn to maintain food safety e.g. aprons, hair nets, arm sleeves. These are regulatory requirements. Decisions will need to be made in the future about what level of risk and what compromises are acceptable”.

When participant # 32 thinks of ethical she thinks about people who are authentic in their actions, not simply green-washing. Using packaging as an example, she explored the options available to her and found there’s no perfect option for sustainable packaging for her product in New Zealand currently. She will probably move to recyclable plastic in the future but won’t until there is better recycling happening here. Even a compostable packaging option won’t necessarily be composted, so she is offering incentives for people to return packaging.. *“A business that is not ethical is doing things for show – their actions aren’t necessarily good for the environment or good for people. Not authentic” (participant # 32).*

The relationship between an ethical approach and a focus on sustainability are inextricably linked in the Māori worldview according to the participants who spoke on behalf of whanau-based businesses that are values-based. People and the environment are at the heart of these businesses that focus on creating inter-generational value:

“Ethical and environmental considerations drive the business and reflect what the team believes in. That’s where the intersection between ethics and sustainability comes into play; what matters to

them as people, what they have been taught, what do they know about what their ancestors thought about sustainability and environmental issues; how do they use science and technology to interpret that. That's merged with community interests to ensure they have a positive impact for the greater good" (participant # 11).

5.2.3 How does your ecosystem reflect your company values?

Values (Individual, Aligned & Company Values)

Alignment of values between businesses and their ecosystems, including suppliers, customers, and other local businesses or businesses of a similar size, or "kindred spirits" (participant # 10) was important to participants.

A whanau-based business, for whom partnership is really important, identified that there must be a values alignment to partner:

"It comes down to people; find the good people; build relationships and then feel comfortable working on that basis. People work within systems that may not be aligned with where the business wants to go, so finding the right people is important. The business has an extensive ecosystem, finds the right people, has amazing partnerships and collaborations regionally, nationally and globally. The business takes positions in national and international fora and takes a leadership position; getting into positions where they can make a difference, particularly if that furthers the business agenda and programme. First and foremost, it's about alignment with the business' values and vision. Even at a team level, if people and organisational values don't align, typically the relationship ends" (participant # 25).

Building long-term relationships with suppliers and engendering trust is fundamental to participant # 26 whose customers *"like the fact that the business is honest. A positive listeria detection is not the end of the world. They communicate with their customers. The business is dealing with a live product and has the integrity to be honest"*.

Fourteen participants (44%) talked about the formal mechanisms that are in place to ensure their ecosystem reflects the company's values, for example supplier certifications, service level agreements, and approved supplier programmes. These are targeted at both product supply, for example milk or meat, and consumables. Auditing to verify adherence to these requirements was mentioned by four participants. One large retail business took a risk assessment approach to segment suppliers:

"For suppliers with a greater than minimum risk, a social audit is required against one of the business's mutually recognised social auditing schemes. Suppliers are benchmarked against business requirements. There is an equivalency where suppliers are rated against business standards which determines what kind of follow up action may be required from the audit outcomes; corrective actions; timescales; frequency of follow-up audits. The business tracks the audit, audit outcomes and reporting. There is a lot of data collection, review and verification" (participant # 9).

According to participant # 9, there is evidence that the leadership shown by the food business by whom she is employed is trickling down into the business' supply chains.

Modern slavery was flagged as a topical issue by several participants. One business has started asking for supplier certifications such as environmental certifications and is: *“digging deeper into the ethics of suppliers, citing modern slavery as an example. The business is taking a leadership position across the industry to start a conversation, raise awareness and encourage suppliers to come to a policy position on modern slavery”* (participant # 18). They want suppliers to think about it with their suppliers as well. Those questions will be asked of the business by their customers. The business wants to provide confidence to customers that they take this issue seriously (participant # 18).

Another participant talked about wanting to work on the supply chain, but *“as a start-up her plate is full”* (participant # 27). In the future she will look at how she can develop a supply chain that reflects her values, and that is what she wants to work towards: *“When people know better, they do better”*.

She intends to achieve B.Corp status. Participant # 32 has *“been quite inspired about this recently, having attended sessions about B.Corp and hearing speakers including from companies like Fix & Fogg about how they work with their suppliers. Those companies have relationships with suppliers where values or issues such as sustainability are dealt with upfront”*. In contrast, participant # 17 represents a business that: *“works on the global stage, and is of a size where it can influence its ecosystem. If a supplier wants to do business with that company it must meet its food safety and quality standards”*.

Responsible Stewardship of Natural Resources (Custodianship - Waste Reduction/Minimising Harm/Recycling; Resource Use)

A range of strategies were identified by participants to minimise waste and harm and use resources more efficiently, including, for example, supplier agreements that prohibit palm oil in feed or ban the killing of male animals (participant # 4). Participant # 8 encapsulated the sentiment of participants in relation to responsible stewardship of natural resources. *“Industry collectively have decided that less waste, less impact on the environment, using less plastic, and recycling are the right things to do. People, planet and profit are all resources. Resources shouldn't be wasted”*.

Ecosystem Pressures (Social Licence, Future Focus, Packaging, Ethical Sourcing, Regulations & Standards, Risk Management)

Challenges related to sourcing ingredients were mentioned by several participants. One business has begun a journey to develop a sustainability framework that will: *“guide future actions and choice and ensure sustainable and ethical sourcing”* (participant # 15). *“Customers are asking more questions. They want to know about sourcing. They want visibility through the supply chain”* (participant # 20). Sourcing ingredients internationally is one issue; sourcing local ingredients is the other. The ideal for participant # 22 would be that her business supported New Zealand dairy farmers to transition to growing crops that could be used in her production. There are Scandinavian and US companies that are doing that. Her business does not use palm oil, but that decision is driven as much by consumer perception as environmental concerns. Apparently, the use of coconut oil may be equally damaging. *“It's not an ethical decision, because it would be difficult to sell (her) product using palm oil. The company does check that the coconut oil is not produced in areas where monkeys are used for harvesting for example. Beyond that, the business cannot make claims about their ingredients”* (participant # 22).

Two participants talked about the difficulty in sourcing locally-grown ingredients. Sustainability was a key part of the strategy for participant # 32 and she was constantly on the lookout for locally-sourced supplies. Ingredients that are not grown in New Zealand must be sourced internationally, but the pandemic has resulted in shipping delays. Participant # 27 also wanted to use local produce, however being based in Northland where there simply isn't the infrastructure to scale up, she will need to source her ingredients from Auckland because she can get them from one place. Currently she purchases supplies from people with a grading system to ensure the food is safe.

While a company may have the biggest operation in New Zealand, globally they may be "tiny". New Zealand's poultry industry was cited as an example.

"Where possible the ecosystem reflects the company values, but in reality the company has very little influence. New Zealand produces c125 million chickens per annum, the USA produces 9 billion, with six major companies providing 60%. New Zealand doesn't have much influence on the breeds of bird used for instance and how sustainable they are. The poultry industry uses a lot of soya in feed. New Zealand is a tiny proportion of 1% therefore has no influence. Amazon rainforest is being cut down to plant soya, but NZ has no idea where their soya is coming from" (participant # 3).

According to participant # 21:

"The issue with plastic gets confused between CO2 production and rubbish that's left around. Environmental contamination is frequently a result of human activity, littering is endemic, which is the primary issue for plastic, as opposed to plastic per se. Currently it is a necessity for protection of the shelf life of our product. That's where attention should be focused to a greater extent".

Māori Worldview (Intergenerational Value Creation, Whanau, Kaitiakitanga, Business with a Purpose)

Values alignment and partnership with ecosystem actors, including in-market was fundamental for iwi/Māori organisations (participants # 11, 24).

"Generally, it comes down to people; find the good people; build relationships and then feel comfortable working on that basis". The organisation *"has an extensive ecosystem, finds the right people, has amazing partnerships and collaborations regionally, nationally and globally. First and foremost, it's about alignment with values and vision. Even at a team level, if people and organisational values don't align, typically the relationship ends"* (participant # 24).

Ecosystem Pressures (Social Licence, Future Focus, Packaging, Ethical Sourcing, Regulations & Standards, Risk Management)

Packaging emerged as an issue in conversations about alignment between organisational and ecosystem values with participant # 7 providing useful context about plastic packaging as it relates to the meat industry. This participant's company purchases its plastic bags from Sealed Air, a US multinational and one of approximately six companies that manufacturer c90% of the packaging globally. Sealed Air, according to participant # 7, produces enough bubble wrap per year to wrap the earth ten times over and has an annual research and development budget of c\$200M.

"Packaging suppliers are key suppliers because of the intimate relationship packaging has with the product. The plastics industry is more acutely aware than anyone that they are in danger of

becoming the equivalent of 21st century drug dealers. The vacuum barrier bags the business uses have nine layers and are 40 microns thick. That means chilled product can be kept for 20 weeks. Nothing else can do it. There's a nasty barrier in there, though, that is completely non-recyclable. It does break down, but it takes over 100 years".

Participant # 7 went on to provide an example of a package of non-breakable office products encased in bubble wrap. After challenging the supplier about plastic in the packaging, the supplier moved to using excess wrapping materials as dunnage rather than plastic. *"Ethically, that's repurposing and recycling. If it's possible to recycle or repurpose waste, that's a great thing to do".*

Participant # 11 also grappled with the issue of plastic packaging. The business *"has a re-filling initiative nationwide but is trying to find packaging that supports the long shelf life consistent with the product. Packaging is a work in progress. Supporting companies that are trying to address this to the best of their ability within their cost structure is the business's focus"*. Looking for viable alternatives was a common narrative. Participant # 8 used glass jars for the product and was investigating the possibility of recyclable soft plastics. Returned packaging will be recycled by the business and customers offered a 10% discount on the next product. Returnable, refillable stainless steel packaging was being trialled in the South Island according to participant # 2. Suppliers to that business were asked what sustainable options were available. One industry was reliant on polystyrene but is actively looking at alternatives that will do the same job. *"As soon as another product comes along with the same properties, companies will change"* (participant # 28).

External Drivers (regulations and standards) that influenced businesses include Global GAP (Good Agricultural Practice), GRASP (GLOBALG.A.P. Risk Assessment on Social Practice) certification regulations, BRC (British Retail Consortium), Sedex social responsibility standards, Industry Standards, New Zealand Farm Assurance Programme and participation in the Global Business Ethics Survey. Internal mechanisms that set company expectations in the context of the broader ecosystem included staff handbooks, and standards concerning animal welfare and the environment. Supply chains as a mechanism to ensure ecosystems were reflective of company values were described as vertically integrated (participant # 13); and having backward integration (participant # 11).

"What has been established as a goal is not focusing on those aspects of the business that can't be materially influenced. How can the productivity of the land be improved while simultaneously improving the value of that land, off-setting fuel use for example. Supply side economics come into play but having vertical integration control means the risk is manageable" (participant # 11).

5.2.4 What do you consider the key characteristics of ethical leadership are?

Honesty and openness, including descriptors such as integrity, trustworthiness, being approachable and upfront, were identified by participants as the most important ethical leadership characteristics, followed by emotional intelligence encompassing empathy, respect, being calm and composed, interest in people, vulnerability, taking time, self awareness, willingness to compromise, growth, and adaptability, then leading by example and communication. Table 46 summarises the characteristics of ethical leadership identified by the participants with their descriptors and supported by selected quotations from participants.

Table 46: Interface Between Ethical Leadership & Food Safety Culture: Qualitative Research Strand; Characteristics of Ethical Leadership Identified by Research Participants

Ranking	Ethical Leadership Characteristic	Characteristic Descriptors
1	Honesty/Openness	Honesty, Openness, Integrity, Trustworthiness, Approachable, Upfront <i>On approachability: "No one in the business is that precious about what they do that they can't take feedback"; "if dickheads were working for the company the staff wouldn't tolerate it. They've worked too hard to let someone else destroy what has been built" (participant # 24)</i>
2	Emotional Intelligence	Empathy, Respect, Calm/composed, Interested in people, Vulnerability, Takes time, Self awareness, Compromise, Growth, Adaptability <i>On taking an interest in people, "You are only as good as the staff you have" (participant # 3)</i> <i>On vulnerability, "A good leader seeks guidance and learns from others" (participant # 25)</i>
3	Lead by Example/Walk the Talk	Lead by Example, Walk the Talk, Leading from the front, Being a good ancestor and a good descendent <i>"We want to be a good descendant and a good ancestor". Therefore, you have to think about what you are doing, you have to do the right thing. What does it mean? What are you going to leave? Another car, boat, bach? It comes down to identity, belonging" (participant # 25)</i> <i>"People will follow if you are leading the way" (participant # 23)</i> <i>"Making visible what the standards are...and what they are not in practical terms; making it personal" (participant # 31)</i>
4	Communication	<i>"They are comfortable, with integrity, to challenge or express a difference of opinion. That avoids group think. You can say anything, express what you think. Not everything is landed on one individual. Supporting and helping one another is important" (participant # 25)</i>
5	Transparency	<i>"People will see through bullshit a mile away" (participant # 24)</i>
6	Considered decisions/Foresight	Considered decisions, Foresight, Evaluate issues, Act on facts
7	Authenticity	Being real/genuine <i>"Lip service won't work" (participant # 4). "Not greenwashing bullshit" ... and "not hypocritical" (participant # 8)</i>
8	Doing the right thing	<i>"Doing the right thing even when no one is looking" (participant # 27)</i>
9	Courage	Courage, Making hard calls, Taking a firm hand
10	Serving others	Enabling staff, Motivator, Advocate
11	Fairness/Equity	
12	Profit for success	Sufficiently profit driven to enable success

Throughout this research, participants have articulated the company values of importance to them, outlined in section 5.2.1 above. Table 47 maps the characteristics of ethical leadership identified by Participants with their views about important company values. The similarities between individual and organisational values are apparent.

Table 47: Interface Between Ethical Leadership & Food Safety Culture: Qualitative Research Strand; Individual Ethical Leadership Characteristics Mapped to Identified Company Values

Ethical Leadership Characteristics (Individuals)	Company Values Expressed by Participants
Honesty/Openness	Honest, open and trustworthy
Emotional Intelligence	Focus on and care for people; fairness and respect; adequate remuneration; building capability; ensuring safety and security; communicating openly and

Ethical Leadership Characteristics (Individuals)	Company Values Expressed by Participants
	honestly, embracing diversity, setting high expectations, acting with integrity; building and maintaining connections and partnerships; Holding itself to account
Lead by Example/Walk the Talk	Supply chain leadership; Values come from the top
Communication	Communicate honestly; Respond to consumer concerns (social licence)
Transparency	Transparent
Considered decisions/Foresight	Consideration about impact of decision-making on the business and its customers; Seize opportunities; Legacy planning/future focus; Creating inter-generational value; Awareness of impact on communities
Authenticity	
Doing the right thing	To do things right and doing the right thing for people and planet; Ethical practices; Standards and integrity regarding: animal welfare, food safety, product; Doing business sustainably/ Smarter use of resources
Courage	
Serving others	Contribute to the greater good/societal concern/community involvement and partnership
Fairness/Equity	Fair
Profit for success	Generate profit without compromising standards

A review of ten international publications about ethical leadership characteristics showed nine common characteristics (Brown et al., 2005; Brown et al., 2006; De Hoog & Den Hartog, 2008; 2013; Gemechu et al., 2020; Mihelič et al., 2010; Sharif & Scandura, 2013; Toor & Ofori, 2009; Zheng & Zhang, 2011; Witzel, 2018; Yukl et al.). When the characteristics identified in these publications, and those identified through this research are compared (Table 48), the international publications included one characteristic that was not clearly identified by research participants, namely, rewards and discipline. Further, the characteristics of transparency, considered decision-making and authenticity identified by participants in this research did not feature in these publications with the exception of one publication that included authenticity and transparency in the list of characteristics (Witzel, 2018) and one other that identified visionary (foresight) (Zheng & Zhang, 2011)

Table 48: Interface Between Ethical Leadership & Food Safety Culture: Qualitative Research Strand; Characteristics of Ethical Leadership: Research Participants vs Common Characteristics of Ethical Leadership in International Literature

Ethical Leadership Characteristics: New Zealand Food Businesses	Ethical Leadership Characteristics: International Publications
Honesty/Openness	Honesty, Trustworthiness & Integrity
Emotional Intelligence	Internal locus of control
Lead by Example/Walk the Talk	Leading by example
Communication	Communication
Transparency	
Considered decisions/Foresight	
Authenticity	
Doing the right thing	Ethical/moral behaviour; Setting ethical standards
Courage	
Serving others	Citizenship
Fairness/Equity	Fairness
Profit for success	

5.2.5 Do you think there are unique features or characteristics of ethical leadership in Aotearoa New Zealand? If so, what would these be?

Twenty-seven participants supported the idea that there are unique characteristics of ethical leadership in Aotearoa New Zealand; four did not agree and one did not directly respond.

Table 49 summarises the unique characteristics of ethical leadership in Aotearoa New Zealand identified by the participants with their descriptors. Being down to earth or humble, including descriptors such as: don't embellish, unassuming, pragmatic, don't have or accept extremes, less hierarchical, relatable and approachable, was the most common characteristic identified, followed by honesty and openness, indigenous values and lack of corruption.

Table 49: Interface Between Ethical Leadership & Food Safety Culture: Qualitative Research Strand; Characteristics of Ethical Leaders in Aotearoa New Zealand

Ranking	Ethical Leadership Characteristic	Characteristic Descriptors
1	Humble/Down to earth	Humble, Down to earth, Don't embellish, Unassuming, pragmatic, don't have or accept extremes, less hierarchical, relatable, approachable
2	Honest/Open	Honest, Open, Upfront, transparent
3=	Indigenous values	Indigenous culture, kaitiakitanga philosophy
3=	Not corrupt	
4=	2 degrees of separation	2 degrees of separation, Small and relatively homogeneous, everyone knows everyone, harder to hide
4=	Can do attitude	Can do attitude, People who get in there and get things done
4=	Passionate about the environment	Passionate about the environment, Greener
4=	Strong sense of identity	Personal values, connection to place/roots
4=	Collaborative	Collaborative/Co-operative
5=	Tolerant	Tolerant, Less prejudiced
5=	Fair/Equitable	
5=	Accountable	
5=	Take responsibility	
	Other	Walk the talk, well rounded, adaptable, brave, lots of fun, less aggressive

The statement from participant # 31 best captured the view from my participants about the highest ranked ethical attribute of kiwi leaders - that of being humble or down-to-earth:

"New Zealand's basis (for enterprise) has been inclusiveness, representation, real people in leadership. Kiwis walk the talk and are sensitive to fazz and bullshit. For that reason, the people that do well long term engage with the down to earth approach. We might undersell ourselves as a result. There are companies doing similar things internationally, but New Zealand is more unassuming in terms of what is being achieved. That can work in our favour – the wow factor when people see what is actually being achieved".

While each participant identified positive characteristics, five participants reflected on characteristics of either leadership or culture that may not serve New Zealanders well. Several participants have lived or worked or

are working in other countries, bringing perspective to this question. The issues raised included kiwis underselling themselves, dragging the chain particularly in terms of the environment, taking shortcuts and taking the easy way out to avoid conflict. Gaps in talent and leadership were noted: *“There is good talent and leadership in NZ but there are gaps at all levels. A lot of kiwis go overseas and don’t come back”* (participant # 13). The following quotes exemplify the issues raised by these participants:

People *“get away with all sorts of things they shouldn’t get away with. People don’t want to upset the apple cart so take the easy way out “* (participant # 3).

“Sometimes kiwis drag the chain compared to some areas of the world. Europe and the UK are more attuned than us; we are playing catch up; we are still a wee bit ‘number 8 wire’ mentality. Industry Associations are stepping up and supporting change, for example reducing impacts on the environment. The dairy industry has changed over the last few years as the degradation to the environment has been seen. We haven’t recognised the damage that has been done. We have been complacent but it’s starting to change. The impact that our industries have had on the environment have become more obvious and visible – this has led to change” (participant # 19).

Participant # 7 reflected that New Zealanders are not very ethical in some respects because *“we are pragmatic and take shortcuts, we do all sorts of things we shouldn’t do that we get away with because we have a small population in a large land area. There is nothing uniquely kiwi about how we do things. There are some ethical people and strong leaders in New Zealand; Emma Lewisham and her burgeoning makeup business has become the first carbon zero makeup company in the world – that’s ethical leadership”*.

“Having come from a different part of the world, (participant # 30) thinks ethical leadership is a human trait, not a kiwi trait. There is a slight difference between UK cynicism and kiwi naiveite, but the goals are still the same. There are ethical leaders in the UK; Scottish, Welsh, Irish, then the counties. There are people trying to showcase their heritage. We have this thing about the number 8 wire and kiwi ingenuity. The UK has the same. It’s human ingenuity. It’s how we are built. How can we separate ourselves, given how much we have been influenced by other cultures? We are a multi-cultural society. We should be inclusive. We are first and foremost human beings with the same needs, requirements and aspirations”.

Commentary from participants on four of the ‘Kiwi’ characteristics identified in Table 13 (Humble, Māori worldview, Not Corrupt and Two degrees of separation) follows.

5.2.5.1 Humble

Humble, down-to-earth and real are three adjectives participants used to describe Kiwis in the context of leadership. Participant # 16 comments that *“We see our leadership as being different from a typical American or Australian leadership. New Zealanders don’t get carried away with patting ourselves on the back and making a fuss about things”*, with participant # 4 suggesting that *“New Zealand is probably a little more humble and less aggressive than most”*.

“Being an isolated country, having to make do with what we have, means we are adaptable, not blinkered, we don’t have a class structure, we haven’t got the political dynamics in the likes of the US where politics dominates. New Zealand has a grass roots background. We don’t embellish stuff more than we need to; keep things more basic and real” (participant # 23).

5.2.5.2 Māori Worldview

The impact from and value and characteristics of the Māori worldview were acknowledged by both whanau-based businesses and non whanau-based businesses as being uniquely kiwi; characteristics such as connection/identity, an intergenerational focus, kaitiakitanga or guardianship/custodianship, and a collective rather than individual focus as the following quotations show:

“One of the most untapped and unrecognised uniquely Kiwi or Aotearoa New Zealand expressions of ethical leadership is that of the indigenous populations of Aotearoa New Zealand” (participant # 11). *“We are really fortunate in having our indigenous culture – the kaitiakitanga philosophy”* (participant # 5).

“For Māori leadership it’s the long-term view – the consideration of generations to come, and those that have gone before, and connections to a place. That connection or relationship is important – that links back to the identity piece. You know where you are, where you have come from. Pakeha (white New Zealanders) have it too” (participant # 25).

The parallels with the intergenerational approach taken by a Japanese company were drawn by participant # 25:

“They get it; the values, the long term view. The values are very similar. Māori need to be brave and have the courage to say ‘we have some of the answers, we have some of the solutions, we need to back ourselves and not get caught up in systems that aren’t helpful to where we need to go as a community and as a country”.

“The sooner New Zealand embraces Māori values and brings them into New Zealand business as more than lip service, the better. That is authentically what is us. We should be able to pull Māori values into our business. Our business models aren’t set to work with 100 year models. The way a chief executive is valued is completely contradictory to how society should grow. The best cultures are those that value the group over the individual. The way business is set up in the western world, leaders are set up for personal success not for the growth of the organisation” (participant # 4).

5.2.5.3 Not Corrupt

The lack of corruption in this country was viewed as unique by participants. *“We don’t know how lucky we are, politicians and big business are not corrupt. That comes through in the way we do business. We are unique in this way”* (participant # 5). Others expressed similar viewpoints.

“We are in a Kiwi bubble; we have an un-corrupt country compared to other countries; that culture comes through in our leadership; whether you vote for Labour or National, people still have conversations and are mates. Overseas the political divisions almost result in civil war. Not here. We are more tolerant, less prejudiced” (participant # 26).

Participant # 24 ascribed this in part to our connection with the land:

“Over generations we haven’t moved that far away from the good old family farm thinking. We have a socialist system that allows people to survive without having to resort to bribery and corruption. Anyone working in that way gets pulled up and ridiculed. There are dodgy characters around, but as a country our culture looks down on that type of behaviour from quite a height” (participant # 24).

Another participant expressed a similar view:

“New Zealand has an easy operating model to do business ethically in, however we need to be aware of the global influences in decision-making and how other countries may operate. How do we as New Zealanders understand that, work within the environment and continue to work with integrity?” (participant # 12).

5.2.5.4 Two Degrees of Separation

New Zealand’s size, the degree to which people know each other and therefore the personal consequences of actions were emphasised as being positive characteristics by participants as exemplified by participants # 29 and 10:

“There’s no point in being elitist in New Zealand or you run out of people to talk to” (participant # 29).

“Two degrees of separation means everything you do has consequences on someone you know, hence New Zealand’s response to COVID – it’s about saving lives. There’s a lot more selfishness in larger countries. New Zealand is small and relatively homogenous. In the employment context it’s relatively easy to have an honest discussion with your boss. There is a feeling that people generally agree on most things. As a foreigner, a good example is the Collins/Adern debate where there’s a great deal of overlap. They fundamentally have the same goals but disagree in the methods whereas in the United States it’s completely polarised” (participant # 10).

Two other participants expressed similar views: *“New Zealand’s size is quite unique in terms of how businesses do business. We are small. Lots of people know each other and can help speed up conversations and decisions. People are more open to collaborating with each other. It opens doors. New Zealand is not so hierarchical”* (participant # 9). Participant # 32 agrees. *“We are a smaller country with smaller businesses, so it’s harder to hide. In New Zealand there is a smaller population, it requires hard work for the business to succeed, everyone knows everyone”*.

Participant # 4 challenged perceptions about the uniquely ‘Kiwi’ characteristics of ethical leadership, acknowledging the influence of national culture:

“Every country has its own idiosyncrasies. Every country’s leadership and ethical leadership is cloaked in the culture of that country – what works and what doesn’t. Yes it’s unique because it has a New Zealand lens. The leader within a culture is one that understands that culture well and can encourage others to follow them. We are no better or worse than any country in a similar position”.

5.2.6 Why does ethical leadership matter to you?

Five themes best encapsulate the results of this question; alignment of personal and organisational ethics, morals or values; personal ethical leadership characteristics; organisational leadership; a people focus and a future focus – perhaps best articulated through the He Tāngata proverb: He aha te mea nui? Māku e kii atu, he tāngata, he tāngata, he tāngata. What is the most important thing in the world? Well, let me tell you, it is people, it is people, it is people (Digital.govt.nz, 2023).

Findings from this research suggest that ethical leadership matters, and it's primarily personal. Alignment between personal and organisational ethics, morals or values was cited by ten of the participants as the reason why ethical leadership matters. Participants *"couldn't work in any company that wasn't ethical"* (participants # 23, # 5, # 30, # 7); *"want to be able to sleep at night"* (participants # 24, # 5); *"are proud of being part of something that's good"* (# 29); *"go home knowing they have made a difference in the world"* (participant # 24), and have *"left previous roles because he didn't believe his leader was ethical"* (participant # 26). *"No one wants to be part of a cheating, lying organisation"* (participant # 29).

Personal characteristics like honesty, fairness and transparency (participant # 10); leading by example and walking the talk (participant # 18); openness, trust, and integrity (participant # 29); and growing and learning and being the best person possible (participant # 32); listening (participant # 18, 29) and equity (participant # 31) provided the rationale for why ethical leadership matters to individuals. *"The key point is listening, taking it in. It's a journey. It keeps evolving"* (participant # 18). *"It's important to be able to trust the people you work with – open, honest and not going to be back-stabbed"* (participant # 29). Upbringing was mentioned as a personal driver by participants # 7, 27, and 32, with # 32 also citing her faith as a driver.

Despite the fact that participant # 8 is a sole trader it's important that he has a path so that other members of his ecosystem can join the journey, rather than pushing them or chasing them. *"It's about making sure you do what's important to you, and trust that aligns with your brand champions. It takes a village to raise a child and a small city to run a small company"*.

In the absence of ethical leadership, participant # 31 described herself as *"dangerous!"*, who would *"rebel and become bored and destructive"*. She had seen leadership that was not ethical, and liked the *"harmony of everyone having a fair go and understanding where they stand"*.

The importance of organisational leadership was emphasised by the participants, each of whom is in a leadership position in their own right. *"The most important element of leadership is leading, and leading by example. At the end of the day, a leader is being paid to decide"* (participant # 10) and alignment between the ethics of leaders and organisations matters (participant # 12), as highlighted by participant # 21 in the context of recruitment: *"Rightly or wrongly people frequently look to management for their leadership. Often leaders are appointed with ethical values or values counter to company culture, therefore the wrong values are promoted to staff"*. However, leaders can demonstrate effectiveness in *"driving ethical practice in a business"* (participant # 13).

The importance of people was emphasised by participants as exemplified by the following statements:

"People matter. The world doesn't go round without people" (participant # 28). Participant # 13 expressed

similar views: *"It's about thinking about people and culture"*. Participant # 14 *"has a strong moral fibre and has very little time for people who are unethical; who don't treat people well, who don't tell the truth. Why would you want to deal with someone if you feel you are going to be cheated by that person, or you have to put protection in place to ensure you are not cheated?"*. She treats people well and expects that in return and is genuinely surprised when that doesn't happen. Participant # 26 suggested that *"it's not acceptable to treat people poorly"* and participant # 24 wants to go home knowing he has *"looked after people"*. *"You have to get people to follow you, so you need good leaders to bring people along on the journey; real leaders versus box ticking"* (participant # 18).

Future focus was another theme that emerged from the question of why ethical leadership matters. Participant # 15 *"is turning to the future. Regarding ethical leadership – do we believe in what we are doing and is the current system sustainable? The answer to those questions is 'No'"*. Hence why he is doing what he is doing which may be summed up as business with a purpose. Participant # 17 agreed that the values and expectations of ethical leadership are *"core for doing business in the future"*. At a personal level, participant # 19 wants to live by his values and pass those onto future generations.

The interconnected Māori worldview articulated by participant # 25 encompassed each of these themes.

"To be ethically inclined is to first have a really good understanding of self. The business is a Māori business whose ethical values are driven by Te Ao Māori and underpinning values. When decisions are made on a business level, there are a range of considerations; how long can this be done, what resources are needed to do it, how can the business ensure the resources that are used are renewable and how can the long-term value of the whenua be maintained?" She *"is there for a lifetime so she wants to make a difference"*. She and her cousins don't work, they have purpose. There's a huge investment in the future. She has been the recipient of a scholarship, been an associate director, now director. She's in the business. When she *"looks at the investment into upcoming leaders, it's been massive. They are very mindful of the responsibility to leave the planet better, to leave their people better"*, and so she *"feels privileged to be working for the family – 400 whānau members"*.

This concludes the results relating to the 'Ethical Leadership' component of the qualitative interviews conducted as part of this doctoral research. A discussion of these findings can be found in Chapter Six.

5.3 Findings Part Two: Food Safety Culture

5.3.1 The organisational drivers for food safety

Twenty-nine of the 32 participants responded to the question, What are the drivers for food safety in your organisation? Four industry associations were represented by participants. Addressing whole of industry issues, safeguarding market access for their members and addressing public health through maintaining the supply of safe food were the key drivers for associations.

By far the most commonly identified driver for organisational food safety was consumers or customers including vulnerable consumers (e.g. babies), identified by 16 of the 32 participants. Three participants

represented companies that produce infant formula, for “*the world’s most precious consumer*” (participant # 4). That participant cited a “*lightbulb moment*” as his personal driver, recognising that the product is “*the sole source of nutrition for babies*”. That means “*there is no workaround; there is no compromise*”. This sentiment was echoed by participants # 16 and # 29 who also represented companies producing formula for infants, “*a very vulnerable group*” (# 16). “*This food is going to babies and no corners can be cut. Food safety is the absolute focus*” (participant # 29).

“*Not killing anyone*” (participant # 15); not impacting “*consumers adversely*” (participant # 12); not wanting “*potential harm to customers*” (participant # 23); “*protecting customers and consumers*” (participant # 26); having “*a product that (customers) can trust and know to be good, to have confidence*” (participant # 27); and “*consumer perceptions*” (participant # 24) were comments from participants whose driver for food safety was the consumer/customer. “*It’s all about the customer*” according to participant # 27. “*It’s a ticket to the game*” from a regulatory and consumer perspective for one company that sells to UK company, Marks & Spencer who “*set high expectations*” (participant # 19).

The values or ethics of company owners or organisations and the regulatory environment/compliance were the second most cited drivers for food safety. These are expressed in various ways (Table 50).

Table 50: Interface Between Ethical Leadership & Food Safety Culture: Qualitative Research Strand; Expression of values or ethics as drivers for food safety

Expression of values or ethics as drivers for food safety	Participant #
An individual ethical mission	Participant # 22
Always do the right thing as an organisational core value	Participant # 30
A reflection of personal ethics	Participant # 32
A personal responsibility to ensure everything is tip top	Participant # 8
Organisational positioning as a good corporate citizen	Participant # 23

An element of the culture of one dairy company, a producer of infant formula, is “*what you permit or walk past, you are endorsing. Small things that get left or overlooked can escalate into big things*”. This could equally be looked at from a risk management or mitigation perspective, identified by three participants as a driver for food safety. Fear was identified by another participant as being a driver for food safety, after the organisation was delivered an ultimatum by the regulatory authority to fix the problem themselves or the authority would (participant # 3).

In terms of regulatory environment/compliance, “*Fundamentally if you are not producing safe food you won’t be in business*” (participant #7); a sentiment supported by participants # 14 and #19, both of whom represented the highly regulated meat industry; and by participants #17 and # 24 representing the dairy sector. Participant # 15 summed it up. “*No food safety, no business. It’s a way of operating rather than a nice to have*”. Profit was the first response of one participant (# 7) for the same reason. “*If you are not putting out safe food, no one is going to buy it*”.

Protecting a hard-won, respected brand was cited as a driver by two participants (#22, # 23). The driver for the organisation represented by participant # 25 “are not too dissimilar from their purpose which is to preserve and enhance its taonga (legacy) for the benefit of current and future generations; this is the approach taken to health and safety”. The organisation “wants to make sure every person goes home safe and that every person who buys their products or solutions is safe and has a good experience”.

Ecosystem innovation was identified as a driver for food safety: “looking at the benefits for the environment of changing up the food system; diverting nitrogen that would otherwise have ended up in stock feed, the waterways and on the land to nutritious food; also looking at communities, farmers, and other stakeholders so that it’s beneficial for them. It has to be economical, but the outcomes are bigger than that in terms of the environment, wellbeing and the viability of a changing food production system for New Zealand that has been doing dairy well for a long time”. The company “wants to offer those farmers a way of still making a good return but with less significant environmental impact” (participant # 31).

The drivers for food safety discussed above are summarised in Table 51.

Table 51: Interface Between Ethical Leadership & Food Safety Culture: Qualitative Research Strand; Drivers for Food Safety

Ranking	Drivers for Food Safety
1	Consumers/Customers including vulnerable consumers
2=	Owners/Company values/ethics
2=	Regulation/Compliance
3	Fear/Risk Management/Mitigation
4=	Market access
4=	Reputation/Brand value
4=	Food safety culture
5=	Ecosystem innovation
5=	Fits association criteria
5=	Food safety policy
5=	Intergenerational value creation
5=	Profit

Table 52 represents the identified drivers thematically analysed. Thus, it can be seen that company values or culture are the most important driver for food safety for those organisations represented in this research.

Table 52: Interface Between Ethical Leadership & Food Safety Culture: Qualitative Research Strand; Drivers for Food Safety Thematically Categorised

Drivers for Food Safety
Company Values/Culture
<ul style="list-style-type: none"> • Consumers/Customers • Vulnerable consumers • Owners/Company values/ethics

Drivers for Food Safety	
•	Food safety culture
•	Public Good
•	Ecosystem innovation
•	Food safety policy
•	Intergenerational value creation
•	Profit
Ecosystem Pressures	
•	Fear/Risk Management/Mitigation
•	Regulation/Compliance
•	Market access
•	Reputation/Brand value
Other (Association imperative)	

5.3.2 The burning food safety or food safety culture issues

Twenty-eight of the 32 participants responded to the question, 'What are the burning issues for you in terms of food safety or food safety culture?'

Ten participants identified issues related to organisational culture as being top-of-mind. *"Unless the people have the right culture, nothing will work. The right mindset, right culture, quality of care is very important. The number 8 wire attitude doesn't work in the business". The organisation "can't have inventive Kiwis trying to take a shortcut"* (participant # 17). Looking for ways to improve current practice and introduce and manage innovations such as whole genome sequencing was a challenge for participant # 29. Ensuring that staff know they need to speak up was a burning issue for participant # 4. *"Everyone understands that owning up to something is ok. Many companies cover up. It's not in our DNA to allow that to happen. The company's checks and balances mean that issues are caught before they get as far as the consumer. If they brushed it over, they could potentially kill a baby. Communication and enabling, and not blaming is part of the 'sensational culture'"*.

"You can't have a good food safety culture if you don't have a good management culture" according to participant # 3. *"People aren't going to work for people they don't like. You must be fair, even-handed and communicate with people. People don't want to talk to people at the top who are bullies. You can't have a good food safety culture if people feel they can't come to you. You can only get that food safety culture if you have good organisational culture"* (participant # 3).

Food safety culture was top-of-mind for New Zealand food businesses, driven in part by overseas regulatory requirements. *"In February 2019, BRC GS v.8 introduced a section on food safety culture which forced the business to put mechanisms in place to verify food safety culture including defining and maintaining a clear plan. The business has approached this through the sustainability plan which includes food safety key performance indicators"* (participant # 23). One other business had changes in leadership that allowed the company to start driving food safety culture.

"The company wants to get to the same level as health and safety although health and safety has been driven from the regulatory perspective. There aren't the same regulatory or legal rationales for food safety. The company is bringing the Board along on the journey. Food safety has to be driven

from the top, but the people at the coal face are the biggest asset and are well resourced and have the tools to do the job” (participant #18).

Participant # 30 worked with suppliers to ensure compliance with her company’s food safety culture code of practice.

“The business asks suppliers to identify where they are on the continuum from minimal through to embedded food safety culture, and put together a plan about how to achieve continuous improvement. The business wants to see the little steps suppliers are going to take to achieve an embedded approach. The key thing is that it is top down”. An issue for the business is that “supplier excellence standards are seen as a cost to business, rather than a cost benefit or value”.

Participant # 31 was responsible for leading the development of food safety culture in a small start-up.

“There is no underlying cultural backdrop that would either support or undermine food safety because there is no history”. She was the second employee to join the company and within a fortnight there were four people. “It’s making sure these things are being talked about as part of regular reviews”. This participant acknowledged the importance of not assuming a level of knowledge among staff about food safety culture. Once a food safety culture programme is implemented, the issue becomes one of evaluation. “if things aren’t measured, they can’t be improved” according to participant # 24.

The business is “getting to a point where they have been flat out doing, now they have to start looking at how they can measure food safety, quantify it and improve it. They are getting into the continuous improvement mentality now. This year is the first time there has been a set of business objectives from board level rolled out through the teams to individuals across company; the sort of things that can measure food safety and quality performance. Can they trend food safety failures, for example. It’s about getting the mechanisms in place to measure and improve” (participant # 24).

Matters related to the regulatory environment, and market access were burning issues for some organisations. While operating within a regulated sector, the level of lockdowns due to the global pandemic meant the issue is one of implementation (participant # 3).

“Food safety is so market driven it’s important that market pressures don’t negatively impact on how advances in food safety are made” (participant # 14), with participant # 19 from the same sector noting that:

“supplying to markets at a distance means companies must maintain high standards when it comes to microbial levels, as countries that didn’t traditionally test (product) at the border now do. In addition, markets have become more discerning overtime. New Zealand has a great reputation for producing good quality, safe product. Our exporters want to do what is necessary to maintain access to markets” (participant # 28).

Product quality was also identified as a burning food safety issue for participants. Managing microbial and viral, foreign and plant matter contamination, and associated issues such as allergens and labelling were foremost (participants # 32, 20, 18, 13). Changing consumer trends and the risk they pose to product and companies was a concern to participant # 12 given changing international and national trends for eating the

product. *“Customers don’t necessarily consume product in the way that the business intends it, for example eating products raw rather than cooked”.*

A range of workforce-related issues of concern were identified by participants, summed up by participant # 15;

“The biggest issue in New Zealand currently is a labour force and the second biggest issue is a labour force that wants to work. There are always training issues, especially within the manufacturing industry when it sits alongside hospitality. There is a reasonably high turnover. Retention, while not a food safety-specific issue, is one of the challenges which impacts on training. Overlay the current available employment resources which are very restricted, and the business and the manufacturing industry including fruit growers are hamstrung. It’s not a case of getting the right people on the bus; it’s a case of getting someone on the bus at all and then trying to ensure they understand what the business is trying to achieve in terms of food safety, and the importance of following procedures”.

Internal disruption or instability for two of the participants proved a challenge to food safety culture in the past year with one participant having gone through two restructures in less than 12 months and five restructures in six years (participant # 2), and another having relocated two businesses in three months from the South to the North Island (participant # 15).

Labour-intensive manual processes inherent in the red meat industry were a burning issue *“Every time there is a contact between human and food there is an opportunity for biological, chemical, or physical contamination. The business only produces raw food. There is always a healthy bunch of bugs on meat”* (participant # 7). The same participant also raised the issue of emerging infectious diseases.

“Exotic or zoonotic diseases are becoming more prevalent, and are getting more airtime, for example swine flu in China. The combo of pigs, birds and humans is a breeding ground. There are biosecurity issues that are not well known”. This participant formerly worked for a poultry company and in his role *“was not permitted to enter a pig farm, or keep pigs, birds or chickens at home. The poultry industry avidly lobbies against importation of chicken. New Zealand is the only country in the world where several poultry diseases are not endemic. If there are diseases that come in that kill chickens, New Zealand’s endemic birdlife is at risk”.*

A ‘bugbear’ of participant # 30 is *“the differentiation between international and national food standards. Domestic customers should expect the same food safety standards and food safety culture as international customers. Why should New Zealanders accept a lower level of standards?”*

The burning food safety and/or food safety culture issues are summarised in Table 53.

Table 53: Interface Between Ethical Leadership & Food Safety Culture: Qualitative Research Strand; Burning Food Safety or Food Safety Culture Issues

Ranking	Identified Issue	Components
1	Organisational culture	# 8 wire mentality, risk approaches, getting people to speak up, getting into a continuous improvement space, getting consistent thinking, team culture

Ranking	Identified Issue	Components
		(communications and training), building culture from scratch), managing innovation
2	Regulatory Environment	Implementing regulations, market access, managing relationships in-market
3=	Food Safety Culture	Educating suppliers, evaluation of food safety culture, starting the journey
3=	Product quality	Pathogen management, foreign matter, allergens, labelling, impact of lockdown
4	Workforce	Staff availability and desire to work, turnover, seasonal, training and impact on food safety knowledge
5=	Business upheaval	Restructures, relocation
5=	Consumer perceptions	
5=	Processes	Industry-based manual process (red meat); maintaining processes
5=	Standards	Consistent sector standards/difference between national and international
6=	Changing consumer trends	Eating product raw that is intended to be cooked
6=	Communications	Suppliers
6=	Zoonotic disease emergence	

Table 54 shows the results of thematic analysis of the identified burning food safety issues with company values or culture-related issues representing the majority of issues articulated by Participants.

Table 54: Interface Between Ethical Leadership & Food Safety Culture: Qualitative Research Strand; Thematic Analysis: Burning Food Safety Issues

Ranking within Themes	Company Values/Culture
1	Organisational culture
2=	Food Safety Culture
2=	Product quality
3	Processes
4	Communications
	Ecosystem Pressures
1	Regulatory environment
2	Workforce
3=	Standards
3=	Consumer perceptions
4=	Changing consumer trends
4=	Zoonotic disease emergence
	Other
	Business upheaval

Sections 5.3.3 to 5.3.8 are structured according to the behaviour-based food safety management system continuous improvement model of Frank Yiannas (2009): Setting expectations; education and training; communication; goals and accountability; measuring; and reinforcing behaviour (Figure 17).

5.3.3 Expectations

5.3.3.1 Organisational mechanisms to set food safety expectations

Twenty-seven Participants responded to the question: what mechanisms does your organisation use to set food safety expectations? With the exception of small or start-up companies and the four industry

associations, formal organisational systems were the primary means of setting food safety expectations for 17 of the participants. These included policies, procedures, rules, standards (including codes of conduct and principles), goals, key performance indicators for product, departments, functions and individuals, standard operating practice, work instructions and balanced scorecards. An innovative reporting system was described by participant # 3 whereby employees had coloured cards; gold, red, blue and green. The red cards were used to identify things that were going wrong; the *“gold cards said we can do this better and this is how. Some good suggestions came through”*. Participant # 12 emphasised that *“the food safety and quality person doesn’t own quality. As a business, it’s everyone’s responsibility”*, a view supported by participant # 18.

Participant # 25 questioned what the existing formal systems in her organisation meant in practice:

“The investment in the general managers, the next tier, is important to ensure the people on the floor are getting the best guidance. Constant checking and monitoring has increased particularly during COVID. The government might be the regulator, but at the end of the day the market will tell the business what the expectations are in terms of food safety”.

Participant # 24 described the implementation of an electronic information management system (IMS) which is available to every employee:

“In setting up the plant, and developing the risk management plan in accordance with the Animal Products Act, there were approximately 28 standalone prerequisite programmes that cover aspects like biosecurity, product recall, managing vendors etcetera. Rather than having a manual for environmental management, and a manual for boiler management as examples, the one IMS will explain what is done and when. When a new document is published, there is a read and acknowledge function and the business can track and monitor who has or has not read and acknowledged the policy. Dropping down from each of the sections will be the SOPs, (Standard Operating Procedure) the ‘how tos’. The IMS will cover health and safety, food safety, quality assurance, and continuous improvement... and means the business writes it once. There is a feedback mechanism whereby staff can suggest improvements, and a review and approvals process. Once it’s developed it’s easier to maintain and use. If a system isn’t easy to use people won’t use it”.

Organisational and food safety culture were explicitly identified by four participants as fundamental to setting food safety expectations. *“Food safety culture is not something that stands apart. If you have a good food safety culture, you have a good health and safety culture and good quality. People understand what the standards are”* (participant # 3). For participant # 4 who works in a highly regulated industry, *“it’s not about setting expectations, it’s more about ensuring they follow through. That comes back to culture; sharing and not hiding issues”*. Consistent with literature on the topic of sub-cultures, participant # 7 talked about teams within teams having their own culture. *“If there is someone in the lamb boning room letting the team down, the team will sort them out, especially if it’s silly little things. If you don’t want to abide by the rules, there are no locks on the inside of the doors!”*

Setting food safety expectations, training and communication at Aotearoa New Zealand's largest food company align with a food safety culture maturity framework based on the work of Frank Yiannas. Another participant (# 12) described a conscious effort to implement "*effectivity and problem-solving using scientific tools, problem-solving to root cause and using cross-functional teams to mitigate risk for the business*". That business uses a lean manufacturing method called Hoshin Kanri, a process for taking strategic goals and successfully communicating them down through the organisation, then back up the organisation, then finally put into action by employees with shared commitment.

Findings indicate that a range of education mechanisms have been used by food companies to set food safety expectations: internal and external training courses; visual and verbal signage and message boards which some companies translate into the dominant languages of employees; coaching and guiding; annual refreshers; daily toolbox meetings; and the induction process for new employees.

"There was a lot of education focused on frontline management – direct supervisors. The impression you get of a company is how your direct supervisor treats you; the core management culture. Food safety was part of that training to ensure everyone got a good level of understanding of the food safety implications of what they were doing. They had the next customer basis – making sure you were giving your 'customer' (the next worker in the chain) the right quality of product and a safe product. Your colleague is your next customer for food safety, quality, health and safety. A big part of this is training and giving workers an idea of what the outcome will be if they don't work safely" (participant # 3).

Participant # 7 talked about the important role frontline management plays. "*It's also in the supervisory and management team approach; reinforcement rather than enforcement. It's not necessarily going through formal disciplinary procedures, rather it's positive reinforcement. You know better than that, you know what the rules are*". Managers have learned to manage large groups of people more effectively. There's a lot of self-management. Participant # 26 agreed. "*Frontline leadership is relied on; they have to ensure the quality is correct and safety standards are adhered to. It has been a challenge to get the right leaders on board*". The importance of communicating with staff to ensure the "why" is understood was emphasised. "*Any food safety or health and safety incident or near miss is written up and shared via email. The outcomes are publicised as well. It's a proactive way of dealing with issues; the reasons and follow-up are fed back to staff as a learning exercise*" (Participant # 29).

Participant # 31 used real time testing as a means of communicating and reinforcing messaging about food safety. She looked to review test results on a regular basis when they come in, particularly microbiological testing and was an advocate for real time information at the point of the operation happening:

"The company has invested in rapid testing equipment (ATB swab to validate cleaning). Whoever is operator on the day, at the end of cleaning will do the test and get an immediate in or out result and will understand the effectiveness of their action in food safety and plant hygiene in real time. The investment in the reader was reasonably significant, but it makes it real for people to not have to wait for results. They have done a task and can understand whether that task is effective or not; trying to build as many of those proxies – something people can see, measure, and observe that gives an indication that the process is under control".

External regulations, standards, industry benchmarking, audits and audit outcomes were drivers for food safety expectations; GRASP, NZ GAP, Global GAP, Overseas Market Access Requirements (OMARs), BRC, MPI regulations, New Zealand legislation and supplier risk assessments, certifications and standards were those most commonly referenced by participants. Findings showed that industry associations played a role in producing advisories, producing and translating induction materials, setting up, administering and co-ordinating audits, working with Government on policy that impacts market access and writing guidance about systems implementation and topical issues.

5.3.3.2 Are staff aware that what they do impacts food safety?

There were 26 responses to the question, In your opinion, are staff aware that what they do impacts food safety? Results are summarised in Table 55.

Table 55: Interface Between Ethical Leadership & Food Safety Culture: Qualitative Research Strand; Staff awareness of their impact on food safety

Yes	17
Qualified Yes	7
No	1
Room for improvement	1

The one 'no' was from a pan-industry organisation representative (participant # 1) who went onto say:

“A large portion of the industry don’t understand they are in the food industry. Theoretically at management level people should understand that, however there is a fair bit of “she’ll be right”. This is also related to the level of education. The term, “food safety culture” doesn’t help because it sounds like it’s a separate management system. These things and the level of industry maturity, which is improving, contribute to the problem, as does the transition from mum and dad businesses to a corporate model”.

Two participants commented that sometimes production pressure or pressure to get something done overrode intuitive knowledge or impacted safety or quality (# 2, # 24). Participant # 24 admitted that

“it’s been helter skelter since start-up and the company may have dropped the ball a little bit and there is some work to be done to bring the awareness to the fore about never compromising these processes. The company has also got to stop asking people to compromise them”.

“It becomes obvious by observation that most people come to work wanting to do a good job. If they don’t do a good job, it’s usually because management hasn’t allowed them to. In the worst-case scenario, you can get people fed up and sabotaging food – a sign of a very poor culture. You have to keep reminding workers that they have a direct impact on safety. The largest poultry plant in New Zealand processes c140,000 birds per day. You have that many birds coming at you every day so it’s difficult to remember that people are going to eat this. Simple messaging changed regularly helps, for example, your granddaughter is going to eat this” (participant # 3).

Participant # 12 emphasised the importance of communication: *"Language needs to be tweaked so that messaging about ensuring 'we delight our consumers and don't give them any surprises' is included. That must come from the top; cultural transformation"*.

One business had reviewed and revised their induction process to minimise information overload (participant # 26):

There's a lot to take in in one hit. Compliance with protocols wasn't as good as it could have been. Rather than a one-day induction, the business is moving to a series of mini modules over a period of time, that includes competency assessments. For example, spend one hour on handwashing one day, then circle back in a week's time to ensure they are meeting the requirement. Then the next day, focus on foreign objects. The business isn't always where they want to be, and this is a place where improvement can be made".

The regulated nature of one industry and its focus on compliance was emphasised in response to this question.

"There are fulltime MPI vet officials on site every day that have unobstructed access to any part of the plant and records at any time. The (red meat) industry has always had a heightened awareness of meeting compliance issues (which are) about meeting obligations around food safety and quality. For quite some time there have been coaching programmes, one-on-one with individuals by supervisors and team leaders (albeit with) varied uptake across the business. They are a mechanism for engagement around food safety. It has been challenging over the past twelve months with COVID and workforce issues" (participant # 23).

Participant # 31 represented a start-up that used real-time measurements to inform staff. The first time listeria was found, the participant communicated the result with the following outcome:

"The general manager sent everyone off to research what listeria is, where it is found, what the health implications are, and who is susceptible (following which) the staff came had a whiteboard session to discuss and understand (the importance of the issue). They are a technical-centric team with science and engineering backgrounds so the process to seek good sources of information and learn for themselves is proving to be a good approach. It's not easy to maintain the learning mindset; staff are tired, things don't always go well because they are doing new and sometimes hard things. It can also be a skill or challenge to present information".

5.3.4 Educate & Train

5.3.4.1 Available food safety training

Twelve of the 27 participants who responded to the question, What kind of food safety training is available?, cited induction as a key component of company training programmes. Induction programmes varied from half a day to sessions phased over several weeks. According to participant # 24:

"Induction includes food safety 101 for every person who comes on board, regardless of how much experience they might have in the sector. On day one they get site induction and a department induction; each of the departments has health and safety induction that includes food safety. During

Week 1 staff are exposed to Food safety 101, and an introduction to the information management system to enable staff to find processes. During Weeks 2 & 3 there may be more task-oriented learning. The business may not do the feedback loop that well".

Participant # 24: *"hasn't been in a business where induction is done well. It needs to be structured and include a feedback loop to test competency".* Induction according to participant # 3 started with: *"this is food, people are going to eat this; you are going to eat it at staff prices and your family is going to eat it. You don't know which box you are going to get"*. The next level up you started teaching basic microbiology. *"This is campylobacter. This is what it looks like. Same with Salmonella and listeria"*. Induction was extensive according to participant # 18 and included information about allergens, food safety, health and safety and quality.

For the company represented by participant # 19 *"the initial course is one-day, but there is stair-cased training from bronze through to gold and involves unit standards"*. Two other participants work for businesses that provided unit standards training opportunities.

Annual refreshers were explicitly noted as standard practice by three participants, forming one component of an extensive suite of internal training opportunities provided by businesses. These included internal departmental and on-the-job training; food safety information days, webinars, seminars, targeted modules and bespoke courses; food safety walk-throughs; visits to other parts of the operation; visual communication boards; and practical training such as swabbing people's hands to show them what was on them to reinforce the need for hygiene (participant # 12). Quality standards workshops and two - three day leadership workshops that incorporated food safety and leadership culture training were offered by the business represented by participant # 23.

Two companies represented by participants used novel approaches to food safety training employing the use of games, videos, focus cards and 'pub quiz' style questions (participant # 17, # 12). The belief here was that *"If people have fun, they are more likely to remember"* (participant # 12). Five participants mentioned using external providers for food safety training.

The impact of high staff turnover was noted by participants # 23 and # 12.

"There are 6500 employees and a lot are seasonal. There's high staff turnover. This training is a high maintenance thing. There are annual inductions after shutdowns that update the workforce, taking them through new policies, and a shortened 30 minute module on food safety expectations to keep building the culture. That has been included into onboarding of all new employees who learn about company expectations surrounding food safety culture" (participant # 23).

"There is likely a high turnover of staff in some parts of the business with people contracted in, so the bulk of information needs to be delivered within a day. For fulltime staff, the onboarding would take longer and use a modular system. Most sites are FSSC accredited (Food Safety System Certification FSC22000) so have to have a cultural piece" (participant # 12).

Participant # 19 represents a company that used the Triple O (Optimising Operating Ownership) route; a regulatory model introduced when the Animal Products Act was implemented in the 1990s. *“As a component of that there is a high degree of training for staff, supervisors, guys on the shop floor who are responsible for managing a process. That’s training not only on compliance but including behavioural training, for example taking ownership”*. Participant # 21 talked about the role of meat inspectors in food safety training. His business had company meat inspectors in addition to Government meat inspectors on site, an apparently uncommon practice.

For the business represented by participant # 23:

“Food safety and quality training and enhancements have been developed in-house using actual scenarios. Most are around quality, but a couple have been around potential food safety issues which were contained internally, but which could have been avoided or the scope reduced. The business got a production company in and filmed four scenarios about what happened; what the learning was, involving staff. The training is interactive and in addition to the videos, includes scenarios explored in groups; if this happened, what would you do”.

This same business had implemented a system whereby information is pushed up from the floor, not just fed down from management:

“Each day a department or department subset stops operating for 10 minutes. They get around a board with their team leader/supervisor and they go over key things that happened the day before, issues they need to be mindful of, good things that have happened, and they get feedback from the entire workforce. That gets captured, and allocated actions and responsibilities assigned to it. Workers are getting engaged with the issues and how to fix them; the more serious things get kicked up to another meeting half an hour later. Departmental information feeds into the plant management information. There’s feedback on how things are going. There’s a feedback loop regarding outcomes so it’s not left in limbo. People are kept informed”.

Findings indicated that external opportunities for food safety training included attending industry workshops, meetings and conferences. Two participants cited standard operating practice and setting competency requirements as means of facilitating food safety training. Given the amount of information in standard operating practice participant # 26 created a one-point lesson, using a simple template. This *“is an efficient way to get messages around the team, ad-hoc, and as required. Staff must sign to indicate they understand the change in the lesson”*.

Participant # 30 described the leadership role her business is playing in developing supplier food safety culture. *“For stakeholders in businesses there is an increase in the return from businesses that embrace ethical sourcing and food safety culture. People are turning towards those kinds of business”*. Participant # 30 is:

“working with (international food safety culture expert) Lone Jespersen using a trickle-down approach through quality specialists who become subject matter experts. The focus is understanding the next steps to cascade learnings down to quality specialists who work with suppliers. A positive step with the business’s food safety culture has been suppliers coming to have a conversation about

ingredients that may not be able to be supplied. In the past, suppliers may have changed ingredients and not communicated that to the business. The business is living its values which are being spread across the eco-system”.

The impact of the global pandemic was noted by participant # 30. *“With COVID, food safety culture has taken a little bit of a back seat due to just trying to get product out the door”.*

5.3.4.2 Ways the business ensure staff are given the tools or equipment they need to ensure food safety

Twenty-six participants responded to a question about the ways the business ensured staff are given the tools or equipment they need to ensure food safety.

Participant # 25 emphasised the importance of having lots of conversations and working together so that everyone understands the benefits of equipment.

“The business is trying to be more collaborative across other industries they are involved with to learn; for example, going to visit other packhouses to learn what they are doing. The business’s fruit might go in a box, but consumers will see all fruit, not an individual company’s box. Growers try to work together to get more knowledge and from an investment perspective, if there are new tools coming, the business explores whether there is an opportunity to work collectively to get those tools; collaborative rather than competitive”.

Findings suggested that barriers to investment in tools or equipment generally do not exist, however it was acknowledged that a risk-based approach to prioritisation of this type of spend was used (participant # 12), as was a creative outcomes-focused approach to determine a fit-for-purpose solution (participant # 31). Two businesses referred to design engineering to both minimise risk (participant # 24) and to make people’s jobs easier (participant # 18). The business represented by that participant adopted a poka-yoke or mistake-proofing philosophy; an approach that was used to minimise waste and mistakes, avoiding the need to rework and eliminating potential safety issues.

An interesting point about compliance audits and the relationship with food safety was made by participant # 7:

“Some of the workers are large. Size 18 gumboots had to be sourced. Gloves, XXXL, weren’t big enough for worker hands. A compliance audit doesn’t pick up gloves that have split because they are too small. Was a worker wearing his gloves? Yes. Was he comfortable wearing them? No. Were they food safe? No”.

The mechanisms businesses use to ensure staff are given the tools or equipment they need to ensure food safety are articulated in Table 56; the top three articulated being two-way communication; training, observation and feedback; and audits or regular checks.

Table 56: Interface Between Ethical Leadership & Food Safety Culture: Qualitative Research Strand; Ways business ensure staff are given tools or equipment to ensure food safety

Ranking	Mechanism
1	Two-way Communication: Team meeting feedback; Toolbox meetings, Talking to people, Staff encouraged to speak up
2	Training, observation and feedback; Induction
3	Audits/Daily and monthly GMP checks; Continuous improvement team/Compliance monitoring
4	Annual staff engagement surveys
5=	Design engineering
5=	Global GAP requirements/Standards
5=	Adequate budgeting
5=	Role of managers
6=	Root cause analysis
6=	Board reporting (near misses)
6=	Regular repairs & maintenance
6=	Provision of PPE
6=	Collaboration with other industries
6=	Licence to operate (department specific)

5.3.5 Communicate

5.3.5.1 Ways food safety information is communicated to staff

Twenty-six Participants responded to the question: how is food safety information communicated to staff? with the results shown in Table 57 below. The top three mechanisms used by food businesses are daily or weekly meetings; training, induction and reinforcement; and electronic methods of communication, WhatsApp groups, email, and via information management systems and the company intranet.

For participant # 7, *“A lot of benefit comes from talking to staff. A book on food safety would be a waste of time. Staff react well to speaking; it’s a vocal tradition for the workforce. The young ones are forever saying, “all the old people want to do is tell a story”*”. Participant # 12 was mindful of the need to *“test that communication about food safety does get through the system to the right people. This would be via safety walks, talking to people, having a conversation; the personal touch”*.

Maintaining staff interest by feeding back results was the strategy emphasised by participant # 3, an approach that he considers is true of all culture things; health and safety, quality, food safety. The extent to which the interrelatedness of knowledge and therefore decision-making impacts on food safety was highlighted by this participant:

“Quality is easy to see. Food safety less so. Illness reporting and personal hygiene are elements of food safety. There are lots of other aspects of food safety, for example packaging. Purchasing is important. People doing the purchasing need to understand why packaging is important; other organisms can enter the process. It’s about giving people the information they need to make food safety decisions in their field. It’s also about devolving operational decisions to people, making sure they have the information and tools to make those decisions. A company rep may come and offer a good deal, which may not be the best deal for food safety. Animal feed is a good example; mould in

a cheap material that contains mycotoxins that impact on animal health and may be in the final product”.

The need to be aware of the diversity of the workforce was emphasised by participant # 25:

“In seafood and horticulture there need to be visuals. There are 32 different ethnicities working in the business so it is necessary to ensure there is engagement and understanding for people with other languages. Signage may be in other languages. There is a lot of pastoral care wrapped around those communities. There is a good induction process. That’s critical. There is constant reinforcement; the business brings people into the family, and trains them, however the managers in the next tier have a lot of responsibility in reinforcing learning”.

Other kinds of cultural challenges may arise in food businesses that have foreign ownership or interests. Participant # 29 was employed by a company with Chinese interests with the challenge being ensuring the same message was understood in the same way:

“There is a Chinese cultural practice whereby the boss is not told bad news. In the earlier days, translations of issues to a direct manager at the parent company, versus translations to a manager in New Zealand were quite different because of this cultural aspect. It was realised that some strange decisions were made because senior managers got the wrong story. Even with visual messaging there is huge scope for misunderstanding. New staff are encouraged, when communicating with China, to think about how many ways, including the worst possible way, a message can be interpreted. The assumption is that the worst-case scenario is the way the message will be interpreted.

A mechanism for raising awareness of food safety risks at Board level was described by participant # 3, after completing a risk assessment course.

“One of the questions that arose was ‘how many people are we likely to kill?’. With the current rate of testing we are likely to kill more than one but less than three people over a decade. Sharing that with a Chief Executive generates shock. There is no such thing as zero risk. It’s about acceptable levels of protection. The Board doesn’t necessarily understand that. They need a reality check. The business may take all reasonable steps, but the risk remains. There needs to be a systemic level of failures to get onto the radar. A one-off every now and then is human”.

Table 57 summarises the ways in which food safety is communicated:

Table 57: Interface Between Ethical Leadership & Food Safety Culture: Qualitative Research Strand; Ways in which food safety information is communicated

Ranking	Food Safety Communication Mechanisms by Associations
1=	Resources: webinars, advisories; magazines
1=	Emails/member engagement
2	Training courses & Workshops
3	Participation in professional groups

Ranking	Food Safety Communication Mechanisms by Associations
	Food Safety Communication Mechanisms by Companies
1	Daily and weekly discussions and meetings/Toolbox meetings (recorded)
2	Induction/Training courses/Reinforcement
3	Electronic communication; Email/WhatsApp Groups/IMS/Intranet
4	Both aural and visual; message boards; notice boards; posters; newsletters
5=	Two way communication; with growers; with staff
5=	Resources ; One point lesson
6=	Standards
6=	Translation of material
6=	Management support for staff
7=	Reports: Monthly; Board Reports
7=	Conversations in the canteen

5.3.6 Goals & Accountability

5.3.6.1 Types of formal systems for staff who identify food safety problems or staff who break the rules

Twenty six responses were received to the question, “What kind of formal systems are used for staff who identify food safety problems or staff who break the rules?”, shown by association and company in Table 58. For food businesses, rewards and discipline systems were the most often cited, followed by developing and maintaining a culture that encourages staff to talk to managers; systems to capture issues and anonymous ways to raise flags such as whistleblower hotlines. Each of the association mechanisms was mentioned once.

Three participants talked about the importance of conducting a root cause analysis (participants # 3, 17, 24).

“Less than 1% of errors would be people related; this person didn’t do it right because they weren’t trained properly etcetera. The root cause analysis will find that out. There have to be consequences; serious disciplinary consequences for deliberate breaches. When you do things you shouldn’t be doing, there have to be visible consequences. These things have a way of getting around a factory. Within a week of someone getting a final warning or getting sacked, people will know. The rewards and penalties help to reinforce the food safety culture. A company has to have the carrot and stick approach” (participant # 3).

Participants # 17 and 24 were in agreement about using a root cause analysis. *“Sometimes (an issue) occurs because the worker isn’t given the right tools”* (participant # 17). According to participant # 24 *“With root cause analysis, often people jump to a solution. The Chief Executive brings discipline and focus to these kinds of areas. The business is starting to work with people about what good root cause analysis looks like. Kiwis are good at fixing things but aren’t necessarily good at providing evidence”*.

The importance of near misses was emphasised by participant # 4.

“If you aren’t getting a 10:1 or 15:1 near miss ratio vs actual accidents that’s a bad thing – we don’t believe you; you have incidents because everyone knows about it. Near misses are encouraged. If there have been three accidents in the past 12 months and only six near misses that means staff

aren't recording near misses. Issues are reported in WhatsApp immediately, then it's talked about at the end of the week at a toolbox meeting. Don't write a report, stick it in WhatsApp and leave it alone then we will talk about at the end of the week as a near miss".

Disciplinary processes ranged from re-training to a formal disciplinary process. The severity of the breach determined the channel to be followed; *"the good, bad and the ugly"* (participant # 25). Several businesses represented by this research had multicultural workforces which brought an added layer of complexity:

"The key thing is getting the facts first, trying to educate people, show them how to do things. If it's repeat offending there's a warning process. The business tries to educate. It doesn't shame an individual, rather they will share an issue across the teams to learn from it" (participant # 18).

For participant # 25 *"culture is really important. Workers need to feel confident and comfortable approaching someone to talk to first. If there is a big issue, it's important to get onto it straight away. An incident is reported, dealt with, there's a review, then the issue is reported up and could come to the manager, the Chief Executive, or Senior Leadership Team, depending on the severity. Information is provided about how's it been managed; what steps have been taken. Issues are constantly maintained on a register. Someone is always peer-reviewing or monitoring the situation"*.

Staff were encouraged to speak up in the first instance (participants # 30, 16, 23, 25, 26, 27).

"That's the culture. There's a no punishment culture; if a staff member does something wrong, they are encouraged to own it, speak up, put it right and to learn from it. People are honest about making mistakes. People can go around their direct manager if need be. There's an open office culture. Staff see senior managers as approachable" (participant # 29).

Rewards systems varied from business-to-business including acknowledgement in daily meetings, mentions in newsletters, letters of thanks from the Chief Executive, a medal system, accumulation of points culminating in a gift voucher, 'shout-outs' and formal awards. Participant # 7 raised an important point regarding recognising staff.

"A lot of the workforce doesn't like to be identified individually. They are humble people who like everyone knowing they are good at their job but don't want to be singled out. It can be a job to find out what people value. In a previous role, a shared lunch was the reward staff valued the most. There was always a reason for it, they were limited; no more than four or five per year, no formalities, and staff got an extra 30 minutes for their lunch break. It was a small thing and highly valued. It was a small workforce and everyone worked closely together with a strong workforce culture. In a big company it's more difficult. There is a cultural river running through the business, but each area doesn't necessarily have the same culture. Unless you know your staff well, you can get it very wrong. Part of the recognition is making sure that the directors of the company appreciate their efforts. The managing director goes around the factory at Christmas and knows most of the names of the staff. The staff value knowing that he takes the time to do that and knows their names. Generally in the food industry, management is not physically that far from the factory. People have an affinity with the factory".

Participant # 25 also suggested that finding a reward system that resonates with staff can be challenging.

“What do people respond to? Is it financial, leave, community work? It’s different for each business. It might be through remuneration, a bonus scheme. It’s been interesting to look at the rewards systems to see what motivates people to do well and do better. What the business has found is that it’s more social, community involvement that is a key motivator. Especially now, in challenging times. The business is finding that workers are more inclined to help others if there is a planting at one of their sites, or a community event”.

The business represented by participant # 12 *“isn’t good at doing this (rewarding staff). The organisation is not comfortable finding and communicating the good things”*. This participant wasn’t sure where that comes from and challenged her leads in her weekly one-on-one notes to provide recognition of good behaviour. *“Often leads were saying, ‘we get paid to do that; it’s not recognition’”*. She had to coach her staff. *“When good behaviour is reinforced, it creates more good behaviour. As people we are good at finding what’s not right and have to practice reinforcing what is right”*.

When participant # 12 received information about positive behaviours from her leads, she sent a personal email to the person concerned:

“The business is working on giving recognition. It comes down to the senior leaders modelling this behaviour. The Chief Executive is very good at it. The Senior Leadership Team is too, but it gets diluted as you move down through the organisation. Consistency is needed. It’s important that it’s authentic and real or the wrong things could be reinforced. Do it in the moment, rather than waiting a week. Instant recognition can be more valuable than a big thing”.

According to participant # 24, his company *“doesn’t do recognition as well as they could do. They are working hard on shouting out to staff who are doing good things. Less formally, at the discretion of managers, there are small rewards to express appreciation. There are mentions in reporting including Board reporting”*.

Conversely, *“there is no reward for correct behaviour as this is expected from staff, however where staff go above and beyond there are opportunities to reward staff”* (participant # 30). *“They expect good behaviour from all staff so reward all staff”*. These rewards included company shares, staff discounts and pay increases during COVID in 2020. Participant # 20 expressed a similar view: *“the issue is a balance between rewarding positive behaviours and sending the message that people should be doing those things anyway. There is a need to ensure that people are doing things or nominating people (for awards) for the right reasons”*.

Industry associations were involved in audit administration and coordination and policy development on behalf of their constituent members. Participant # 28 managed an industry awards event within which there were a number of food safety-related winners. Food safety was often recognised but the integrity, value and authenticity of the awards was maintained, so there had to be a genuine rationale for the recognition. When awards or opportunities for research became known, industry members were advised.

A summary of the formal systems used by industry association and companies to recognise who identify food safety problems or staff who break the rules are in Table 58.

Table 58: Interface Between Ethical Leadership & Food Safety Culture: Qualitative Research Strand; Formal systems for staff who identify food safety problems or who break food safety rules

Ranking	Associations
N/A	Varies from business to business
N/A	Involvement in audits
N/A	Involvement in policy development
N/A	Published magazine and newsletter to highlight topical issues
N/A	Industry awards
	Companies
1	Recognition of good behaviour; rewards systems; incentive systems; OFI system (opportunities for improvement)
2	Formal discipline processes to deal with misconduct
3	Company culture; Staff encouraged to talk to managers/others
4=	Systems to log non-conformance; issues, near misses or accidents
4=	Whistleblower hotline; anonymous site
5	Root cause analysis
6=	Daily toolbox and supervisor meetings to raise issues
6=	Monitoring (supervisory and CCTV); quality team on each site
7=	Unannounced audits
7=	Senior leaders modelling good behaviour
7=	Performance review processes
7=	Training programmes

5.3.6.2 How are managers held to account for food safety in their areas? Are accountabilities clear?

Twenty-three Participants responded to the questions, How are managers held to account for food safety in their areas? Are accountabilities clear? These 23 participants represented four industry associations and nineteen companies. The use of key performance indicators (KPIs), whether for managers, or departments was the most cited accountability mechanism by participants.

A range of KPIs were employed across food businesses, with a sample shown in Table 59.

Table 59: Interface Between Ethical Leadership & Food Safety Culture: Qualitative Research Strand; Examples of management KPIs

Examples of KPIs	Interview Participant
Food safety, Animal welfare, Efficiency and profitability	Participant # 7
Near miss ratio vs actual accidents on farm; in spec or out of spec (processing)	Participant # 4
Customer complaints	Participants # 5, 16, 30, 17
Right first time (production)	Participant # 2
Recalls and withdrawals	Participant # 30

Food safety was a shared responsibility (participants #18, 20, 24).

“Food safety is more difficult than food quality and health and safety because food safety isn’t always visible. Food safety is not negotiable. Quality is perception; the agreed level of quality for the

customer. The first question is “Are we doing anyone any harm?” If yes, stop immediately. This has to be instilled in senior and technical management” (participant # 3).

Participant # 24 also endorsed the shared accountability for food safety, stating that the company *“is trying to get across to people that they are empowered to stop; its ok to not start the process for example, if the plant isn’t fully sanitised”*.

Food safety KPIs for participant # 25 were dependent on seniority and are at general manager level. Conversely the managers in the food business represented by participant # 15 were personally held to account by the co-founder of the business, rather than having formal food safety KPIs. Food safety KPIs were newly introduced for two companies (participants # 18, 20) with acknowledgement of the pressure on managers as they were driven by other KPIs as well.

The importance of having the right people in the right roles was mentioned by participants # 12 and # 18:

“Changes have been made in the past 12-18 months where people have been moved into different roles. It’s important to have people who are approachable and who have the right ethics. Culture doesn’t change overnight, it takes a while. It’s proven worthwhile to have people in key roles that understand the regulatory environment. Change can be really good but sometimes it can be very disruptive. Historically the food safety role reported into processing but now reports directly to the Chief Executive. This works much better. The new blood coming in has been exciting” (participant # 18).

Other challenges impacted on management accountability:

“There is a mix of attitudes to food safety across the management team. They will say the right words but may not follow through. Most understand their accountabilities. When staff numbers are down, then corners can be cut. It’s not just getting staff; it’s also getting people to turn up for work. It’s possible to have a shift of 40 people with 12 not turning up. Getting a reliable team base is a challenge. The factory guys are four days on, four days off, 12 hour days. Absenteeism is a problem” (participant # 26).

The role of the Chief Executive in modelling and ensuring transparency and discipline around expectations and accountabilities was emphasised by participant # 12:

“Accountabilities are clear. People are respectful that when there is a challenge, the conversation is about what are we going to do; how are we going to help”; respectful; transparent; and escalating with solutions that demonstrate the manager has thought about what is going on”.

Staff were empowered according to participants # 24, 27, 30. Participant # 27 *“has always advocated for staff raising an issue even if they feel uncomfortable”*. Often people doing the wrong things was about a need for education. She had previously been responsible for a staff of c20 people. She didn’t always encourage people to communicate with each other due to the hierarchical nature of a commercial kitchen; staff would go directly to her so that the dynamics weren’t negatively impacted.

Participant # 30 asked her team members for their recommendations. She *“encourages her team to come up with a decision supported by a rationale. Accountabilities are clear; who is responsible, who is informed and who it is communicated to; why and how things are done”*. One participant reported the use of incentives for management *“across quality and complaints and corrected actions”* and of *“soft incentives; annual prizes for the best quality factory, and best improved quality”* (participant # 17).

The company represented by participant # 23 had comprehensive systems in place to ensure management accountability including daily operations meetings that included dashboard reporting, and a highly structured data-gathering reporting function and traffic light system:

“The MPI performance-based verification process reports monthly. A plant either has an acceptable outcome or unacceptable outcome. The business has a monthly dashboard that outlines where plants sit in performance levels, if they have moved up or down, or stayed the same, and what has contributed to the issues. A monthly newsletter is developed that links to that. These things feed into board reports as well. A number of changes in recent years at executive level, including the Chief Executive have resulted in an amalgamation of diverse viewpoints”.

Historically participant # 23 and his team *“were the bastion of what was morally right in risk management and that has completely changed. Staff are challenged about why they do what they do. The company is looking out five, 10, 15 years to what a producer of meat protein will look like or is going to need to do”*.

From an industry association perspective, participant # 1 *“doesn’t consider that managers necessarily are clear on their accountabilities. Actually getting the support to get information out about food safety appears difficult”*. Sector members ranged from small grower owner-operators to corporates, and there were growers and packers. Packers were often where a lot of the food safety is focused. *“The sector on-farm is governed by GAP (good agricultural practice) schemes, either NZ GAP or Global GAP, which have minimum standards which are audited and in theory that should pick up the problems”*.

Legal services and advice, and providing advice on regulatory issues were some of the functions participant # 14 provided to member companies. The sector represented by participant # 28 was thinking about accountability in the context of the move to workforce development councils and workforce transition and pathways. The sector was short of labour, therefore developed a plan focusing on attracting workers including development of an education strategy; looking at needs across the education ecosystem from primary school age through secondary to tertiary to enable a proper pathway to effect recruitment into a very lean sector.

The accountability measures reported by Participants are summarised in Table 60.

Table 60: Interface Between Ethical Leadership & Food Safety Culture: Qualitative Research Strand; Accountability measures for managers

Ranking	Accountability Mechanism
1	Key Performance Indicators; for managers, departments: dashboards
2=	Internal Audits/Checks
2=	Reporting mechanisms
2=	Communication; Newsletters, IMS, Talking to staff, staff handbook
2=	Staff empowerment
3=	Annual food safety objectives
3=	Meetings; daily, weekly, monthly
3=	Food safety & quality team accountability
3=	HR functions; Job Description Accountabilities, Performance Reviews
4=	Standard operating practice
4=	Incentives; hard and soft
4=	Reporting line (food safety manager to chief executive)

5.3.7 Measure

5.3.7.1 Commitment to food safety

The twenty-six participants who responded to the question, How confident are you that there is a strong commitment to food safety in your organisation? indicated a strong commitment to food safety from their respective organisations. A commitment to food safety is led from the top (participants # 3, 12, 24, 26). “You can’t build this bottom upwards. It won’t work” (participant # 3).

Participant # 4 is: “incredibly confident it’s strong because it’s the only thing that can trip this business up. If they get it wrong in market, they not only don’t have a business, they’ve caused a catastrophe. It’s top of mind. There’s no coming back. Everyone loses their jobs, the company’s gone and they’ve done damage”. Participants # 24, 25 and 31 expressed similar views. “If you want customers, make sure you don’t do anything that could potentially harm them” (# 24). “If the business doesn’t get this right, the show is over. It’s baseline, foundation stuff that needs to be built in now” (participant # 31).

“With the team culture, we are all in this together. If there are issues, ultimately that could affect people’s jobs. If there was a big issue the business could be closed down. Nobody wants that. It’s important that everyone cares for one another. The business definitely tries to instil that; it’s a really strong driver. They want to ensure that people who buy their products are safe and well. Any issues can put things in jeopardy” (participant # 25).

For participant # 18: “last year’s survey results revealed that the commitment is high. The result was unexpected. The environment is challenging, the business is a growing business and the survey showed that the food safety message is getting through. The job now is to expand on this and dig a little deeper”.

5.3.7.2 Systems to evaluate food safety culture

Twenty-four Participants responded to the questions, How do you know? What kind of system does your organisation use to evaluate food safety culture? Nine companies had staff survey processes in place; seven of those included questions targeting food safety culture.

One participant was not sure about whether the survey included food safety questions; and one indicated that “*food safety is not specifically asked about because it is so entrenched in the organisation*” (participant # 16). Two participants had food safety culture evaluation as an impending action (participants # 24, 26). By sector, four dairy companies; two seafood companies; one red meat company, one horticulture company, and one food and beverage manufacturing company had evaluative processes in place with varying degrees of maturity. Each of these sectors is discussed in turn below. One company in the dairy sector and one in the horticulture sector are about to broach evaluation of food safety culture.

Dairy Sector

Findings suggested that progress toward evaluation of food safety culture across the dairy sector was variable. There was a six-monthly survey of staff; anonymised, in the business represented by participant # 29, who was unsure about whether it includes questions on food safety. Other companies ran annual surveys that may or may not have included specific questions related to food safety or food safety culture (participants # 2, 16).

The company represented by participant # 2 ran a quarterly Gallop Engagement Survey, containing 12 questions focused on engagement of teams, however in addition to the baseline questions, other questions were added on and could include food safety and quality.

“The survey is for every staff member and contains a question about staff having adequate tools or equipment to do their job. Results are key. Engagement planning falls out of the survey results. In 2020 the business carried out a food safety and quality survey which resulted in the Food Safety & Quality (FSQ) Project. While the survey was run in-house, an external company helped interpret the results. There were a number of actions that arose from the survey. The project will develop deliverables to ensure improved food safety and quality. The FSQ survey will be repeated in the future when there are deliverables from the initial project”.

For participant # 16: *“There is an annual “culture metre” – an annual staff survey which is about the whole culture of the organisation”. Food safety is not specifically asked about; it is so entrenched in the organisation. The survey asks about staff performance, adequacy of remuneration, beliefs about the company taking action as a consequence of the survey, relationships peer-to-peer or between workers and management. Health and Safety rather than food safety is the focus; what is being done well; what could be done better. Departments are provided with feedback and staff receive a company overview. Actions as an outcome of the survey are fed back to staff”.*

Food safety culture evaluation was a work-in-progress for the business represented by one participant, however the business’s Food Safety Culture Framework, modelled on Frank Yiannas’ Food Safety Culture Continuous Improvement Model which was instigated in 2017 was advanced. The first food safety culture evaluation was piloted in 2018. A scheduled survey in 2020 was unable to go ahead due to the pandemic and was deferred until May 2021 at which time the pandemic was still impacting the ability to run the survey. The quantitative survey was finally administered in April 2022, the results of which are discussed in Chapter 4. The intention was that the survey be bi-annual. Outcomes will feed into understanding and improvement.

How to evaluate food safety culture was the challenge for the year ahead for participant # 24:

“A new food safety lead has recently been appointed and has been charged with development of the food safety culture within the business. The business will get there through education, repetition, survey, constantly looping through iterative improvement. A survey to establish a benchmark will be an early piece of work; then re-surveying in a year’s time; formalising the process. It will be evolutionary, not revolutionary. It took seven - eight years for health and safety culture to become part of everyday life. Some of that was mandated; legislated. Health and safety is the first issue on every agenda. There are good systems in place now; should it be the first thing focused on now? Perhaps it’s time to bring food safety and quality to the fore”.

Seafood Sector

The company represented by participant # 18 also does an annual survey. *“Last year was the first year that food safety was captured, focusing on the food safety culture from senior leadership through to the people at the coal face. The highest scoring question in the whole survey was the question about food safety being taken seriously. It peaked health and safety”.* This participant and his team *“are perfectionists, and the survey results were better than expected. Clearly his people ‘get it’. It was reassuring”.* He was looking forward to this year’s results. They are tailoring a few more questions and asking more questions about food safety.

Participant # 12 was using Frank Yiannas’ model. Last season she worked with the whole management team (c40 people) through a survey using five maturity pillars; teams of ten who ranked food safety culture using the pillars. Teams were mixed up so they were cross-representational. The results were collated to determine where the senior leadership team considered food safety culture sat. They came out at the start at two, five being good. To move that position, six programmes of work were put in place. The intention was to move this system through the organisation. In the whole time this participant had been with the company, New Zealand was in (COVID 19) lockdown. *“Trying to do strategy through Teams Meetings means you can’t get to ‘the heart’”.* Her food safety and quality community *“may have a different perception than management”.*

Horticulture Sector

Participant # 5 from the horticulture sector talked about *“annual anonymous survey which everyone is encouraged to participate in. It covers culture and food safety. Feedback is provided to staff. It is benchmarked against company standards and links back to the company’s global mission statement and values”.*

Participant # 26 *“has an action to do the first food safety culture survey. The company got a food safety trainer in last October, set up focus groups primarily from the fresh cut business, and facilitated a food safety culture workshop. The output was summarised, gaps identified and that formed the basis for a plan. 50% hadn’t been achieved. The plan was revised, and the company re-committed to the process. A survey will be piloted then run six-monthly. The company has an internal social media mechanism that will be used for the survey. Staff will be incentivised to participate. It will identify the areas of focus”.*

Red Meat Sector

According to participant # 23, an expectation of *“BRC GS is how you are going to measure what you’ve done, and how effectiveness will be reviewed. That is the challenge everyone faces. You can’t change what you don’t measure”*. The company looked at what is in place and what is needed. There was an issues management system in place that captured any complaint whether serious or minor, the issue was categorised, and monitored. Monitoring the frequency of food safety related issues was a measure of improvement of culture. Staff surveys had always been in place; a pulse check on the engagement of the workforce. Food safety understanding was now included. Over time, it was expected that there would be better data about staff engagement and understanding. This was contracted out and the format was rigid. Staff were last surveyed two years ago and were to be in 2022. A flexible platform was put in place that the company could use to modify and run the survey so the intention was to run it more regularly.

Food & Beverage Manufacturing Sector

The company represented by participant # 20 ran the first food safety culture survey using Survey Monkey at the end of 2020 using the Food Standards Australia New Zealand (FSANZ) model. There was a 60-65% completion rate with some quite pleasing results and some areas for improvement. The intention was to repeat the survey annually. One of the actions from the 2020 survey was development of a food safety culture roadmap. The focus was on timetabling actions in the right order; a few things that were tried regarding communication had not worked the way that was hoped; therefore other strategies were to be tried. The company needed to figure out what works best for them. *“There is a lot of information out there to draw on but nowhere that provides a blueprint for specific businesses”*. The business has *“a couple of customers that have shared what they have done, so will sit down with them to understand how they got food safety culture-raising activities underway”*.

Other Comments

One company in the poultry sector was working toward evaluation of food safety culture (participant # 3). The company exported to Australia, Hong Kong and the Middle East. The need for food safety culture evaluation was being driven by standards (BRC, GFSI). Participant # 19 was currently reviewing and considering ways in which evaluation is done, for example in the United Kingdom. There was no formal survey currently in use, but this was something the company was interested in doing in the future. Food safety culture was something that’s being asked about by customers increasingly. The company understood where they are, at but wanted to do better.

“Some of it is intuitive” according to participant # 7. *“Staff are buying and eating what they make and are acutely aware of food safety as a consumer”*. Did he know staff are committed to it?

“No, because you only know what people tell you. The company doesn’t have a history of food safety issues and food safety culture is not evaluated formally. There are no routine surveys but there is incredibly low staff turnover. The overall turnover statistic is probably 20% but c95% of those turnover statistics are within three months. If someone is with the company for three months, they will be there for life. There are c25 people in the admin team; c18 of them were there 15 years ago” when Participant # 7 joined. *“For a big organisation, it’s very personal. Anyone at all can walk into the managing director’s office and he will talk to them. It’s a family-oriented business.*

There are a lot of families in the business. A tried-and-true method of employment is if you have staff and there are family members who want to work in the company you encourage it. If there is a ratbag, you can talk to a family member who rectifies the issue. Staff like the fact that the owner comes into the office every day. The other director comes in every Saturday”.

The business represented by participant # 21 took a different approach:

“There is visible CCTV throughout the plant so the company sees what is going on. Management will bring people in, show them what they are doing, why they shouldn’t be, how the process should be done, why it is important, and ensure it doesn’t happen again. The company is regulated so has to comply to the required standards, but where appropriate, does elevate the standards for higher risk items. There is a full-time vet on-site during processing who has ultimate control. Whether he is right or wrong, he is always right. The company has a very good relationship with the regulator and takes a no-surprises approach”.

An internal review of food safety culture within the head office team was programmed for this year for participant # 30.

“Continuing to build and enhance food safety culture is also part of the business KPIs for this year”. A third party-run, anonymous survey was run regularly, “part of which is a question about whether the company is living its values; you, your line manager and the leadership. Every staff member has an opportunity to respond. Where there are ten respondents from a team, all scores can be seen across the whole business, and it’s possible to see comparisons across teams. It is also possible to see the verbatim comments. These are fed back to the team”.

5.3.7.3 Frequency of food safety culture evaluation

If there is an evaluation system, eg survey, how often is it done? Do changes arise in the way food safety is approached as a consequence of the results?

The question regarding frequency of food safety culture evaluation was deemed redundant as it was answered when Participants discussed their food safety culture evaluation programmes.

5.3.8 Reinforce

5.3.8.1 Management support for food safety (Walking the talk)

Twenty-six Participants responded to the question, Do you think managers show support for food safety? Nineteen answered this question with ‘yes’. Five gave a qualified ‘yes’. One responded with ‘some better than others’ and one with ‘sometimes’.

Visibility, communication and modelling were all mentioned by participants as being important, particularly in the context of production pressures and an unstable workforce as alluded to below. *“You have to live the dream. You have to demonstrate by your behaviour, not just talk about it”* (participant # 3). Participant # 2 commented that: *“Instability in the workforce is an issue, as is the pressure to get product out the door. Morale is low due to the restructuring. Everyone starts out passionate about food safety and quality then the pressure comes on around production. It will likely take six months to embed the new structure and processes”.*

For participant # 21: *“It’s important that managers are seen out on the plant and going through each of the departments, talking to people and ensuring that people are compliant. Within 30 seconds it’s possible to gauge whether a plant is well run or not”*. According to participant # 13: *“The technical managers do. At the higher level it comes down to cost; return on investment. The technical managers know the risk and how to manage it, and are responsible for justifying the investment to senior management”*. For participant # 20: *“It’s not as visible at high-level management as it needs to be. There is a signed food safety statement from the Chief Executive. Sharing food safety commitments in the same way that health and safety commitments are shared is needed; communicating the overall vision; commitments with staff could be done better”*.

The importance of company culture was stressed by several participants: *“From an ethical perspective the culture is very good. The personal integrity of leaders in the company is very high”* (participant # 29). The business represented by participant # 25: *“is fortunate to have managers with the level of commitment they have. Good managers have a good team around them that they are coaching, mentoring and leading. There is a ripple effect. It’s not always easy. The culture is important. If there’s not good alignment, they don’t stay round for long”*.

“Positive feedback is given to and support provided for managers. You can’t just flick a switch and things change. The low-hanging fruit are the switches you can flick but changes to culture take time. The changes taken over the past 18 months; getting people with the right attitude in who are willing to listen, have been positive. Managers these days have so many aspects to the job compared to 20-30 years ago, so you have to be an all-rounder. That’s the kind of people the company has brought in” (participant # 18).

Participant # 14 *“hasn’t met a manager that doesn’t walk the talk. At every plant that’s visited, or manager that’s talked to, this is evident. If food safety is not attended to, the business is lost. New Zealand has an exemplary record because food safety is a priority”*.

5.3.8.2 Access to funding

Twenty-two participants responded to the question including three associations that gave qualified responses. The question about difficulty in accessing funding was not relevant to ten of the participants who were owner/founders or in roles which do not necessitate funding for food safety. One association which has an education rather than training role sees:

“food safety as a strategic issue relevant to the industry. Funding support for food safety initiatives is available and is now budgeted for. They have funded a range of projects and have quickly grasped the benefits of involvement with the New Zealand Food Safety Science & Research Centre. Ensuring that any newsletters and advisories are translated into plain English for the industry means that the association is becoming a go-to source” (participant # 1).

For participant # 13: *“There is reluctance from some of the industry to invest in food safety. There is a general perception that the industry is low-risk”*. Conversely participant # 14 finds that: *“food safety is the easiest thing to get funding for at the association”*. A Government-funded food safety programme is available to members of the fourth industry association for whom this question was therefore not relevant.

Nine Participants responded that they did not experience trouble getting access to funding for food safety-related matters, and ten gave a qualified response. *“There is a fight for resource in any business”* (participant # 30). Participants # 2, and 20 are able to get funding: *“provided the team can demonstrate the rationale/justification for investment. There is support when requests are put through the right channels”*. The company represented by participant # 17 expects: *“accountability for spending but there is always a funding reserve just in case. There has never been a question of finding money for food safety related issues”*.

Participant # 5 knew how to go about getting funding if required. No one said no to a case that participant # 31 had presented. She focused on outcomes. *“The question is, what outcome is going to be fit-for-purpose for the business?”* A key question asked by the chief executive of participant # 3 when a request for capital investment for pathogen control was made was: *“is this going to keep me out of jail and out of the press? Will this work because I’m holding you accountable?”* (participant # 3). This participant generated savings annually through technical innovations then used the argument that *“I’ve saved you \$100K therefore I’ve offset some of the cost of what I’m asking for”*.

“It would be nice to get more (funding for food safety) but the company wouldn’t be performing at the level it is without the investment in and commitment to food safety and quality” according to participant # 19 who wanted to see some things done better with implementation of modern systems.

Participant # 26 was always looking to work more efficiently and acknowledged the strategic commitment from his Board. The importance of educating the Board was emphasised by participant # 18 who *“is bringing the Board along on the journey. Food safety has to be driven from the top, but the people at the coal face are the biggest asset and are well resourced and have the tools to do the job”*. He does a monthly food safety report to, and a quarterly risk meeting with the Board. He used his reporting *“to help to educate the Board. It’s a case of small steps. “Getting them where he wants them””*. He *“plays the long game!”*. Participant # 25 also talked about upskilling for her Board which has an active programme of education:

“There are educative topics at each Board meeting. Health and safety is a big one”. *One subsidiary company’s Board gets more reporting about food safety aspects. Then it’s up to the general managers through the Chief Executive to ask what investment is required in order to ensure that the parent company is meeting its obligations. The pitch usually goes up through an annual planning process. When it gets to the parent Board from each company, the level of investment is decided on. Health and safety is a big deal but food safety perhaps needs to be discussed and reviewed at the Board level. Does the Board feel confident about what is being pushed up? There haven’t been incidents but it’s important to have a conversation”*.

As a consequence of this interview participant # 25 flagged this as an area for improvement to be raised with the Board.

Figure 17 graphically summarises the key findings from Sections 5.3.3 to 5.3.8 within the behaviour-based food safety management system continuous improvement model of Frank Yiannas (2009).

Figure 17: Summary: New Zealand Food Businesses Perspectives on Food Safety Culture based on the behaviour-based food safety management system continuous improvement model (Yiannas, 2009)



5.4 Summary of Qualitative Results

Objective 1: Understand the importance of ethical leadership to some of New Zealand's largest food producers and exporters

Twenty-nine of 32 participants unreservedly agreed that their food businesses positioned themselves as 'ethical' or 'better/open, honest and trustworthy. Two of 32 participants reservedly agreed; one business aspired to be ethical and one believed it is ethical. Company values were the key driver for this positioning; it's the right thing to do. Aotearoa New Zealand food businesses, according to this research, valued people whether employees, customers or shareholders, or the world's most vulnerable consumers, babies. Larger food businesses were aware of their responsibility to demonstrate supply chain leadership on an international stage and with issues such as modern slavery. Inter-generational value-creation, undertaking business with a purpose, building value for whanau and acting as kaitiakitanga, or custodians of the environment were fundamental to iwi/Māori food businesses; being mindful of the responsibility to leave the people and planet better off. The importance of earning and building consumer and stakeholder trust, and therefore social licence to operate was top-of-mind for participants involved in this research. The importance placed on being or becoming sustainable and the inextricable link between ethicality and sustainability was common to all research participants. At an individual level, ethical leadership mattered to participants, all of whom occupy senior roles in Aotearoa New Zealand food businesses. It's personal. Alignment between individual and organisational values, personal characteristics such as honesty, fairness and trust, and as senior managers involved in food safety and quality, knowing that they are making a difference and therefore being able to sleep at night were key drivers. This research informs our understanding of the importance of ethical leadership to some of Aotearoa New Zealand's largest food producers and exporters.

Objective 2: Understand if there are 'uniquely kiwi' characteristics of ethical leadership according to some of Aotearoa New Zealand's largest food producers and exporters

Twenty-seven participants supported the idea that there are unique characteristics of ethical leadership in Aotearoa New Zealand; four did not agree and one did not directly respond.

Being humble or down to earth encapsulated the descriptors used by 14 or 52% of the 27 participants to describe a uniquely Kiwi ethical leadership characteristic. Six participants ascribed being honest or open (including being upfront and transparent) as a uniquely Kiwi ethical leadership characteristic; five participants ascribed the values of Aotearoa New Zealand's indigenous people and five also ascribed the lack of corruption as uniquely Kiwi characteristics.

Objective 3: To supplement data from the quantitative survey of staff in Aotearoa New Zealand's largest food company, (Chapter 4). This will be discussed in Chapter 6.

This Chapter has provided comprehensive, qualitative data from 32 representatives of 31 food businesses in Aotearoa New Zealand about the state of play regarding ethical leadership and food safety culture and in

these organisations. It is believed to be the first such study of this nature and constitutes the qualitative strand of this mixed methods research project.

The next chapter, Chapter 6, discusses the results of both the quantitative and qualitative research strands within the context of available literature.

Chapter 6: Discussion

This chapter firstly discusses the findings of the quantitative research strand, carried out across the ingredients business of Fonterra, Aotearoa New Zealand's largest food company. Potential reasons for one demographic variable, that of gender being positively associated with ethical leadership are explored. Drawing on both the quantitative and qualitative research strands of this doctoral research, two key findings; the relationship between ethical leadership and food safety culture, and the differing perceptions of supervisors and workers toward ethical leadership and food safety are discussed. The drivers for food safety and ethical positioning, and the meaning participants ascribe to ethical positioning are discussed. Given the dearth of literature relating these findings to food safety culture, parallels are drawn with the body of research on workplace safety.

The second part of this chapter discusses the characteristics of ethical leadership in Aotearoa New Zealand identified by research participants in the qualitative strand of this research, comparing the findings with international and Aotearoa-specific literature. This chapter concludes with a discussion of the emerging research field of food integrity which has evolved during the time that this doctoral research has been underway.

6.1 The Nature of the Relationship Between Food Safety Culture & Ethical Leadership in Aotearoa New Zealand's Largest Food Business (Quantitative Research Strand)

The primary research question investigated in this doctoral research, "What is the nature of the relationship between food safety culture and ethical leadership in New Zealand's largest food company?" found a positive relationship between food safety culture and ethical leadership, therefore changes in ethical leadership variables may infer changes in food safety culture variables and vice versa. Before discussing what this means in practice, the findings from the quantitative research strand will be summarised.

Before reducing the 1315 survey responses to a dataset of 1181 high quality responses suitable for applying principle component analysis, a simple analysis was undertaken that shows the category response levels for each of the ethical leadership questions contained in the Fonterra Food Safety & Quality survey (see Chapter 4) (Table 24). These data were ordered by response level 6 & 7, the most positive category response level showing that the majority of survey respondents (workers and supervisors combined) agreed that supervisors/managers at Fonterra: are honest and trustworthy; stand up for what is right; walk the talk; make fair and balanced decisions; listen to others; treat people with dignity and respect; follow through on promises and commitments and if rules are broken; encourage collaboration; explain expectations; explain what ethical behaviour looks like; and take personal responsibility.

6.1.1. Principal Component Analysis

PCA analysis of the Food Safety & Quality survey data found that the first principal component had large positive associations with the ethical leadership variables and less so with food safety culture variables, and the second component had positive associations with food safety culture variables and less so with ethical leadership variables.

It may be inferred, therefore, that the first principal component broadly measured ethical leadership, and the second, food safety culture. These first two components accounted for 59.95% of variance in the data. From the rich dataset generated from the quantitative research strand, there are two key findings that will be discussed in Sections 6.1.1 and 6.1.2; firstly, the positive relationship between ethical leadership and food safety culture which addresses the research question “What is the nature of the relationship between food safety culture and ethical leadership?” augmented with findings from the qualitative research strand; and secondly, the differing perceptions of supervisors and workers toward ethical leadership and food safety.

6.1.2 The nature of the relationship between food safety culture and ethical leadership

The primary purpose of this quantitative research, the first to statistically investigate the nature of the relationship between food safety culture and ethical leadership, was to understand the nature of that relationship, with the findings suggesting that food safety culture and ethical leadership are positively correlated. This positive correlation infers that changes in ethical leadership may result in changes in food safety culture. One may ask the question, would changes in food safety culture result in changes in ethical leadership? The finding of this positive relationship between food safety culture and ethical leadership does not infer causation, and it should be noted that the correlation is moderate, indicating individuals who responded positively to statements about the organisation’s ethical leadership, did not necessarily respond positively to statements about the organisation’s food safety culture. Further the relationships and responses were dependent on the demography and location of respondents.

The results of this research were based on a reduced dataset of 1181 high-quality responses. There is no data regarding the characteristics of non-respondents to the survey, therefore it is difficult to draw inferences regarding whether the results are, in fact, representative of the target population. There is a dearth of literature regarding this relationship in a food safety specific context, however literature focused on the relationship between ethical leadership and workplace safety may serve as a proxy. Several studies into the relationship between ethical leadership and workplace safety found an indirect relationship between ethical leadership and workplace safety culture with mediating factors that enhance safety participation and safety compliance including trust in the leadership, the quality of relationships between supervisors and workers, self-efficacy, organisational identification, task significance, and job autonomy, effort and performance (Bouckenoghe et al, 2014; Chughtai, 2015; Enwereuzor et al, 2020; Piccolo et al, 2010; Shafique et al, 2020; Walumba et al, 2010; Yang & Wei, 2017).

Two studies found a direct relationship between ethical leadership and safety culture (Freiwald, 2013; Khan et al, 2018). As highlighted in section 2.2.7, Freiwald’s findings suggested a positive relationship between an ethical workplace climate and safety culture and between worker perceptions of ethical leadership and safety outcomes (2013). Khan et al. (2018) found that safety culture is a primary driver of safety performance. These authors suggested that positive employee behaviours and safety performance will result from a positive safety culture; and that there is a positive relationship between ethical leadership and employee safety culture and consciousness with the most important predictor of organisational health and safety performance being safety culture.

The findings of the qualitative research strand of this doctoral project provide a means to augment the discussion about the relationship between ethical leadership and food safety culture. It could be argued that all 12 of the drivers for food safety identified by participants in the qualitative research strand (Section 5.3.1) constitute 'doing the right thing', a simple definition of integrity, whether for customers (national, international and the vulnerable), shareholders, owners, employees, the environment or whanau. The primary driver for food safety identified by participants is protection of consumers or customers including the world's most precious consumer – infants – whose sole source of nutrition is New Zealand-produced infant formula. "Not killing anyone"; not "impacting consumers adversely" having "a product that customers can trust and know to be good" are comments made by participants. This is consistent with the findings of MPI's research carried out in 2017. That research found that keeping customers safe; brand reputation; and staying in business and keeping people in employment were the three primary drivers for food safety commitment in Aotearoa New Zealand food businesses. The secondary driver for food safety was both the values and ethics of companies and their owners, and acting in compliance with regulations. "If you are not producing safe food you won't be in business". "Being a good corporate citizen", having an "ethical mission", "doing the right thing" and setting and maintaining high standards are examples of the values espoused by companies and owners according to participants. The Aotearoa New Zealand food businesses represented by this research value people highly. While important, compliance with the regulatory environment was second equal as a driver for food safety. MPI (2017) also found that regulatory compliance was "relatively minor in comparison" to customer safety, brand reputation and staying in business (p.5).

The burning issue in terms of food safety is organisational culture, followed by the regulatory environment then food safety culture and product quality. Participants acknowledged that it is not possible to have a good food safety culture if the organisational culture is not right. While the 'number 8 wire' attitude is a Kiwi characteristic that is seen as positive by participants in the context of Aotearoa New Zealand-specific ethical leadership attributes, it has been acknowledged by participants that it is not helpful to apply that attitude to taking shortcuts when applied to food safety. While there are not the same regulatory drivers for establishing a food safety culture as there are for health and safety culture, getting the same level of acceptance for food safety culture is a goal for Aotearoa New Zealand food businesses. Having the right people in the right roles is fundamental according to participants, as is managers walking the talk, being committed, and having a high level of personal integrity according to the outcomes of this research.

The strategies used by Aotearoa New Zealand food businesses in setting food safety expectations: educating and training staff; communicating about food safety; setting goals and holding staff accountable; measuring food safety culture; and reinforcing appropriate behaviours were well described by participants and are summarised in Figure 17. The importance of building and enhancing organisational and food safety culture was emphasised throughout this research, as was the importance of the commitment, visibility of, role modelling by, and communication from managers and supervisors.

The drivers for New Zealand food businesses positioning themselves as ethical are summarised in Table 52, what the organisational ethical positioning and sustainable focus means for those businesses can be seen in Table 61, and the drivers for food safety organised thematically are in Table 51.

Table 61: Interface Between Ethical Leadership and Food Safety Culture: Qualitative Research Strand. What Organisational Ethical Positioning & Sustainability Focus Means

Organisational Ethical Positioning & Sustainable Focus means...

- A sense of pride, and of contributing to 'the greater good' for individuals. Being able to sleep at night.
- Alignment of individual and company values
- Company culture, the DNA, matters – fairness, honesty, openness – and a focus on people (employing, developing and valuing staff; concern for the community)
- Benefitting people and the planet through: minimising harm, minimising waste, recycling, responsible sourcing, finding viable alternatives to plastics, responsible resource usage
- Supply chain leadership – modern slavery as an example
- Awareness of and attention to consumer expectations about the company's focus (social licence); not green-washing; addressing issues related to packaging (single-use, compostable)
- A future focus; eg affordability of animal protein, creating a food system where rubbish isn't created at the outset
- Values-driven leadership
- Inter-generational value creation; business with a purpose; regenerative approaches

Comparing the drivers for both ethical leadership and food safety culture reveals parallels: the emphasis on company values including the values and ethics of owners, company culture and the importance placed on consumers and in particular vulnerable consumers; intergenerational value creation; and ecosystem pressures including compliance with regulations.

While the necessity to comply with regulatory requirements is acknowledged, the Aotearoa New Zealand food businesses represented in this research move beyond compliance to a focus on doing the right thing, or integrity; of their products, their people, their performance, and their interaction with their ecosystem. The cornerstone of food integrity is a values-driven environment (Alrobaish et al., 2023; Manning, 2020; Paine, 1994). Values or standards of behaviour help to shape organisational culture and beliefs (Albert & Whetten, 1985; Manz et al., 2010; O'Reilly & Chatman, 1996; Schein, 1985) therefore the optimal situation for an organisation is to have employees for whom doing the right thing comes naturally (Hartman, 1998) given that an organisation's integrity is reflective of individual integrity and vice versa (Hartman, 1998; Moore, 2005; Moore & Beadle, 2006; Peterson & Park, 2006; Solomon, 1992).

Inherent in an integrity-based approach are clearly communicated organisational values, aspirations, commitments and social obligations; leaders who are committed, credible, competent and accountable who act according to their values; and organisational systems that reinforce organisational values, ensure responsible conduct and ensure compliance (Manning, 2020).

Commentary from research participants in the qualitative research strand show clearly that values – organisational, management and individual - are the primary driver for both food safety culture and ethical leadership in Aotearoa New Zealand food businesses. Quantitatively, a positive relationship between ethical leadership and food safety culture has been established. Qualitatively, this positive relationship is reinforced by research participants.

6.1.3 Supervisors & Staff Perceptions of Ethical Leadership and Food Safety Culture

As discussed in section 6.1, the findings from this research suggest that supervisors have a more positive view of food safety culture and ethical leadership than do staff in Aotearoa New Zealand's largest food company's ingredients business. It further suggests that food safety culture is viewed slightly more positively than ethical leadership. Section 2.1.9 (Chapter 2) discussed the literature relating to homogenous and heterogeneous perceptions of supervisors and staff toward food safety culture and climate and food integrity culture and climate more fully; Section 2.1.11 in reporting the results of an MPI study about food safety culture in New Zealand food businesses (2017), noted differences in perceptions between decision-makers and staff particularly in relation to leadership and management commitment questions; while Section 2.2.3 wrote about perceptions of organisational ethics which may be dependent on where an employee sits in the hierarchy with senior managers more likely to hold rosy perceptions of organisational ethics than lower-level organisational members (Pratt & Rafaeli, 1997; Treviño et al., 2008). The findings of this doctoral research appear consistent with those of Alrobaish et al. (2021), Alrobaish et al. (2023), De Boeck et al. (2015), Harvey et al. (2002), MPI (2017), and Taylor & Budworth (2018), who found differing perceptions of supervisors and staff toward food safety culture, food safety climate and food integrity climate. In addition to safety culture varying between workers and management, it may differ across different departments or plants within an organisation (Harvey et al., 2002); otherwise known as organisational sub-cultures (Griffith et al., 2010b; Jespersen et al., 2017; Manning, 2017; Nayak & Taylor, 2018). This point is relevant to the levels of dissatisfaction expressed by staff at specific sites involved in this research as revealed through PCA (section 4.2).

Several studies have examined areas of discrepancy between perceptions of supervisors and workers in food businesses. Harvey et al. (2002) found that management have more positive views of themselves than do staff who had more negative views about management communication, commitment to safety, being listened to and taking personal responsibility for safety. De Boeck et al. (2015) found that managers were more positive about provision of financial resources and education and training to support food safety, and about constructive and respectful addressing of food safety issues while staff were more positive about leaders setting clear expectations, motivating staff, food safety messaging, recognition and reward systems and the active involvement of employees in food safety related matters. Taylor & Budworth (2018) found that managers are more positive about company culture, strategy (purpose), reward and empowerment (people) and that workers were more positive about practical dimensions such as setting short term goals and training frequency and less positive about food safety.

A possible explanation for this could be that these functions constitute management's area of focus, responsibility and incentivisation, and are therefore within their control. Workers in Aotearoa New Zealand's largest food business were less positive than decision-makers about maintaining emphasis on food safety when production pressures increased, and also less positive about questions related to line managers, specifically that managers walk the talk, follow the rules when no one is watching, are held to account, or give clear feedback (MPI, 2017). Alrobaish et al. (2023) found that managers had a more positive perception of food integrity climate than operators who were not in contact with food and much more positive than operators who were in contact with food. Workers represented by the research of Alrobaish et al. (2023) were concerned about: leaders as role modellers; listening to and motivating employees; encouraging open

and honest communication; rewarding positive behaviour; respecting employees and customers' rights; and investing in working conditions and training. Conversely, in relation to food integrity climate, Alrobaish et al. (2021) found that, with the exception of resources rated higher by managers than operators, there was no meaningful statistical difference found between managers' and operators' ratings. These researchers concluded that there may be shared perceptions of food integrity between hierarchical levels. Treviño et al. (2008) agree that a range of factors may lead to senior managers identifying more strongly with their organisation and therefore holding a more positive view of organisational ethics than workers in lower hierarchical levels.

Clustering survey participants into four groups, mapped two dimensionally shows the characteristics of each group (Table 62). Analysis of the Cluster data suggested that supervisors have a more positive view of food safety culture and ethical leadership than do staff in Aotearoa New Zealand's largest food business ingredients section; that food safety culture was viewed slightly more positively than ethical leadership, and that staff in Clusters 1 and 2 may not wish to be recognisable through not providing identifiable variables (age, gender, years worked, years in the role).

Table 62: Food Safety Culture & Ethical Leadership in New Zealand's largest food business: Inaugural FSQ Survey PCA Clusters & Cluster Characteristics

Cluster	Cluster Characteristics
Cluster 1	These individuals are dissatisfied on both dimensions although less dissatisfied with ethical leadership. Cluster 1 is positively correlated with four sites, the role of staff, and with age, years worked or gender either not given or identified as 'other'. All quantitative variables are negatively correlated.
Cluster 2	These individuals are dissatisfied on both dimensions; less so than group 1. Cluster 2 is positively correlated with six sites, with the role of staff, with having worked at Fonterra for 5-10 years, aged over 56, with gender and age, either not given or categorised as 'other'. All quantitative variables are negatively correlated, but to a lesser degree than Cluster 1.
Cluster 3	These individuals show average representation and are more satisfied on both dimensions. Cluster 3 is positively correlated with most quantitative variables, with the role of supervisor, with four sites and with individuals who have worked for Fonterra for longer than 20 years. Four quantitative variables and seven sites are negatively correlated, as is the role of staff, and gender, age, and years worked not given or 'other'.
Cluster 4	These individuals are largely satisfied on both dimensions. Cluster 4 is positively correlated with all quantitative variables, with five sites and with the role of supervisor. It is also positively correlated with individuals aged 56+ and with years worked in the role being less than two years, and length of time worked at Fonterra either not given or more than 20 years. Cluster 4 is negatively correlated with six sites, with gender and age either not given or other, the role of staff, and having worked at Fonterra for between 5-10 years.

Looking at the average statement survey scores by role in Table 42 ordered by average supervisor scores, it can be seen with one exception (When we have a FSQ issue we learn from it and don't make the same mistake again), the average score by Supervisors was higher than that of Staff for all survey statements.

Consistent with the findings of Alrobaish et al. (2023), staff in this research appear most concerned about rewarding positive food safety behaviour, communication about food safety and quality within and across teams, and supervisors acknowledging mistakes and taking responsibility for them, an aspect of role modelling. Further, several of the sites involved in this research appeared to have increased levels of dissatisfaction with both food safety culture and ethical leadership in those workplaces.

There may be a number of reasons for these divergent perceptions: differing roles and tasks (Alrobaish et al., 2021, Taylor & Budworth, 2018); differing work environments for different levels of employees (Harvey et al., 2002); demographic characteristics including age, gender, work status, and years of experience (Fatimah, 2014); product-type (animal versus plant-based), certification status, and company size (Alrobaish et al., 2023); and the relationships that supervisors have with individual employees (Kessler, 2019). In relation to demographic characteristics, this research found Gender Female more positively associated with the first principal component (ethical leadership) than Gender Male, however on the other two dimensions there was no significant difference. What the data did suggest, however, was that those individuals who were more dissatisfied tended to identify their demographic characteristics as Not Given, perhaps to ensure they were not identifiable, despite rigorous steps to ensure anonymity of participants throughout the research process.

Leadership and management commitment are critical factors in influencing food safety culture (Fatimah et al., 2014; Griffith, 2013; Griffith et al., 2010b; Powell et al., 2011; Yiannas, 2009) which in turn leads to improved productivity, competitiveness and responsiveness (De Boeck et al., 2015; Griffith et al., 2010a), improved employee food handling practices (Fatimah et al., 2014; Griffith et al., 2010b; Powell et al., 2011; Yiannas, 2009) and therefore safer food behaviours and outcomes (De Boeck et al., 2015; Fatimah et al., 2014; Griffith et al., 2010a; Jespersen et al., 2018; Nyarugwe et al. 2016; Yiannas, 2009). Participants in this research support the view that leadership is a critical factor in influencing food safety culture. A commitment to food safety is led from the top (participants # 3, 12, 24, 26). *“You can’t build this bottom upwards. It won’t work. You have to demonstrate by your behaviour, not just talk about it”* (participant # 3). Visibility, communication and modelling as evidence of management commitment were mentioned by research participants. *“Good managers have a good team around them that they are coaching mentoring and leaving. There is a ripple effect”* (participant # 25).

By the same token, ethical leadership improves organisational effectiveness through improved senior management effectiveness, financial performance (Jespersen et al., 2018); worker performance, job satisfaction and organisational citizenship behaviour (Eisenbeib & Giessner, 2012; Ko et al., 2017), and in reducing harmful or unethical behaviour (Bouckenoghe et al., 2015). Employee attitudes and behaviours are influenced by the internal ethicality of an organisation including the commitment of leadership (Blackman, 2018; Brown & Treviño, 2006; Treviño et al., 2008). As with food safety culture and climate, the responsibility of establishing and maintaining an ethical climate that fosters ethical conduct falls to senior leadership (Ko et al., 2017; Mihelič et al., 2010). The findings from this research support this assertion. Ethical behaviour is *“about what filters down from the top”* (participants # 3, # 28). The values or ethics of governing bodies, senior management, industry associations, owners and families drive organisational values or ethics, and legacy thinking as described in section 5.2.1.2. The ‘how’ of establishing and maintaining an ethical climate is exemplified by the approach taken by a producer of milk powder for babies with special dietary needs - the world’s most vulnerable consumers, whose head animal is called Susan. The company mantra is, ‘what would Susan say?’:

In addition to filtering down through an organisation, according to the findings of this research, ethical leadership extends into organisational networks through supply chain leadership. This research surfaced modern slavery as a common issue that Aotearoa New Zealand food businesses are seeking to raise awareness of, educate and redress through their supply chains. Likewise a strong food integrity climate acts as a motivator for staff to act with integrity which leads to improved food integrity behaviour, high food integrity performance and low food fraud vulnerability (Alrobaish et al., 2021; Alrobaish et al., 2022). Leaders motivating, giving constructive feedback to and recognising good employee behaviour may result in favourable food integrity (Alrobaish et al., 2023). Motivating factors for employees include supervisors in food businesses having the requisite management skills to positively influence employees through communication, providing resources, and the use of recognition and rewards (Ellis et al., 2010).

6.1.4 The Association Between Supplementary Categorical Variables & Principal Components

Analysis of the categorical variables for the principal components or dimensions showed that Dimension 1, which was primarily related to ethical leadership, was associated with plant sites, the role of supervisor, respondents with less than two years in their role, and workers aged 56 and over. Dimension 2, which was primarily related to food safety culture, was associated with plant sites, and variables categorised as NG or Not Given by respondents (years worked at Fonterra, years in the role; age; gender and role). An Analysis of Variance confirmed the PCA results. Site, gender and role were significantly associated with Dimension 1 and showed a notable difference that could not be attributed to chance; site and role and to a lesser extent, years worked at Fonterra were significantly associated with Dimension 2 and also showed a significant difference that could not be attributed to chance.

Gender Female appeared most positively in Dimension 1 and within that dimension negatively for NG (not given) and other. Gender NG and Gender Other were positively associated with Dimension 2. For Dimension 2, there was no significant difference between Gender Male and Gender Female variables. The role of supervisor was positively associated with both Dimension 1 and Dimension 2 with the role of staff negatively associated. Dimension 1 was associated with ethical leadership and as noted above, Gender Female, site and role had positive associations with this dimension.

6.1.4.1 Site-Specific Perceptions of Ethical Leadership & Food Safety Culture

The relationship between site and both Dimension 1 (ethical leadership) and Dimension 2 (food safety culture) could be attributed to differences in organisational culture given the range of geographical locations, leadership styles, and plant functions. This may also be indicative of organisational sub-cultures that can arise in across different departments or plants within an organisation (Griffith et al., 2010b; Harvey et al., 2002; Jespersen et al., 2017; Manning, 2017; Nayak & Taylor, 2018).

6.1.4.2 Female Perceptions of Ethical Leadership

There are a range of possible reasons to help understand the positive relationship between Gender Female and Dimension 1. Using social role theory, the communal behaviour patterns ascribed to women lead to socially oriented, nurturing and co-operative behaviours (Kacmur et al., 2011; Karakus, 2018). Men, on the other hand, tend to engage in agentic behaviours which are more achievement-oriented and competitive. According to these authors, while females build personal relationships to foster a sense of belonging, men

are more motivated to build personal status and focus on career development (Kacmur et al, 2011). Some research has suggested that women are more socially and emotionally intelligent and are able to express both positive and negative emotions appropriately (Goswami, 2018).

Perhaps with their focus on meaningful relationships with others, females take a more positive view toward their colleagues overall, whether workers or supervisors; whereas if the agentic behaviour theory holds, the males represented by this research may have limited opportunities for career development contingent on their roles and may therefore hold more negative views of the leadership. If the view espoused by Goswami (2018) is subscribed to, perhaps a level of social and emotional intelligence results in a balanced work life perspective which may lead to more positive attitudes from females.

Social role theory further suggests that perceptions of leadership may rely on traditional views of gender roles; men as the breadwinner and women as the homemaker (Paustian-Underdahl et al., 2014). Perhaps these types of prevailing attitudes underpin the positive response of females to ethical leadership in this research.

Workers may respond differently to leadership behaviour contingent on whether the leader is a male or female, that is, according to different sex role expectations (Russell et al., 1988). These authors posit that workers may respond more positively when a leader behaves in a way which is consistent with their perceived feminine or masculine role. Russell et al. found that women respond more positively to male leaders who act in accordance with their perceptions of an effective male leader (1998). Paustian-Underdahl et al. (2014), in an attempt to extend understanding about the relationship between gender and leadership effectiveness using role congruity theory suggest that men are perceived as more effective in male dominated organisations. The organisation represented in this research is male dominated. Perhaps this has a bearing on the perception of leadership, or alternatively perhaps the leaders do act in accordance with the female subordinates' perceptions of an effective male leader.

Leaders' behaviour and subordinate perceptions of them may relate to their position in the organisational hierarchy with a suggestion that lower-level supervisors may be more concerned with subordinate welfare than higher-level leaders (Lewis & Fagenson-Eland, 1998). These authors also suggest that, with less formal power than high level leaders, lower-level leaders may be considered subservient by their supervisors and therefore may behave in a more considerate way. This would be another justification for females perceiving the leaders in the organisation more positively.

This research has found a positive relationship between Gender Female and ethical leadership. From the literature sourced, reviewed and discussed above, it appears that there are a number of ways that this positive relationship could be considered. The author has been unable to find an explanation that fits satisfactorily, therefore understanding the positive view of females toward ethical leadership, and potentially a divergent view between males and females to ethical leadership may be an area for future research.

6.1.4.3 The Relationship Between Food Safety Culture & Ethical Leadership Variables

The correlation analysis indicated positive relationships between the food safety culture and ethical leadership variables, therefore it may be inferred from these analyses that the quantitative variables are positively correlated. The relationship between the food safety culture and ethical leadership variables, while moderate, appeared stronger than between food safety culture variables. There was one strong correlation between food safety culture variables; 'We discuss FSQ risks with other related teams on site' and 'I could tell you exactly how our team is tracking against our FSQ targets'. All but four of the ethical leadership variables were strongly or very strongly related to each other.

6.1.5 Summary

Consistent with two studies that established a relationship between ethical leadership and workplace safety (Freiwald, 2013; Khan et al., 2018), the quantitative research strand of this doctoral research found a positive relationship between ethical leadership and food safety culture. Further, these data shows a positive relationship between Gender Female and the ethical leadership dimension, between plant sites and role and both ethical leadership and food safety dimensions. This research appears to be the first of its kind internationally examining the relationship between ethical leadership and food safety culture using statistical methods. Given the importance of the food and fibre sector to the economy of this country, highlighted in Section 1.3, the evidence from this research suggests that Aotearoa New Zealand food businesses, through a focus on the ethicality of their leaders, could improve organisational food safety culture and therefore increase the safety of food produced in this country (Section 1.4).

The nature of this relationship was augmented by qualitative research involving 32 participants from 31 Aotearoa New Zealand food businesses, who, through their emphasis on organisational, managerial and individual values and integrity anecdotally moved the conversation from food safety culture and ethical leadership to one of the emerging and holistic concept of food integrity. This research also appears to be the first to provide an up-to-date understanding of ethical leadership and its characteristics, and of food safety culture in Aotearoa New Zealand food businesses. Food safety culture in particular, is a topical issue for Aotearoa New Zealand food businesses driven in part by compliance with international standards and regulations. The qualitative strand of this research provides wealth of information and advice to share with the Aotearoa New Zealand food sector.

The differing perceptions of supervisors and staff toward both ethical leadership and food safety culture arising from the quantitative analysis were consistent with literature on the phenomenon. Supervisors were more positive on 21 of the 22 survey questions in the quantitative research strand. Some literature posits a range of reasons as to why this might be, including where any employee sits in the organisational hierarchy, and the existence of organisational sub-cultures, while others find a more homogeneous perception of supervisors and staff. This is an important area for further study in order to fully understand the reasons behind these differing perceptions in the largest food business in Aotearoa New Zealand. Two other foci for future research are the more positive perceptions of females toward ethical leadership highlighted in the quantitative analysis which may be viewed through several lenses, and exploring the reasons for the negative perceptions of a small number of geographically dispersed plants.

The next section responds to the question, “What are the unique characteristics of ethical leadership in food companies in Aotearoa New Zealand?” using evidence from the qualitative research strand of this doctoral project.

6.2 Unique Characteristics of Ethical Leadership in Aotearoa New Zealand

Are there unique characteristics of ethical leadership in Aotearoa New Zealand? This question was put to 32 participants from 31 food companies in the qualitative strand of this doctoral research (Chapter 5), primarily food safety and quality managers; senior managers or company owners or directors. Following is the ranked list of unique characteristics of ethical leadership in Aotearoa New Zealand (Kiwi characteristics) according to research participants, mapped onto extant literature (Table 63).

Table 63: Unique Characteristics of Ethical Leadership in Aotearoa New Zealand Mapped onto Extant Literature

Ethical Leaderships Characteristic/s	Extant Literature
Humility: Humble and down to earth	Mihelic et al., 2010; Weaver, 2005; Witzel, 2018; Zauderer, 1992
Honest, Open & Transparent	Kalshoven et al., 2010; Kaptein, 2003; Mihelic et al., 2010; Resick et al., 2006; Treviño et al., 2000; Weaver et al., 2005; Witzel, 2018; Yukl et al., 2013; Zauderer, 1992
Aotearoa New Zealand Indigenous Māori values	
Not corrupt	Reproach unjust acts (Zauderer, 1992) Principled (Kalshoven et al., 2010) Follow ethical decision rules (Treviño et al., 2000) Consistently ethical; uncompromising ethical vision (Weaver et al., 2005)
2 degrees of separation	
Can-do attitude	
Passionate about the environment	Creates ecological value (Kaptein, 2003) Concern for sustainability (Kalshoven et al., 2010)
Strong sense of identity; connection to place/roots	
Collaborative	Power-sharing (Kalshoven et al., 2010) Encouraging and supporting others (Witzel, 2018)
Fair, Equitable & Tolerant	Kalshoven et al., 2010; Kaptein, 2003; Mihelic et al., 2010; Treviño et al., 2000; Weaver et al., 2005; Witzel, 2018; Yukl et al., 2013; Zauderer, 1992
Accountability/taking responsibility	Kalshoven et al., 2010; Kaptein, 2003; Resick et al., 2006; Weaver et al., 2005; Zauderer, 1992
Other:	
Walk the talk	Kaptein, 2003
Role modelling	Treviño et al., 2000
Lead by example	Witzel, 2018
Well rounded; Adaptable; Brave; Courage to stand up for what is right	Mihelic et al., 2010; Witzel, 2018
Lots of fun; Less aggressive	

These are consistent with the general ‘Kiwi’ leadership characteristics identified by Kennedy (2000) in his report on New Zealand participation in the international Global Leadership and Organisational Effectiveness Research Programme (GLOBE) that investigates cultural values and leadership practices, acknowledging

that Kennedy's work took no account of Aotearoa New Zealand sub-cultures at that time (Pfeifer & Love, 2004). The characteristics identified by Kennedy included:

- “modesty, humility, recognition of one's own weaknesses balanced with a healthy respect for self and others” (p.33); we “like winners, but like our winners to be humble” (p.16)
- openness, honesty and informality (p.7); egalitarian; managers are largely ethical (p.29);
- not corrupt (p.39);
- the small size of the country means “there is nowhere to hide when problems arise” (p.28);
- “a practical problem solving approach to life” or “Kiwi ingenuity” (p.6) otherwise known as the ‘Number 8 wire mentality’; “determination, stickability, resolve and perseverance” (p.35);
- values-based and decisive (p.37); good communicators; strength of character and commitment (p.46);

Lasthuizen (2018) identified both the size of the country and maintaining and enhancing high integrity as a challenge and an opportunity for Aotearoa New Zealand. That report noted the unique traits arising from being a small, bicultural nation; what New Zealanders refer to as two degrees of separation that may lead to conflicts of interest, nepotism, favouritism and intermixing of the public service and politics. Aotearoa New Zealand's low level of corruption led to a first equal ranking alongside Denmark and Finland in Transparency International's Corruption Perception Index (Transparency International, 2022), an important position to maintain in terms of national integrity.

Kennedy (2000) concluded that the ways in which Aotearoa New Zealand leaders have approached problem-solving has helped to define and reflect Kiwi culture, finding that the overall pattern of Aotearoa New Zealand's leadership is unique despite many of the elements being found globally. This view was echoed by participant # 4 in this research; *“Every country has its own idiosyncrasies. Every country's leadership and ethical leadership is cloaked in the culture of that country – what works and what doesn't. Yes, it's unique because it has a New Zealand lens”*. Interestingly, our view of ourselves appears to have changed little in the twenty plus years since Kennedy's published work. According to the findings of this research, we pride ourselves in particular, on our humility, honesty and lack of corruption and see these as inherent in our ethical leadership qualities.

Food manufacturers and producers represented in this research reflected the passion of New Zealanders for the environment and the importance of Aotearoa New Zealand Indigenous Māori values. Associated with both of these characteristics is a strong sense of identity and a sense of connection to place. These two characteristics do not appear to have been identified by Kennedy (2000). Noted is the focus on ethical leadership by this research as opposed to Kennedy's focus on leadership in general. I suggest that environmental concerns and recognition of Aotearoa New Zealand Indigenous Māori values is reflective of the changes in attitudes in Aotearoa New Zealand in the intervening twenty years and supported by the narrative from research participants throughout the interview process. The strength of the emerging Māori economy and recognition of the value of the Indigenous Māori worldview; increasing ecosystem pressures on Aotearoa New Zealand food businesses including social licence to operate from consumers and supply chains who are demanding visibility, traceability and provenance; responsible stewardship of natural resources; the need for ethical individual, business and supply chain leadership; and the ethics of workers,

managers, leaders and companies are all themes that emerged during this research. Many of these issues are not, of course, unique to Aotearoa New Zealand.

In exploring the meaning of ethical leadership and its role in addressing the main ethical issues in New Zealand, a challenge and opportunity identified was Aotearoa New Zealand's sense of responsibility for the people, planet and future generations (Lasthuizen, 2018). As the findings of this qualitative research suggest, there are significant concerns about and steps being taken to redress environmental management, water quality, climate change, waste and the prevalence of single-use plastics. The sense of custodianship of the planet emerged strongly throughout the qualitative interviews; the shouldering of responsibility to leave the planet and people better. As some participants identified, acting ethically means doing the right thing by every part of the ecosystem: the people and the planet.

Ecosystem pressures (social licence, a future focus, packaging, ethical sourcing, regulations and standards and risk management) are drivers for organisations addressing these issues. Providing healthy food for consumers will become increasingly challenging if care is not taken for the environment according to several participants. While acknowledging that food safety must not be compromised, a range of strategies are being used by Aotearoa New Zealand food businesses to improve their stewardship of natural resources including moving to fully recyclable packaging, exploring viable alternatives to plastic, improving energy and resource efficiency, using less water and paper, creating less waste, and consideration of food miles.

The body of scientific research on ethical leadership takes a western-based perspective that has rarely taken concern about societal and environmental welfare into consideration (Eisenbeiss, 2012), however a deep and genuine concern for the environment and the society is the anchor for a successful, sustainable enterprise (Kalshoven et al., 2010; Wang et al., 2016) and is reflective of the interconnectedness of the Māori worldview.

In the first study of its kind, Pfeifer & Love (2004) hypothesised that perceptions of leadership behaviour are determined by cultural differences, finding that Māori (collectivist culture) perceive their leaders as being more transformational than Pakeha (individualistic culture). The authors concluded that the two primary sub-cultures in Aotearoa New Zealand, Māori and Pakeha, show differences in leadership behaviour, a result consistent with other research into cross-cultural leadership. Further, differences among followers, due to underpinning cultural values, may influence perceptions of leadership behaviour therefore the leadership process may be hindered by ethnocentric leadership behaviour (Pfeifer & Love, 2004). While cautioning against generalising the results of the study given its small sample size and focus on followers' perceptions of leadership, their findings led Pfeifer & Love to suggest that "New Zealand's unique cultural mix suggests that a distinct set of leadership behaviours is required to lead diversity within its shores" (p.11).

In order to better understand the relationship between Māori and Pakeha values, the opinion of Te Tira Whakamana, the Māori Advisory Group of the NZFSSRC were sought (Personal Communication 19-20 September 2023). Their collective view was that Māori and Pakeha share similar values - human values, however what differs is the interpretation and application of those values across hapū, iwi, and Māori, Pakeha and other ethnicities. It is in observing practices that values are revealed. Māori values are

contextualised within a values system and those values “ooze out of the land” (Hone Morris, Personal Communication, 20 September 2023). Quoting Abhay Charanaravinda Bhaktivedanta Swami Prabhupada, Associate Professor Morris advocates for rising above the duality to reach unity (Hone Morris, Personal Communication, 20 September 2023); “This world is duality. So we have to rise above this dual world and enter into the absolute world. Then there will be happiness” (Vaniquotes, 2023).

The leadership characteristics in the Aotearoa New Zealand-specific studies referred to in this discussion are not in themselves unique. The way these characteristics and underpinning values are interpreted and applied in the Aotearoa New Zealand context however, is the point of uniqueness. “Doing the right thing” by people whether employees, customers, consumers or markets, and by the planet emerged as the ethos underpinning the food manufacturers and producers represented in this research. This equates, by definition, to behaving and leading ethically. The majority of research participants believe that ethical leadership in Aotearoa New Zealand is unique, influenced in part by our size, our Indigenous Māori worldview, and our geographical isolation.

A review of literature by Aotearoa New Zealand academics suggests parallel strands of research into ethical leadership; one aligned with Western approaches and the other aligned with the Indigenous Māori worldview, acknowledging the touchpoints between the two articulated by Haar et al. (2018): whakaiti (humility, humbleness, self-discipline, consideration of influence on others); ko tau rourou and manaakitanga (altruism, care for others, doing the right thing by others, generosity of spirit); tāri ate wā and kaitiakitanga (long-term guardianship and protection, sustainable); whanaungatanga (collectivism, relationships with current, past and future generations); and tikanga Māori (cultural authenticity, the Māori way of doing things).

To understand the commonalities or to use Haar et al.’s terminology, the touchpoints, between Aotearoa New Zealand cultural perspectives on leadership values and characteristics, Table 64 compares leadership characteristics outlined in the five research studies discussed in Chapter 2 (section 2.2.5), including Haar et al. (2018) with the ethical leadership characteristics identified by participants in this research..

The parallels between the work of Kennedy in 2000 and the characteristics identified in this research were discussed earlier in this section. Some consistency with Haar’s antecedents of ethical leadership can be seen. The identification by the participants in this research of Aotearoa New Zealand indigenous Māori values as an ethical leadership characteristic is an holistic term which encompasses those values espoused by Haar et al. (2018), Spiller et al. (2011) and Ruwhui & Elkin (2016) who share commonalities among them, again acknowledging that each of these studies is taking a slightly different perspective. The intention is to look at common characteristics. The work on ethical leadership characteristics by the Lasthuizen (2018) is modelled on the work of Brown et al. (2015) and shows some overlap with the characteristics identified by Kennedy (2000) and this research.

This comparison perhaps reveals the evolution and maturing of values and characteristics of ethical leadership in Aotearoa New Zealand. Consistent with the view of Pfeifer & Love (2004) that a distinct set of leadership behaviours is required to lead diversity in this multi-cultural country, finding agreement on what

those behaviours are is an interesting area for further research, however this is beyond the scope of the current work.

Table 64: Comparison of New Zealand-specific research into ethical leadership characteristics

New Zealand Leadership Characteristics (Kennedy, 2000)	Research Outcomes: Unique Characteristics of Ethical Leadership in Aotearoa New Zealand in 2021	Antecedents of Ethical Leadership (Māori Values with Western Touchpoints) (Haar, 2018)	5 Well-Beings Approach (Spiller et al., 2011)	Māori & Servant Leader Values (Ruwhui & Elkin, 2016)	Pillars of Ethical Leadership in NZ (Lasthuizen, 2018)
<p>Modesty, humility</p> <p>Openness, honesty and informality; Good communicators; Strength of character and commitment</p> <p>Not corrupt;</p> <p>Largely ethical; Values-based and decisive</p> <p>2 degrees of separation</p> <p>A practical problem-solving approach to life (kiwi ingenuity or Number 8 wire mentality)</p> <p>Determination, stickability, resolve and perseverance</p> <p>Egalitarian; Recognition of one's own weaknesses balanced with a healthy respect for self and others Independence</p>	<p>Humility: Humble and down to earth</p> <p>Honest, Open & Transparent</p> <p>Not corrupt</p> <p>Fair, Equitable & Tolerant</p> <p>2 degrees of separation</p> <p>Can do attitude</p> <p>Accountability/taking responsibility</p> <p>Strong sense of identity; connection to place/roots</p> <p>Passionate about the environment</p> <p>Collaborative</p> <p>Other (Walk the talk, well rounded, adaptable, brave, lots of fun, less aggressive)</p> <p>Aotearoa New Zealand Indigenous Māori values</p>	<p>Whakaiti/Humility Humbleness Self-discipline Consideration of the influence on others</p> <p>Ko tau rourou and Manaakitanga/Altruism Manaakitanga: care and concern for others; doing the right thing by others Ko tau rourou: generosity of spirit; giving for long-term benefit</p> <p>Tōri ate wā and Kaitiakitanga/Long term orientation Tōri ate wā: the long journey or long time Kaitiakitanga: sustainable, long-term guardianship and protection</p> <p>Whanaungatanga/ Collectivism Relationships with past, current and future generations</p> <p>Tikanga Māori/Cultural authenticity Knowing and being true to one's tikanga; the Māori way of doing things</p>	<p>Manaaki, to show respect or kindness; Aroha, to show care, empathy and charity Hau to respect, promote and maintain vitality Hōpai meaning to uplift others</p> <p>Kaitiakitanga, which includes guardianship, preservation, conservation, fostering, protecting and wise use of resources</p>	<p>Māori Leader Values Manaakitanga (care and concern for others) Whanaungatanga (relationship/kinship) Wairuatanga (identity/spirituality) Kaitiakitanga (guardianship)</p> <p>Servant Leader Values Integrity Empathy Foresight Stewardship Community</p>	<p>Moral Person Moral Character Core values: Integrity, Honesty, Fairness Authenticity Moral courage</p> <p>Ethical Behaviour Do the right thing Showing vulnerability Mentoring</p> <p>Decision-Making Fair treatment Making social ethical choices Transparency & accountability</p> <p>Moral Manager Role modelling Visible good examples No exceptions on general rules Clarity about code of conduct Diversity & inclusiveness</p> <p>Communication Storytelling Discussion & dialogue Honest feedback</p> <p>Reinforcement Sanctions & rewards Setting clear boundaries Creating a safe environment</p>

6.2.1 Summary: Unique Characteristics of Ethical Leadership in Aotearoa New Zealand

With the addition of passion for the environment and the importance of Aotearoa New Zealand indigenous Māori values, the ethical leadership characteristics identified by participants in the qualitative research strand of this doctoral project align with the general 'Kiwi' characteristics identified in the 2000 GLOBE report (Kennedy, 2000). While some of the ethical leadership characteristics identified in this research are not of themselves unique to Aotearoa New Zealand, the way they are interpreted and applied within our national culture is. The research of Haar et al. (2018) identified the western ethical leadership touchpoints with Māori values and a comparison of this work with other indigenous and western focused research shows an evolution and maturing of these concepts. Further research into the ethical leadership characteristics and underpinning values of bi-cultural Aotearoa New Zealand would be of benefit to all leaders in this country.

Being committed to ensuring this research was as up-to-date as possible, looking at the data through a different lens, that of food integrity, the body of literature for which was evolving in real time during the period I was undertaking the data gathering phase of my research, provided an opportunity for extension. The focus was the nature of the relationship between ethical leadership and food safety culture; food safety culture being a topical issue for the food businesses represented in this research. Section 6.3 constitutes an extension of this research into food integrity for Aotearoa New Zealand food businesses, briefly revisiting the key concepts following which an augmented model of food integrity climate is suggested. This section concludes with a re-imagined approach to food safety culture and burning food safety issues research findings using a food integrity lens.

6.3 Food Integrity for Aotearoa New Zealand Food Businesses

Prevention of intentional food modification that is harmful to health for economic gain (i.e. food fraud/food defense) has been the driver for the body of literature focused on food integrity (Section 2.2.8). While food safety and food quality impacts are unintentional and may be caused through negligence, Spink (2019) noted that the root cause of food safety incidents may be food fraud. The food supply chain integrity scholarship provides a link between food safety culture and ethical leadership (Section 2.2.8) with definitions of food integrity culture and food integrity climate building on definitions of food safety culture and climate (Alrobaish et al., 2021; Alrobaish et al., 2022). The concept of food integrity goes beyond compliance with rules and standards to building an environment that is values-driven, and which supports ethical behaviour and shared accountability (Alrobaish et al., 2023; Manning, 2020; Paine, 1994). Inherent in an integrity-based approach are clearly communicated organisational values, aspirations, commitments and social obligations; leaders who are committed, credible, competent and accountable who act according to their values; and organisational systems that reinforce organisational values, ensure responsible conduct and ensure compliance (Manning, 2020). The four elements of food integrity; product, process, people and data are predicated on authenticity and honesty (Alrobaish et al., 2021; Manning, 2017).

The findings of the qualitative research strand, as summarised in section 5.4 demonstrated that the food businesses represented in this research positioned themselves as 'ethical' or 'better/open, or honest and trustworthy', because it's the right thing to do, with the key driver being company values. Those company values are driven by founders, owners, and managers and imbue every aspect of organisational activity according to participants.

The issues of food safety, food authenticity, traceability and integrity are significant for both food businesses and consumers (Manning, 2017). A singular focus on compliance with product and process requirements is no longer sufficient; food integrity is now considered critically important to food businesses (Alrobaish et al., 2023). This body of literature provides an interface between food safety culture; “... a long-term construct existing at the organisational level relating to the deeply rooted beliefs, behaviours and assumptions that are learned and shared by all employees, which impact the food safety performance of the organisation” (Sharman et al., 2020), and ethical leadership; “the demonstration of normatively appropriate conduct through personal actions and interpersonal relationships, and the promotion of such conduct to followers through two-way communication, reinforcement and decision-making” (Brown et al., 2015).

The terms food safety culture and climate, and food integrity culture and climate have been used in this section. Section 2.2.8.4 describes the definition and origins of food integrity which builds on the food safety climate and culture models of de Boeck et al. (2015) and de Boeck et al. (2018). Food integrity is an holistic concept encompassing the integrity of product, process, people and data (Alrobaish et al., 2021; Alrobaish et al., 2022; Manning, 2017); integrity being a cornerstone of ethical leadership and behaviour as described in section 2.2 (Chapter 2).

To confirm and expand the thinking about perceptions toward the emerging field of food integrity in Aotearoa New Zealand food businesses, five experts, members of the NZFSSRC’s Industry Advisory Group representing some of New Zealand’s largest food exporters, were asked about the applicability of the food integrity elements initially identified by Manning (2017) (product, process, people and data integrity) to the Aotearoa New Zealand context. Input from these food industry representatives suggested the addition of two elements given their importance to Aotearoa New Zealand food businesses; supplier integrity, and social integrity. Taking this input into consideration, it is suggested that Manning’s (2017) elements of food integrity be augmented with the elements of supplier and social integrity Table 65.

Table 65: Elements of Food Integrity for Aotearoa New Zealand Food Businesses (Acknowledgements: Manning, 2017; Alrobaish et al., 2021; Alrobaish et al., 2022)

Food Integrity Elements
<p>Product Integrity Intrinsic characteristics or inherent quality attributes of totality and completeness of a food product, implying the safety, quality, genuineness and authenticity of its non-adulterated components with verifiable and recognised origins</p>
<p>Process Integrity Extrinsic characteristics or activities undertaken to produce the food item encompassing the design, packaging, monitoring and verification of processes within the product life-cycle to ensure that they remain authentic and intact, including compliance with food assurance standards of hygiene, animal welfare, plant health, labour, as well as controlled methods of production, processing and distribution.</p>
<p>People Integrity Moral characteristics of honest behaviour as well as ethical beliefs and attitudes exhibited by the people working in the organisation.</p>
<p>Data Integrity Information accompanying the food item throughout the supply chain from production to distribution, implying the consistency and accuracy of data throughout the food product life-cycle, which include authentic health certificates, valid import documents and accurate product labelling in terms of ingredient list, special properties, nutritional value, origins and expiry dates.</p>
<p>Supplier Integrity Supplier adherence to standards of integrity of product, process, people, data and social integrity, and the integrity of their own suppliers.</p>

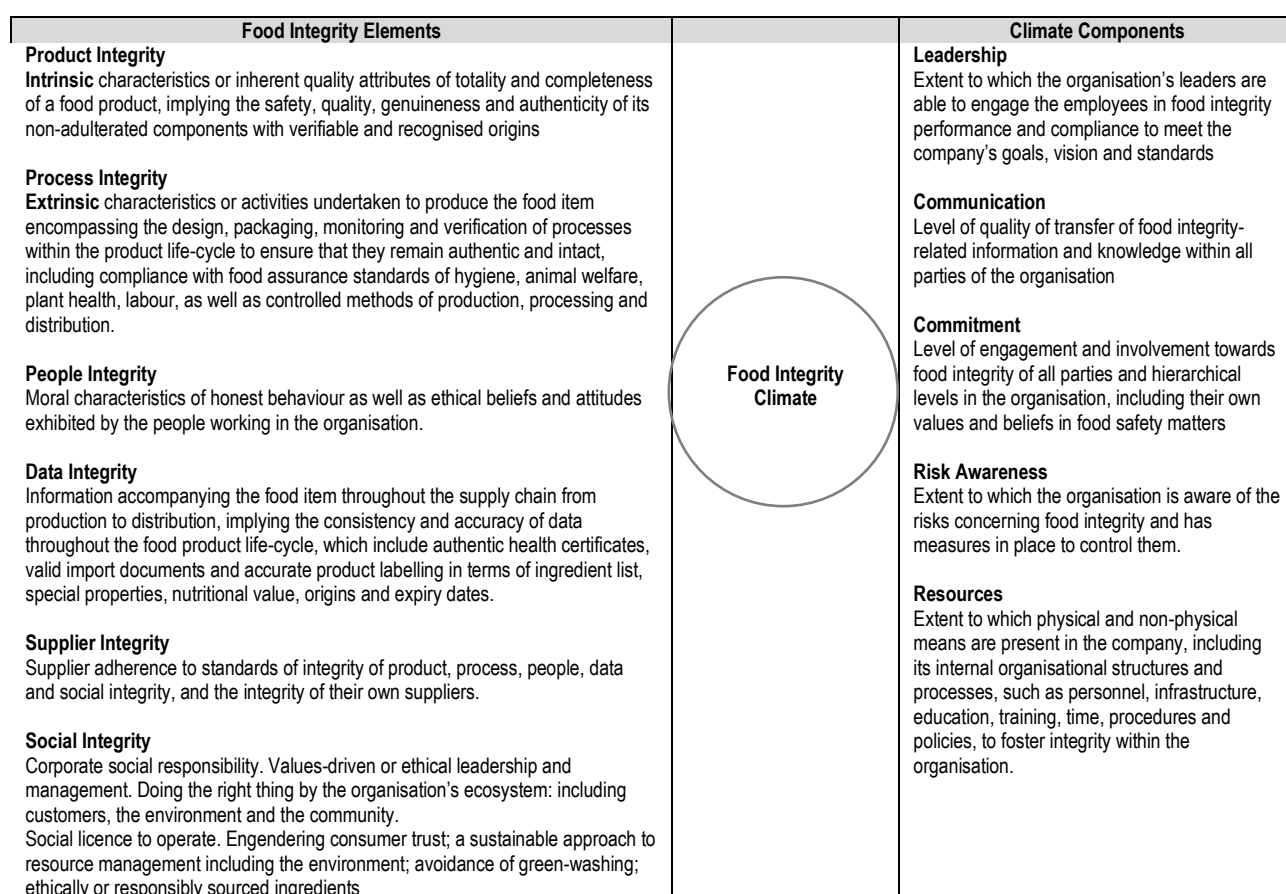
Social Integrity

Corporate social responsibility. Values-driven or ethical leadership and management. Doing the right thing by the organisation's ecosystem: including staff, customers, the environment and the community.

Social licence to operate. Engendering consumer trust; a sustainable approach to resource management including the environment; avoidance of green-washing; ethically or responsibly sourced ingredients

Assuming the climate components of leadership, communication, commitment, risk awareness and resources, and acknowledging the work of Alrobaish et al. (2021), De Boeck et al. (2018), Griffith et al. (2010), and Manning (2017) food integrity climate in Aotearoa New Zealand is best defined as the employees' shared perception of leadership, communication, commitment, risk awareness, and resources regarding food integrity within the company's working environment in terms of product, process, people, data, social and supplier integrity (Figure 18).

Figure 18: Aotearoa New Zealand Food Integrity Climate Conceptual Model (Acknowledgements: Griffith et al. (2010), De Boeck et al. (2018), Manning (2016) and Alrobaish et al. (2021))



6.3.1 Supplier Integrity

The integrity of suppliers of fundamental importance to the participants in this research. While a number of those represented, due to the size of their businesses, saw supply chain leadership and supplier education as a corporate responsibility, the importance of supplier certifications, adequate approaches to risk assessment and mitigation, and performance standards through stringent contractual requirements was emphasised by participants. An issue that was flagged in this research was that of modern slavery and the need to ensure development of and adherence to supplier policies to guide best practice in this regard.

6.3.2 Social Integrity

Social integrity is becoming important particularly for listed companies in Aotearoa New Zealand (Denver McGregor, Personal Communication, 20 September 2023). The intent behind social integrity as an element is the consideration of both corporate social responsibility and social licence to operate according to Mr McGregor, including protecting the environment from pollution which in turn impacts on consumer brand trust. This statement best encapsulates participant feedback concerning social integrity (participant # 8). A discovery arising from this qualitative research was the extent to which food businesses across sectors acknowledge and respect the concept of social licence to operate.

Corporate Social Responsibility, driven by organisations (top down) (Edwards & Trafford, 2016), cuts across the thematic analysis for the qualitative strand, encompassing values, responsible stewardship of natural resources, the Māori worldview, ecosystem pressures and leadership. Social licence, driven by the community (bottom up) (Edwards & Trafford, 2016) was identified as one of the elements of ecosystem pressures that is common to most of the food businesses represented in this research. *“If you don’t have social licence, you won’t have a business”* (participant # 4).

Social licence to operate, which has only recently emerged in Aotearoa New Zealand media and literature, is a social contract between actors, ranging from informal to formal (Edwards & Trafford, 2016) and relates to what an organisation does (Morrison, 2014). It has emerged in response to social pressure about organisational social and environmental performance (Edwards et al., 2019). It is defined as *“broad public acceptance of a company or industry’s development activities and is linked to public trust and confidence in their ability to ‘do the right thing’”* (Edwards et al., 2019). The New Zealand Sustainable Business Council (n.d.) describes social licence as *“the ability of an organisation to carry on its business because of the confidence society has that it will behave in a legitimate, accountable and socially and environmentally acceptable way”* (p.2). Social licence can be difficult to earn and easily lost if there is a perception that the social contract is breached (Sustainable Business Council, n.d.). It can add cost to an organisation but may result in increased profit margins, and it can be expensive to repair or recover from issues that have not been adequately addressed (Parker, 2015). These issues include adverse reactions from consumers, a reduction in sales, and reputational damage (Edwards & Trafford, 2016). It is not a business that determines who stakeholders and communities are, rather they are self-defining (Morrison, 2014), therefore there is a need to ensure authentic community engagement and avoid a risk-management tick-box exercise when mandating social licence (Ruckstuhl et al., 2014). Understanding stakeholder and community *“culture, customs, language and history”* is important according to the Ministry for Primary Industries (MPI) (2014).

The core concepts of social licence are consent, trust and legitimacy (Morrison, 2014), with trust being the critical component (Edwards et al., 2019, p.3, Edwards & Trafford, 2016; Moffat & Zhang, 2014; Stevens & O’Callaghan, 2015). In addition to building trust, openness and transparency in communication are identified by Baines & Edwards (2017) as important characteristics of social licence, as are fairness and reciprocity. Flexibility, accountability and provision of quality information are identified as important by the Sustainable Business Council (n.d.), as are developing a shared language, understanding, experiences and mutual goals and recognition (MPI, 2014).

Some of these core concepts are common to food safety culture and leadership (section 2.1.7), business ethics (section 2.2.2), ethical leadership (section 2.2.3), the characteristics of ethical leadership (section 2.2.4), and to Aotearoa New Zealand Māori perspectives on ethical leadership (section 2.2.5). Social licence to operate therefore provides another point of connection with the integrity of the food supply chain.

“Good ethics is good for business” (Davis, 1994). Davis’s research considered two questions; do consumers assess corporate ethics and do those assessments inform consumer purchasing decisions, finding evidence for both conditions (1994). Consumers are more likely to purchase products from organisations who are perceived to be ethical in their behaviour and communications (Davis, 1994). When talking about the environment, it is beneficial to organisations to communicate with consumers “without the appearance of exploitation, greed or manipulation” (Davis, 1994, p.884).

Greenwashing is an overarching term for a raft of behaviours that persuade or mislead people to view an organisation’s environmental performance, practices or products more positively than warranted (Lyon & Montgomery, 2015). Both greenwashing and blue washing with its focus on economic and social responsibility, are forms of corporate whitewashing (McClimon, 2022). Futerra (2008) uses the term ‘ethics-wash’ for those organisations that substitute unfounded and immaterial environmental claims for social or ethical claims (p.22). Nyilasy et al. (2012) view greenwashing as both a business and ethical problem for organisations.

Greenwashing can range from slight exaggeration to full fabrication, is subjective and not necessarily deliberate, has a negative impact on organisational credibility and financial performance, reduces consumer trust, increases consumer cynicism, and impacts investment intentions and purchasing behaviour (Lyon & Montgomery, 2015) and can lead to ethical harm (Szabo & Webster, 2020). Greenwashing can negatively impact those companies that are honest about their environmental track record (Dimitrieska et al., 2017). Drivers for greenwashing are both internal (organisational characteristics, incentive structure and ethical culture, effectiveness of intra-organisation communication and organisational inertia) and external; non-market (regulatory and monitoring) and market drivers (consumer and investor demand and competitive pressure) (Delmas & Burbano, 2011).

Having suggested an augmented food integrity climate model tailored to Aotearoa New Zealand food businesses, the following two sections of this chapter briefly re-imagine food safety culture and the burning food safety issues found in the qualitative research strand of this doctoral research, through a food integrity lens.

6.3.3 Food Safety Culture in Aotearoa New Zealand Food Businesses Re-Examined Through a Food Integrity Lens

The author’s research interest extended into re-imagining the findings of the food safety culture component of the qualitative interviews with 32 food safety and quality professionals in 31 Aotearoa New Zealand food businesses through a food integrity lens. In examining the qualitative food safety culture data (Chapter 5) through this lens, product integrity is the primary driver for food safety. This is critical for those companies producing infant formula, often as the sole source of nutrition for the “world’s most precious consumer” (participant # 4). Consumers having confidence in a trusted product (participants # 26, 27) and not being

adversely impacted by the product (participants # 12, 23, 26), or in the worst case scenario not being killed (participant # 15) drive organisational food safety. Protecting a hard-won, respected brand (participants # 22, 23) was another product integrity-related driver for food safety.

People Integrity is a close second in terms of drivers for food safety. This relates to leadership, personal and organisational values, and an ethical mission. The introduction of social integrity as a food integrity element would encompass positioning as a good corporate citizen (participants # 22, 30, 32, 23). In the Aotearoa New Zealand-specific context this also relates to inter-generational taonga preservation and enhancement (participant # 25). Showing leadership through ecosystem innovation across the supply chain by reducing environmental impact, improving the viability of a changing food production system and increasing wellbeing is key driver for food safety within the recommended introduction of a supplier integrity element. Regulatory compliance or process integrity is a key driver of food safety (participants # 7, 14, 19, 17, 24, 15). “No food safety, no business” (participant # 15). Maintaining market access through the provision of safe food is fundamentally important to New Zealand’s food exporters.

6.3.4 Burning Food Safety Issues for Aotearoa New Zealand Food Businesses

Organisational and food safety culture are top of mind for Aotearoa New Zealand food businesses; encompassing all four elements of food integrity plus the two recommended additions; supplier and social integrity. Avoiding the # 8 wire mentality; improving practice and process; speaking/owning up; culture verification driven by international regulatory requirements; development of evaluative systems (process integrity); governance and management culture (people integrity); adequate resourcing (product integrity) and supply chain standards and continuous improvement and communication across the board are all burning food safety-related issues raised by participants.

Product integrity is a burning food safety issue. Product quality including microbial, viral, foreign and plant matter contamination and associated issues such as allergens are foremost (participants # 32, 20, 18, 13). Labour intensive manual processes for a raw product increase the risk of contamination (participant # 7). Changing consumer trends can undermine product integrity, for example consumers eating products raw that are intended to be cooked (participant # 12). Resourcing impacts product integrity; a constrained labour force, and retention and training are burning issues for Aotearoa New Zealand food businesses.

In terms of process integrity, the qualitative interviews were conducted during a lockdown period in late 2021, a time when regulatory and market access issues were particularly problematic given the lack of certainty about the origin and spread of COVID 19. Increased international border testing, and maintaining access to increasingly discerning markets were burning issues identified by participants (participants # 3, 14, 28, 19).

Maintaining data integrity through appropriate product labelling was identified as a burning issue, including clear messaging about whether products must be cooked or may be eaten raw (participants # 12).

The field of food integrity, implicit in which is moving from compliance to integrity, is evolving in real time, building on the concepts and definitions of food safety culture and climate. Section 6.3 has briefly revisited the concepts of food integrity, and suggested augmenting the Food Integrity Climate Conceptual Model

(Alrobaish et al., 2021; De Boeck et al., 2018; Griffith et al., 2010; Manning, 2016) to reflect an Aotearoa New Zealand perspective on food integrity climate. This section concluded with a review of findings about drivers for and burning issues related to food safety through a food integrity lens.

6.4 Summary

The quantitative research strand of this doctoral research found a positive relationship between ethical leadership and food safety culture, a finding consistent with literature into the relationship between ethical leadership and workplace safety. Potential for both the positive relationship between Gender Female and the ethical leadership dimension were discussed, as were the more positive perceptions of supervisors than staff toward both ethical leadership and food safety culture, a finding that was consistent with literature on the phenomenon. Each of these findings provides an opportunity for further research. In addition, exploring the reasons for the negative perceptions of a small number of geographically dispersed plants which emerged in the quantitative research is another area worthy of further investigation.

Improving ethical leadership should improve food safety culture. This has important implications for the Aotearoa New Zealand food industry. A proxy may be the research in the field of workplace safety which has found ethical leadership increases safety participation, performance and compliance; and improves organisational & senior management effectiveness; financial performance; worker motivation and performance; and job satisfaction & organisational citizenship behaviour. Building trust in leaders is key.

There are a range of possible strategies to grow ethical leaders in Aotearoa New Zealand food businesses. These include: developing, communicating and living organisational values; ethical considerations in hiring staff, setting expectations, and training and managing performance; modelling good behaviour (walking the talk), fair decision-making, transparent communication and use of consequences; and mentoring and empowering or giving a voice to employees.

Findings from the qualitative research strand into the ethical characteristics of Aotearoa New Zealand leaders revealed little change from those identified by Kennedy in 2000. The two exceptions were passion for the environment and indigenous Māori values which were identified as important to participants in this research. While the characteristics identified in this research may not be unique in the context of international literature, the way they are interpreted and applied within our national culture is. Further research into the ethical leadership characteristics and underpinning values of bi-cultural Aotearoa New Zealand is recommended.

This chapter concluded with a foray into the evolving field of food integrity applying an Aotearoa New Zealand lens to the definition of food integrity climate, followed by an analysis of research findings using a food integrity lens – specifically applying that lens to drivers for food safety and burning food safety issues.

The next chapter, Chapter 7, will summarise key findings, discuss the theoretical contribution and possible limitations of this work, and make recommendations for further research.

Chapter 7 Conclusion

This final Chapter firstly provides an overview, then summarises each of the twelve key findings of this research. This section culminates in two models demonstrating the interface between Ethical Leadership and Food Safety Culture in Aotearoa New Zealand Food Businesses. The first, on the basis of this research; the second within the context of food integrity modelling. The theoretical contribution and limitations of the research are summarised following which practical implications for industry and recommendations for future research arising from this doctoral study are suggested.

7.1 Overview

Despite an extensive literature search, published research regarding food safety culture and ethical leadership in Aotearoa New Zealand food businesses was not sourced, nor was research on the nature of the relationship between food safety culture and ethical leadership generally. This is therefore the first study to attempt to understand this relationship. The purpose of this doctoral research was to investigate the nature of the relationship between food safety culture and ethical leadership. A review of extant literature about food safety culture and ethical leadership in Chapter 2 contextualised the three research questions:

1. What is the nature of the relationship between food safety culture and ethical leadership in New Zealand's largest food company? (Sections 4.2.5; 6.1)
2. What are the unique characteristics of ethical leadership in food companies in Aotearoa New Zealand? (Sections 5.2.4; 5.2.5; 6.2)
3. What is the nature of the relationship between food safety culture and ethical leadership from an international perspective? (Chapter 2)

The key findings are summarised in Section 7.1.1, the Nature of the Relationship Between Food Safety Culture and Ethical Leadership; Section 7.1.2, the Characteristics of Ethical Leadership in Aotearoa New Zealand; and Section 7.1.3, Supplementary Key Findings.

7.1.1 The Nature of the Relationship between Food Safety Culture & Ethical Leadership

The first four key findings from my research, summarised below, relate to the quantitative research strand of this doctoral study (Chapter 4). Each of these relationships is significant statistically.

Key finding # 1: There is a positive correlation between ethical leadership and food safety culture.

The quantitative strand of this research found a positive correlation between ethical leadership and food safety culture in the ingredients business of Aotearoa New Zealand's largest food company; a result that was consistent with two studies focused on the relationship between ethical leadership and workplace safety. Workplace safety in these two studies was used as a proxy for food safety given the dearth of available literature.

The positive correlation infers that ethical leadership and food safety culture either rise or fall together; changes in ethical leadership may result in changes in food safety culture, either positively or negatively. The opposite may also be inferred – changes in food safety culture may result in changes in ethical leadership either positively or negatively. Understanding that leaders who behave ethically may positively influence food safety culture provides food businesses with another tool in their toolkit. Top-of-mind for NZFSSRC industry

members is influencing and changing worker behaviour to ensure safer food for consumers. The qualitative strand of this research highlighted the importance of values and ethics of the founders, owners, and managers within Aotearoa New Zealand food businesses, including some of our largest food exporters. Evidence from this study supports the idea that improving the ethicality of leaders within Aotearoa New Zealand food businesses may be a worthwhile strategy to achieve better food safety culture and therefore, safer food.

Key finding # 2: Females appear to be more positive about ethical leadership than other genders in Aotearoa New Zealand's largest food company.

Also found was a positive relationship between Gender Female and ethical leadership. The reasons for the more positive approach to ethical leadership taken by females could be viewed through several lenses, for example the communal behaviour patterns of women; the social and emotional intelligence of women; the traditional views of gender roles, sex role expectations, or more considerate behaviour from lower-level leaders who have less formal power than their higher level leaders. A satisfactory explanation for this phenomenon, however was not found.

There does not appear to be a large body of literature relating to the perception of women toward leadership, ethical or otherwise. This study, therefore, has identified another potential gap in the literature, and this is an interesting area for further research.

Key finding # 3: Several plant sites appear to be less positive about ethical leadership and food safety in Aotearoa New Zealand's largest food company.

The negative perceptions of staff toward ethical leadership and food safety culture at a small number of geographically dispersed plants at New Zealand's largest food company found in this research could be attributable to differences in culture due to geographically dispersed plant sites, leadership styles or plant functions, or be indicative of organisational sub-cultures. Interestingly it appeared that those personnel who were very dissatisfied at these plants, when responding to the survey gave NG (Not Given) for demographic information. Despite the survey being anonymised it appeared that these staff wanted to ensure they were not identifiable. For Aotearoa New Zealand's largest food company, understanding why there is a level of dissatisfaction at specific locations would be an important issue to address. One approach could be to look at those plants where the opposite applies; plants where there is a high level of satisfaction with ethical leadership and food safety culture. What sets them apart?

Applying PCA provided important insights about potential issues at specific sites within the ingredients business at Aotearoa New Zealand's largest food company. Knowing where to target resources to support and develop leadership, and to improve food safety culture thereby leading to safer food production is critically important to food businesses in this country generally. This is another area for further investigation and research.

Key finding # 4: Supervisors appear to be more positive about ethical leadership and food safety than staff in Aotearoa New Zealand's largest food company.

This research found a positive relationship between the roles of supervisor and staff and both ethical leadership and food safety. Consistent with extant literature, perceptions of supervisors and staff toward both ethical leadership and food safety culture differed, with supervisors more positive than staff on twenty-one of the twenty-two survey questions in the quantitative research strand. There are several possible reasons for this; for example, differences in the demographic characteristics of supervisors and staff, differing environments for different levels of staff, where an employee sits in the organisational hierarchy, or the existence of organisational sub-cultures. This is an important area for further study in order to fully understand the reasons behind these differing perceptions in the largest food business in Aotearoa New Zealand.

It could be argued that the survey upon which the quantitative data analysis is based, constitutes a measure of the safety climate within Aotearoa New Zealand's largest food company; climate being a snapshot of culture from employees at a given point in time. As discussed in Chapter 2, section 2.1.6, Sharman et al. (2020) delineated between food safety culture and food safety climate based on time, sociology and psychology, arguing that food safety climate is temporary and related to individual attitudes and perceptions. Conversely, food safety culture is organisation-based deep-rooted beliefs, assumptions and behaviours.

Key finding # 2, the more positive view of Gender Female toward ethical leadership, key finding # 3, the dissatisfaction toward ethical leadership and food safety culture of personnel at some plant sites, and key finding # 4, regarding the more positive views of supervisors to ethical leadership and food safety culture, may be more reflective of climate perceptions rather than indicative of culture, however as suggested earlier, further research would be required to more fully understand these phenomenon.

7.1.2 Characteristics of Ethical Leadership in Aotearoa New Zealand

Key finding # 5: Ethical leaders in Aotearoa New Zealand are humble, honest, respect indigenous Māori values, and are not corrupt. They have a degree of relatedness, care about our natural environment, have a strong sense of identity or place, are collaborative, are fair, and are accountable.

Consistent with the general Kiwi characteristics identified by Kennedy (2000) which contributed to the GLOBE programme, the qualitative strand of this research found that humility, honesty, indigenous Māori values, not corrupt, two degrees of separation, can-do attitude, passion for the environment, a strong sense of identity, collaborative, acting with fairness and taking responsibility were the key characteristics of ethical leaders in Aotearoa New Zealand.

While research into ethical leadership draws primarily from a western perspective, in the Aotearoa New Zealand context, the work of Haar et al. (2018) identifies and articulates the touchpoints between western approaches and Indigenous Māori approaches: whakaiti (humility, humbleness, self-discipline, consideration of influence on others); ko tau rourou and manaakitanga (altruism, care for others, doing the right thing by others, generosity of spirit); tāri ate wā and kaitiakitanga (long-term guardianship and protection,

sustainable); whanaungatanga (collectivism, relationships with current, past and future generations); and tikanga Māori (cultural authenticity, the Māori way of doing things).

Recognition of the value of the Indigenous Māori worldview; increasing ecosystem pressures on Aotearoa New Zealand food businesses including social licence to operate from consumers and supply chains that are demanding visibility, traceability and provenance; responsible stewardship of natural resources; the need for ethical individual, business and supply chain leadership; and the ethics of workers, managers, leaders and companies are all themes that emerged during this research.

The majority of research participants believe that ethical leadership in Aotearoa New Zealand is unique, influenced in part by our size, our Indigenous Māori worldview, and our geographical isolation. Therefore, while the leadership characteristics identified by research participants are not in themselves unique when compared to the literature, the way they are interpreted and applied in the Aotearoa New Zealand context is. This research finding provides up-to-date information about perceptions of ethical leadership characteristics in Aotearoa New Zealand and is yet another interesting area for future study, incorporating perspectives from research participants in other sectors and cultures nationally.

7.1.3 Supplementary Key Findings

In addition to supporting findings from the quantitative research strand, the qualitative interviews with founders, owners, and senior food safety and quality personnel from Aotearoa New Zealand food companies, including some of Aotearoa New Zealand's largest food exporters provided evidence leading to the following key findings.

Key finding # 6: This research provided evidence in support of the importance of leadership and management commitment in influencing organisational, food safety and ethical climate and culture. Role modelling by and communication from managers and supervisors was fundamental according to the findings of this research. There was support for the notion of the trickle down and horizontal effects of ethical and cultural influence (Eisenbeib & Giessner, 2012; Fatimah et al., 2014; Griffith et al., 2010b; Griffith, 2013; Kane & Taylor, 2018; Ko et al., 2017; Manning, 2017; Mayer et al., 2008; Mihelič et al., 2010; Powell et al., 2011; Yiannas, 2009). This ethos extended into company ecosystems and included a sense of responsibility to provide supply chain leadership in best practice, food safety, and topical issues such as modern slavery; and developing and maintaining a social licence to operate by earning and building consumer and stakeholder trust through consistent ethical behaviour.

Key finding # 7: This research found that at individual, managerial and organisation levels, ethical values, integrity and leadership mattered as did alignment between organisational and individual values. Company values were the key driver for ethical positioning for the food businesses represented in this research. Consistent with the literature, participant feedback suggested that values were communicated from the top of the organisation (Treviño et al., 2000).

Key finding # 8: There was support in this research for an association between ethicality and sustainability. Taking a leadership position in responding to manmade crises such as climate change and negative

environmental impacts mattered to participants in this research, consistent with the work of Eisenbeib & Giessner (2012). These responses included finding solutions for packaging, waste minimisation, and improving energy and resource efficiency in order to better care for the planet and for ecosystem actors – the people. Importantly indigenous Māori values underpinned discussions about sustainability in its holistic sense; inter-generational value creation which would only be achieved through kaitiakitanga or guardianship. Having a five hundred year vision which the businesses represented by one participant had brings a perspective and a responsibility that western organisations would struggle to comprehend. This leads into Key Finding # 9.

Key finding # 9: Building on the commentary within Key Finding # 8, fundamental to Māori food businesses were inter-generational value-creation, undertaking business with a purpose, building value for whanau and acting as kaitiakitanga.

Key finding # 10: The primary driver for food safety was protecting customers and consumers (not wanting to cause adverse health impacts or death) including the world's most vulnerable consumers, babies, for whom infant formula may be their sole source of nutrition. The second most important driver was owner/company values and ethics which help to shape organisational culture and identity (Manz et al., 2010). Emphasis on values and ethics as a driver for food safety was evidence for qualitative support for the positive relationship between food safety culture and ethical leadership found in the quantitative strand of this research.

Key finding # 11: The burning food safety issues for Aotearoa New Zealand food businesses were identified as firstly, culture – organisational and food safety culture, and secondly, the regulatory environment. As discussed in Section 1.4, food safety culture has been referred to as the zeitgeist or current issue in food businesses internationally, with the greatest challenge for food businesses being the introduction of a positive food safety culture (IFST, 2019). Likewise, finding the best way to improve company culture is a challenge for businesses in general (Jespersen et al., 2018). Findings from this research are consistent with this literature. The positive relationship between ethical leadership and food safety culture may provide another route for businesses to consider in addressing these challenges. In terms of the regulatory environment, food businesses' attitudes were best summed up by one participant (#15) "*No food safety, no business. It's a way of operating rather than a nice to have*".

Key finding # 12: In reviewing the emerging body of literature about food integrity to extend this doctoral research, consultation with a group of Industry members of the NZFSSRC suggested augmentation of the Food Integrity Climate Conceptual Model of Alrobaish et al. (2021) to incorporate supplier integrity and social integrity. These two components were considered to be of fundamental importance to Aotearoa New Zealand food businesses. Food integrity was not an issue raised by the food businesses represented in this research, however the body of literature which has emerged strongly during the time this doctoral research has been underway, provides a further link between ethics and food safety. Aotearoa New Zealand food businesses are grappling with the impact of, the evaluation of, and improvement to food safety culture to ensure safer food production. In addition to opportunities for research focused on food safety culture across other food sectors in this country, research into food integrity in Aotearoa New Zealand food businesses arising from the

work of Alrobaish et al., (2021) and Alrobaish et al., (2022) and the work of Manning (2017) would be of interest given this country's reliance on food exports as a source of revenue (Section 1.3).

7.1.4 The Interface Between Ethical Leadership and Food Safety Culture in Aotearoa New Zealand Food Businesses

The food businesses represented in this research positioned themselves as ethical, with organisational values being the key driver for this positioning. Doing the right thing by people; (employees, customers, stakeholders and the world's most vulnerable consumers); by the planet (Aotearoa New Zealand's and indeed the global environment); doing business sustainably (inter-generational value creation); leading with integrity, earning and building trust across the supply chain; and ensuring alignment of values were important at both an organisational and an individual level. While these findings are interesting in and of themselves, careful consideration suggested that an integrated model couldn't be formed and presented which now incorporates concepts from the literature with learning from this study.

Figure 19 presents a conceptual model of the interface between ethical leadership and food safety culture in Aotearoa New Zealand based on the findings of this research. The definitions of character and values in this conceptual model are according to section 2.2.2; character being moral qualities and ethical standards and principles (Wright & Goodstein (2007)); and values being situationally-based principles or standards of behaviour (Manz et al., 2010).

Owners, founders and food safety and quality managers represented in this research are driven to produce safe food to ensure the safety of consumers; through improved organisational and food safety culture; which is influenced by the role modelling of committed leaders and managers; whose behaviour is underpinned by aligned individual and company values. The points of connection in the values of Indigenous Māori & Western food business points in bi-cultural Aotearoa New Zealand, according to this research are: sustainability/intergenerational value creation; kaitiakitanga/custodianship; relationships: the interconnectedness of and between people & environment; and doing the right thing.

The positive correlation between ethical leadership and food safety culture found in this research is the moderating factor between leadership and management commitment and food safety behaviour. At an operational management level, the behaviour-based food safety management system of Yiannas (2009) provides a practical framework for food safety and quality management and is included in this model given its influence on the food safety and quality framework of Aotearoa New Zealand's largest food company upon which the quantitative strand of this research is based, and as the basis for the food safety culture questions used in the qualitative strand of this research.

Figure 19: Conceptual Model of the Interface Between Ethical Leadership and Food Safety Culture in Aotearoa New Zealand Food Businesses

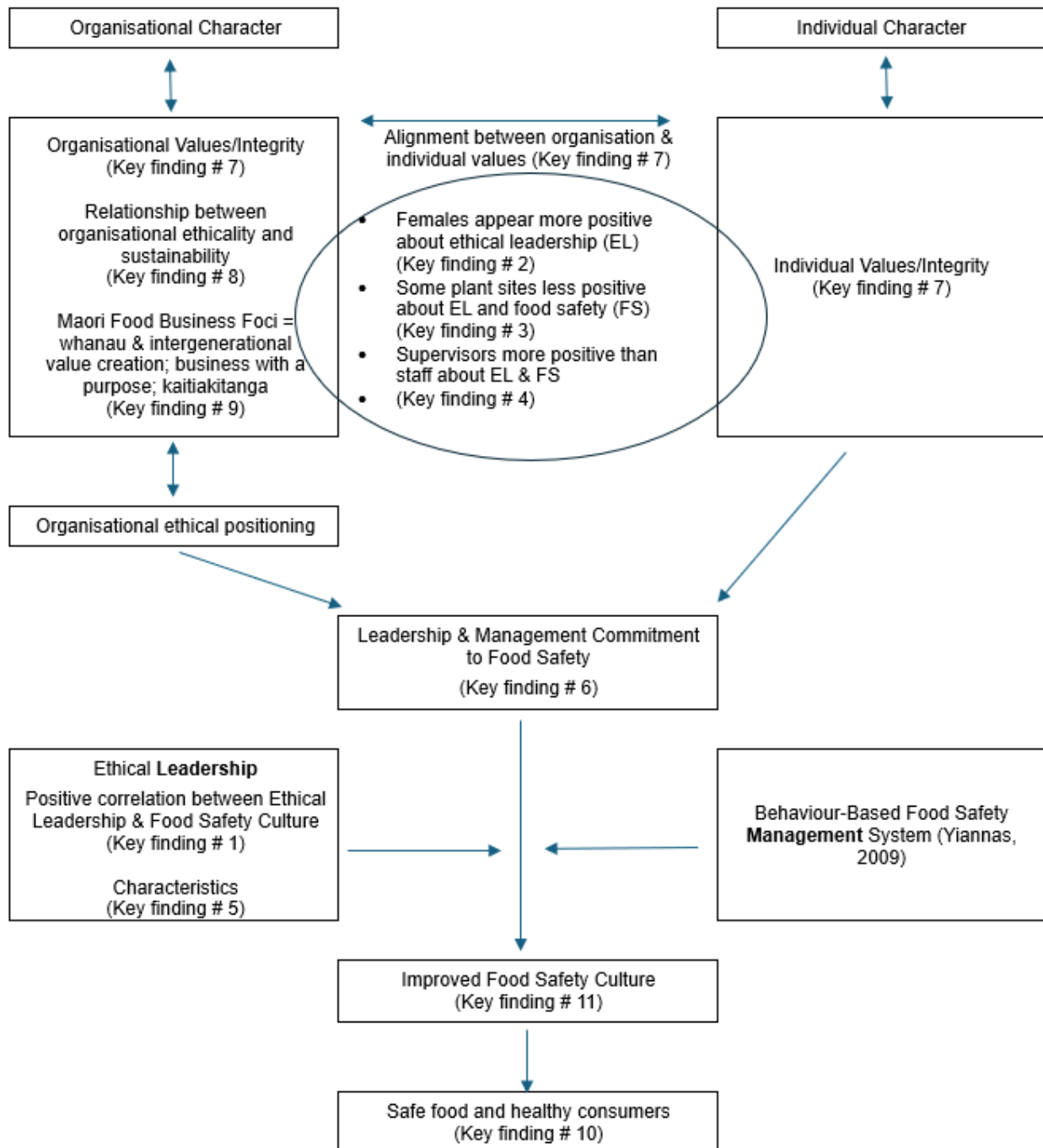
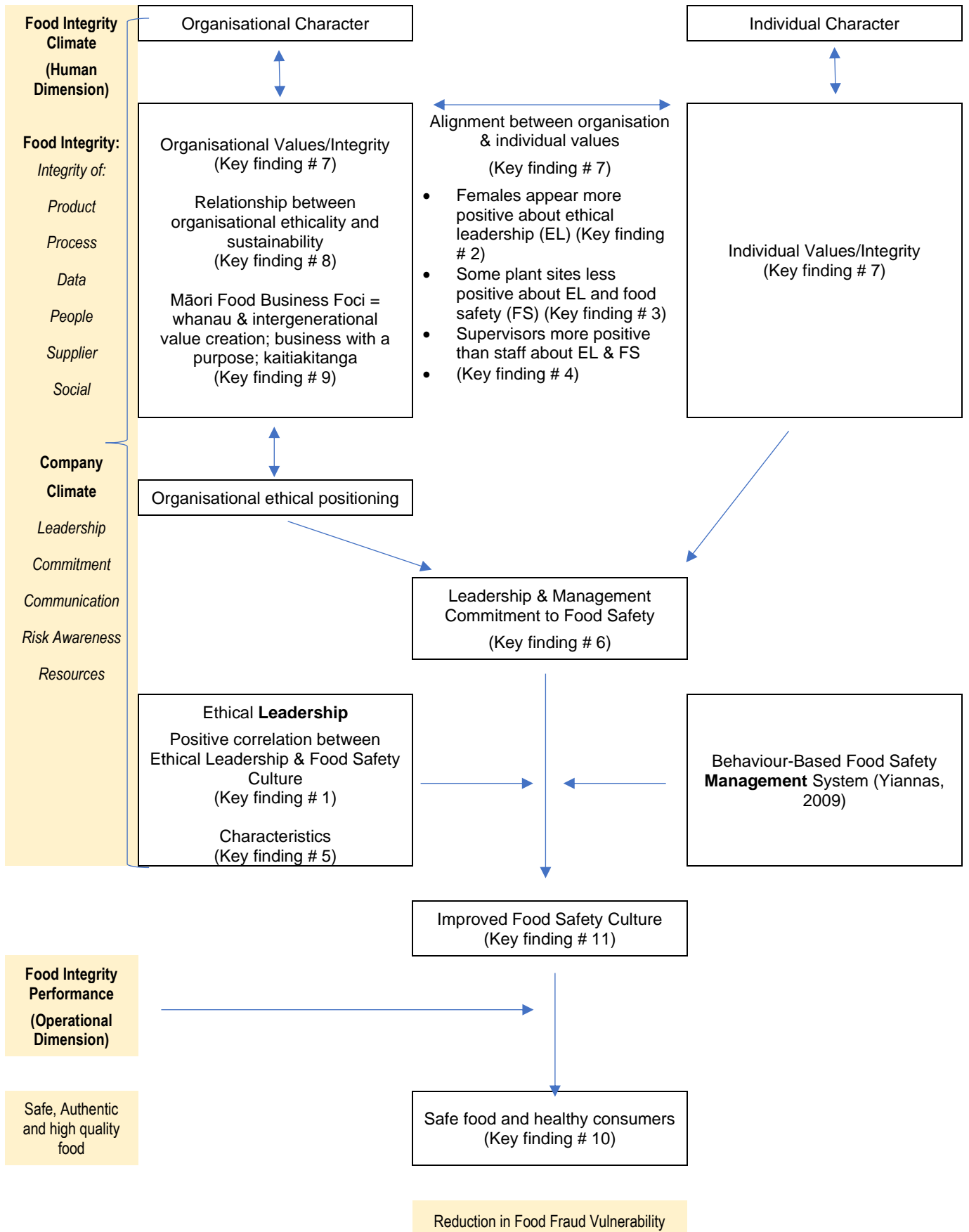


Figure 20 extends this conceptual model further, integrating the Model of the Interface Between Ethical Leadership and Food Safety Culture in Aotearoa New Zealand Food Businesses (Figure 19) with the Food Integrity Culture Model of Alrobaish et al. (2022), the three components of which are food integrity climate (food integrity and company climate); food integrity performance; and food fraud vulnerability (see Section 2.2.8.4). Framing research outcomes from this doctoral research within a Food Integrity Culture Model (Alrobaish et al., 2022) further strengthens the interface between food safety culture and ethical leadership and better reflects the values-driven approach and direction of travel from compliance to integrity taken by food safety and quality actors in the food businesses represented in this research.

Figure 20: Conceptual Model of the Interface Between Ethical Leadership and Food Safety Culture in Aotearoa New Zealand Food Businesses within a Food Integrity Culture Framework (Acknowledgement: Alrobaish et al., 2022)



7.2 Theoretical Contribution of the Thesis

This thesis makes a novel contribution to the body of knowledge in five key ways, each of which is described below.

This is the first research focused on the nature of the relationship between ethical leadership and food safety culture nationally or internationally, finding a positive correlation between the two, using principle component analysis. Using a mixed methods approach, this result was augmented by the qualitative research strand that provided support for the positive relationship. There is a paucity of literature related to the relationship between food safety culture and ethical leadership. Two studies previously found a positive relationship between workplace safety and ethical leadership (Freiwald, 2013; Khan et al., 2018). Consistent with these authors, these doctoral research findings suggest that a close relationship exists between ethical leadership and food safety culture. It seems likely that ethical leadership drives food safety culture and this is an area for further investigation.

Consistent with the extant literature, in this doctoral research there was evidence of more positive attitudes toward ethical leadership and food safety culture from supervisors than staff. In addition, females appeared more positive toward ethical leaders than did males. Prior research into these two phenomena in Aotearoa New Zealand food businesses was not found. This is therefore another novel contribution to the body of knowledge.

This is the first in-depth qualitative investigation into food safety culture and ethical leadership in Aotearoa New Zealand food businesses, including some of this country's largest food exporters. Extant literature about food safety culture is focused on Europe and North America food businesses therefore this study will contribute to an Aotearoa New Zealand-specific understanding of and insight into the views of founders, owners and food safety and quality managers across a broad range of food businesses and sectors toward food safety culture and ethical leadership. The key findings in Section 7.3 above summarise the issues identified as of importance to Aotearoa New Zealand food businesses: individual, managerial and organisational values; leadership and management commitment in influencing organisational, food safety and ethical climate and culture; inter-generational value-creation, sustainable practice and acting as *kaitiakitanga*. This research has also provided insight into understanding the drivers for and primary challenges related to food safety for Aotearoa New Zealand food businesses.

This research has contributed to our understanding of the characteristics of ethical leaders in Aotearoa New Zealand, who, according to this study, are considered humble, honest, respect indigenous Māori values, and are not corrupt. They have a degree of relatedness, care about our natural environment, have a strong sense of identity or place, are collaborative, are fair, and are accountable. Our size, Indigenous Māori worldview, and our geographical isolation contribute to the unique interpretation and application of these leadership characteristics in Aotearoa New Zealand.

Finally, this research has proposed firstly, a model of the interface between ethical leadership and food safety culture in Aotearoa New Zealand Food Businesses based on the findings of this research, and secondly, an expanded model that embeds that model within a Food Integrity Culture Framework.

7.3 Implications for the Aotearoa New Zealand Food Industry

Finding a positive correlation between food safety culture and ethical leadership has important implications for Aoteroa New Zealand food businesses. If safety participation, performance and compliance, organisational & senior management effectiveness; financial performance; worker motivation and performance; and job satisfaction & organisational citizenship behaviour improve through ethical leadership according to workplace safety literature, then it is reasonable to expect that same would apply to food safety.

From an organisational perspective, consultatively developing organisational values which are well communicated and lived is one strategy to grow ethical leadership in Aotearoa New Zealand food businesses. Looking at the People & Culture organisational function, ensuring ethical considerations when hiring staff is another. For managers and supervisors, ethical considerations when setting expectations, and in training and mentoring staff and managing performance processes including the use of consequences are an important strategy. Across the business, modelling good behaviour, making fair decisions, ensuring open, clear communication and giving employees a voice is another way to grow ethical leadership.

7.4 Limitations of the Research

This doctoral research project began in January 2020. Two months later, as a consequence of the emergence of COVID-19 (COronoAVirus Disease-2019), the Aotearoa New Zealand borders were closed and the country placed in lockdown. Data gathering for both the quantitative and qualitative strands of this research was therefore subject to delays and deferrals. All qualitative interviews were undertaken by Zoom rather than face-to-face. Access to personnel to plan and execute the quantitative research strand was limited due to tight security constraints and rolling lockdowns. Physical access to plants and individuals was not possible. The national and organisation lockdowns while disruptive provided opportunities too.

Experience with work patterns that are now commonplace in the post-COVID world, for example video-conferencing as an alternative to face-to-face engagement, bringing the ability to record and transcribe meetings and interviews using Zoom or Teams technology proved advantageous, as did the opportunity to use delays productively to thoroughly test ideas and revise approaches.

The quantitative strand of this research was based on a survey disseminated across the Ingredients business of Aotearoa New Zealand's largest food company. As such, it represents the views of supervisors and staff in one food business only. It would be beneficial to extend the survey to incorporate other business units, governance, management and administrative personnel within that food company.

In light of food safety culture literature, particularly in relation to evaluative mechanisms, there was consideration of strengthening Fonterra's 12 food safety culture questions by augmenting those with several recommendations from the researcher. However, Fonterra's survey had already been subject to international peer review by an expert in the field therefore these augmentations were not implemented.

It would be beneficial to broaden the scope of the survey to other food businesses and sectors in order to gain a breadth of understanding of ethical leadership and food safety culture from an Aotearoa New Zealand perspective.

To answer the qualitative interview questions regarding ethical leadership and food safety and quality within New Zealand food businesses, it was necessary to speak to personnel in senior food safety and quality management roles. This brings a particular lens to this research whereby these roles, accountable and responsible for food safety in their respective organisations, are critically aware of the importance of food safety and quality, and food safety culture. Interviewing a range of other roles in each of the representative food businesses, for example workers and supervisors at the coal-face, Board members, and administrative staff, would provide a 360 degree view of food safety culture and ethical leadership across these food businesses. Extending the scope of the qualitative interviews to those sectors of the food industry not represented in this research would further increase the understanding of food safety culture and ethical leadership within Aotearoa New Zealand. An aligned limitation may be the culture within which these personnel received their leadership training and experience. This would bring a particular lens to their lived experience and therefore their contributions to this research.

7.5 Recommendations for Future Research

Given the novelty of the findings of this doctoral research, there are several opportunities for future study. These opportunities might respond to each of the key findings of this research as summarised in Sections 7.1.1, 7.1.2 and 7.1.3, and to the limitations of the research alluded to in Section 7.3, as follows:

1. What is the nature of the relationship between food safety culture and ethical leadership in other business units, governance, management and administration, and overall within Aotearoa New Zealand's largest food company?
2. What is the nature of the relationship between food safety culture and ethical leadership in other Aotearoa New Zealand food businesses; severally and collectively?
3. Why are perceptions of females toward ethical leadership more positive than those of other genders in Aotearoa New Zealand's largest food business? Does that perception apply to other business units within the business? Does that perception apply to other food businesses in Aotearoa New Zealand? Why?
4. What are the reasons for staff at some plants at Aotearoa New Zealand's largest food company being less positive about food safety culture and ethical leadership in those plants? Would this phenomenon occur in other business units within the same company? An associated question, is why are staff in some plants more positive about food safety culture and ethical leadership? What sets these plants apart? Does this phenomenon occur in other food businesses in Aotearoa New Zealand?
5. Do the perceptions of supervisors and staff toward food safety culture and ethical leadership differ in other business units within Aotearoa New Zealand's largest food company? Do these perceptions differ in other food businesses in this country?
6. What are the ethical characteristics of ethical leadership according to other business sectors in this country?
7. What is the perception of other business sectors in this country toward the role of leadership and management in influencing organisational and ethical climate and culture?
8. What is the importance of individual, managerial and organisational level values in the business sector in Aotearoa New Zealand? Does alignment between individual and organisational values matter?

9. What is the relationship between ethicality and sustainability according to businesses in Aotearoa New Zealand?
10. How aware are Aotearoa New Zealand food businesses of food integrity climate and food integrity culture research, benefits and challenges? Should the conversation about food safety culture and ethical leadership be moving toward one of food integrity and the avoidance of food adulteration, food fraud, food crime, and the integrity of people, product, systems, processes, suppliers and social integrity?

Given the dearth of literature relating to the Aotearoa New Zealand specific context, particularly in relation to the food sector, the research opportunities identified here are but a few that may increase our understanding, and support food businesses in this country to continue to produce safe food of the highest quality to meet the needs of domestic and international consumers alike.

7.6 Final Thoughts

This research has resulted in an up-to-date understanding of and insight into the views of founders, owners and food safety and quality managers across a broad range of food businesses and sectors in Aotearoa New Zealand toward food safety culture and ethical leadership. Ethical leadership has been shown to improve effectiveness, performance and safety at an organisational and individual level. In finding a positive relationship between ethical leadership and food safety culture, the evidence suggests that maintaining and improving the ethicality of leaders within Aotearoa New Zealand food businesses is a worthwhile strategy to positively influence food safety culture and therefore, the production of safer food.

It is the values-driven relationships with and among people and with the environment that have emerged as key themes through this research; manaakitanga (relationships with people), whanaungatanga (relationships among people), and kaitiakitanga (relationship with the natural environment).

Research participants demonstrated that food companies in Aotearoa New Zealand, while ensuring compliance with necessary food regulations, underpin their practice with integrity. Their desire to ensure the production of safe, high quality, authentic food products was a key driver at an individual and organisational level. From an Aotearoa New Zealand Inc. perspective, ensuring a secure supply of safe, healthy, ethically and sustainably produced and packaged food to meet increasing consumer demand, or in other words, of ensuring the integrity of food produced in Aotearoa New Zealand is of the utmost importance to key actors in our food system.

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Appendices

Appendix 1: Food Safety Culture Assessment Tools

	Ball, Wilcock & Colwell	Griffith, Livesey & Clayton	Lee et al
Title	Tool for measuring food safety climate	The assessment of food safety culture	Does transformational leadership style influence employees attitudes toward food safety practices
Published	2010	2010	2012
Methodology	Quantitative	Literature Review	Quantitative
Administration	Self administered	N/A	
Location	Ontario, Canada	N/A	Midwest USA (1 state)
# Companies	Meat Plants plus 5 further processing establishments	N/A	67
# Participants	* All personnel at small plants * All salaried personnel and hourly quality assurance & food safety personnel at medium/large plants 124 usable surveys	N/A	686 paper survey questionnaires distributed to frontline employees of Midwestern restaurants; postage paid envelopes to return surveys; 299 responses (43.6%)
Indicators Constructs Dimensions	6 constructs from 65 scale items	6 possible groupings of culture factors	4 constructs
Ranking	7 point Likert Scale	N/A	7 point Likert Scale
Purpose of the paper	<i>To validate a tool to ID key factors that influence meat plant workers to follow food safety behaviours</i>	<i>To examine a possible framework for assessing a business food safety culture</i>	<i>To examine whether transformational leadership style and organisational climate impact employee food safety behaviours</i>
Initial Opinion	<ul style="list-style-type: none"> * Factors that influence workers * Measuring climate (worker perception) vs culture * Don't know what the breakdown of management vs governance vs worker responses is * Survey questions seem reasonable * Ease of administering * Self administered is sensible, but subjective 	<ul style="list-style-type: none"> * Assessing FS culture * Important paper in FS culture 	<ul style="list-style-type: none"> * Impact of leadership style on workers * Different focus ie specific leadership style impact on worker vs FS culture * Organisational Climate is one of the four constructs * Literature suggests leadership is a major if not the major factor in FS culture * Paper may have useful context but does not fit in the suite of models to be evaluated to assess FS culture * Definitions of FS culture vs FS climate important * Self assessment - attitudes vs behaviour
	Dimension	6 possible Indicators	Constructs
	Management commitment; Behaviour	Leadership	Transformational Leadership
		Commitment	
	Work unit commitment	Management systems, styles & processes	Intention to perform food safety practices
	Food safety training		
		Communication	
	Infrastructure	Environment	
			Organisational climate
	Personal understanding	Risk awareness, perception & risk taking behaviour	Attitude to food safety practices

Fatimah et al, 2014	Campden BRI Food Safety Culture Excellence Model (Taylor et al.)	De Boeck, Jaxsens, Bollaerts & Vlerick
An empirical investigation of food safety culture in onsite foodservice operations	Several papers looking at Food safety culture excellence survey review and information	Food safety climate in food processing organisation; development and validation of a self-assessment tool
2014	2015	2015
Quantitative	N/A	Develop & validate a tool; tested in a pilot study
Self administered, paper survey questionnaire	Online survey	Self administered
3 Midwest states; Iowa, Minnesota, Kansas	Global (80 countries reported in 2015)	Belgium
37 healthcare, 24 school foodservices	2500 reported in 2015	8 affiliates of a large scale meat distribution company (butcher shops)
2030 questionnaires (1010 healthcare/1020 schools); 33.6% response rate (675); Hourly foodservice employees in healthcare and	N/A	>250 including management and senior management (unable to find reference to %age completion)

school food services; 18 years or older in nonsupervisory job positions				
8 dimensions		4 dimensions with 20 categories		5 components with 28 indicators
7 point Likert Scale		N/A		5 point Likert Scale
<i>To investigate the extent to which employee perception of food safety culture differs based on demographic variables and operation characteristics</i>		<i>Several papers looking at Food safety culture excellence survey review and information</i>		<i>To set a definition for food safety climate and culture and to develop and validate a tool to assess the food safety climate in food companies</i>
<p>* Demographic and organisational impacts on workers</p> <p>* A large response rate compared to other studies</p> <p>* Measuring the influence of demographic variables on employee perceptions of FS culture eg age, length of service, part-time vs full-time</p> <p>* This approach found that sub-groups do exist within an organisation</p> <p>* Also looked at impact on FS culture perceptions of management system and operation size</p> <p>* Demographic variables useful in organisations with range of ages perhaps</p> <p>* Useful to understand an organisation's sub-cultures</p>		<p>* 15 year R & D journey to develop an online assessment tool</p> <p>* Links back to Griffith & Fatimah and forward to de Boeck, Jespersen</p> <p>* Web-based platform; visual reports; uptake spreading; quick to implement and cost-effective; IDs cultural strengths & weaknesses; informs training</p> <p>* Development predicated on qualitative research methods - the cultural model was built from the ground up</p> <p>* Developmental process articulated</p> <p>* Suggest its effectiveness needs to be validated by research outside of UK & UAE</p> <p>* Suggest triangulation important to get a reliable and valid picture</p> <p>* Dimensions and categories available, but need to be a member of Campden BRI to see how it actually works</p>		<p>* Tool to assess climate</p> <p>* Reflects work of Fatimah in the dimensions</p> <p>* Need to understand FS climate vs FS culture; dimensions marry with other cultural assessments; perhaps terminology issue</p> <p>* Simple questions, easily administered</p> <p>* Self assessment = attitudes vs behaviour</p>
Dimension underpinned with 47 Indicators	Dimension	Categories	Dimension	Indicators x 28 (examples only)
				In my organisation
Leadership	People	Empowerment	Leadership	the leaders set clear objectives concerning hygiene and food safety
Self Commitment		Reinforcement		the leaders are clear about the expectations concerning hygiene and food safety towards employees
Teamwork		Teamwork	Commitment	the leaders consider hygiene and food safety to be of great importance
		Training		My colleagues are convinced of the importance of hygiene and food safety for the organisation
Communication		Communication	Communication	the leaders communicate regularly with the operators about hygiene and food safety
Work pressure	Process	Control		I can discuss problems concerning hygiene and food safety with colleagues in my organisation
		Co-ordination		
		Consistency		
Environment support		Infrastructure	Resources	employees get sufficient time to work in an hygienic and food safe way
		Systems		sufficient staff is available to follow up hygiene and food safety
	Purpose	Vision		
		Values		
		Strategy		
		Objectives		
		Metrics		
Risk perception	Proactivity	Awareness	Risk Awareness	the risks related to hygiene and food safety are known
Accountability		Foresight		My colleagues are alert and attentive to potential problems and risks related to hygiene and food safety
		Change		
		Investment		
		Learning		

Jespersen et al Maturity Profiling		De Boeck, Mortier, Jacxsens, Dequidt & Vlerick		De Boeck, Jacxsens, Mortier & Vlerick	
Measurement of food safety culture using survey and maturity profiling tools		Towards and extended food safety culture model: studying the moderating role of burnout and job stress, the mediating role of food safety climate and food safety behaviour		Quantitative study of food safety climate in Belgian food processing companies in view of their organisational characteristics	
2016		2017		2017	
Novel model framework; tested on one Canadian food manufacturer		2015 assessment tool extended through literature review		Quantitative	
Test = self administered online survey		Anonymous self administered paper based survey		Online survey	
Canadian food manufacturing company (2014); 19000 employees across 47 plants		Belgium		Belgium	
47		2 x Belgian vegetable processing companies		Belgian food processing companies	
21.3% response rate (219 employees). Included leadership and supervisory roles		85 responses		136 valid responses	
5 capability areas; 5 maturity stages Maturity model based on literature review and industry expert council		Original 5 components with 28 Indicators (2015) used; added 5 additional categories related to stress and behaviour		Based on 2015 5 component, 28 indicator survey	
5 point Likert Scale		Varying Likert Scales to respond to questions		5 point Likert Scale	
Presentation of a food safety culture maturity model		To examine the relationship between food safety climate and food safety behaviour		A study of food safety climate in the Belgian food processing industry	
<p>* Tool to assess food safety culture maturity</p> <p>* Is self assessment sufficient to establish organisational maturity? Would baseline data include independent audit and observation given the idea is to base training on the outcomes of the survey to improve an organisation's maturity. What about areas of risk and communication that are quite common across assessment models?</p> <p>* Could maturity be assessed given year on year comparisons with simpler models?</p> <p>* Are the capability areas right/sufficient? Scheins 5 dimensions of organisational culture were used as opposed to food safety culture-specific dimensions</p> <p>*Developed with industry experts</p>		<p>* New elements built into 2015 model; burnout, job stress, food safety behaviour, food safety knowledge and food safety motivation</p> <p>*Again, the terminology - FS culture vs FS climate</p> <p>* "individual huma route" introduced based on occupational health literature - safety compliance and safety participation; Is there a positive relationship between FS climate and FS behaviour of the individual?</p> <p>* Does this then measure culture or climate? Climate is one element of culture...</p>		<p>* Based on Dimensions in 2015 paper.</p> <p>* Food safety climate defined as employee perceptions</p> <p>* Is this then sufficiently broad?</p> <p>* Small number of responses to draw conclusions about food processing companies</p> <p>* Results based on perceptions rather than behaviours</p> <p>* 4 underlying factors in assessment of companies FS climate; leadership; resources; risk awareness; communication</p>	
Capability Area	Maturity Stage	Dimension	Indicators	Dimension	Indicators
	Plus Inventory of Pinpointed Behaviours				
People System	Stage 1 Doubt	Leadership	Indicators of 2015 paper	Leadership	Indicators of 2015 paper
	Stage 2 React to	Food Safety Behaviour	8 items; 4 about compliance and 4 about participation		
	Stage 3 Know of	Commitment	Indicators of 2015 paper	Commitment	Indicators of 2015 paper
Perceived Value	Stage 4 Predict	Burnout	15 items of Utrechtse Burnout Schaal		
	Stage 5 Internalise	Communication	Indicators of 2015 paper	Communication	Indicators of 2015 paper
Process Thinking		Job Stress	1 question; how often do you feel stressed because of your job?		
Tools & Infrastructure		Resources	Indicators of 2015 paper	Resources	Indicators of 2015 paper
Technology Enabled					
		Risk Awareness	Indicators of 2015 paper	Risk Awareness	Indicators of 2015 paper
		Food Safety Knowledge	4 items of Safety Knowledge Sale of Neal & Griffin (2006)		
		Food safety Motivation	Safety Motivation Scale of Neale (2000)		
				General Organisation Characteristics	Part of national coy; multiple sites; FTEs; Sector
				Quality Organisational Characteristics	Quality Dept present; size of quality team; FTE days pw on quality control; Certifications; Annual budget for FSMS Mtce; FS training frequency

Nyarugwe et al	Jespersen et al	Global Food Safety Initiative
Food safety culture assessment using a comprehensive mixed-methods approach: a comparative study in dairy processing organisations in an emerging economy	Comparative analysis of existing food safety culture evaluation systems	GFSI Summary Paper
2017	2017	2018
Comparative study; mixed methods approach x 6	Evaluation of 8 culture evaluation systems	GFSI Positioning Paper
Mixed	N/A	N/A
Zimbabwe	N/A	N/A
3 Zimbabwean dairy companies	N/A	N/A
820 employees	N/A	N/A
4 key elements with 25 indicators	5 dimensions	5 dimensions with guiding questions
		N/A
Evaluation of food safety culture in 3 Zimbabwean dairy companies	To analyse existing culture evaluation systems and suggest a simple structure of food safety cultural dimensions	Positioning paper
<ul style="list-style-type: none"> * 6 methods used; microbial analysis; observations; card-aided interviews; questionnaires; story-telling; document analysis to collect information on the 4 elements * Comprehensive * 3 Dairy companies only therefore results cannot be inferred more broadly * Microbiological outcomes stated as consistent with actual worker behaviour * 3 levels - reactive, active and proactive distinguish prevailing FS culture and allow development of a roadmap for improvement; ? builds on Jespersen's maturity profiling but simpler 	<ul style="list-style-type: none"> * Evaluates Ball (2009), de Boeck et al (2015), Denison (1989), Jespersen (2010), TSI Model (2015), Wright (FSA UK) (2013), CEB Model (2016), NSF Model (2016) * Concluded that all were represented to some degree in 5 elements: * People systems; consistency; adaptability; risk awareness; values and mission * The lack of a food safety culture is an emerging risk 	<ul style="list-style-type: none"> * Draws directly on Jespersen et al and includes "Hazards" with risk awareness * "A mature food safety culture is one in which the company vision and mission have been broken down into the finer details of expectations for every department and person throughout the organisation" - is this a correct statement??
Elements	Dimensions	Dimension underpinned with 18 guiding questions
	People Systems	People
Actual behaviour		
Employee characteristics		
	Consistency	Consistency
Technological and organisational enabling conditions		
	Values & Mission	Vision & Mission
Microbiological safety performance	Risk awareness	Hazards & Risk Awareness
	Adaptability	Adaptability

Ko & Kang	FSANZ
Effect of leadership style and organisational climate on employees' food safety and hygiene behaviours in the institutional food service of schools	Measuring food safety culture in a business
2019	2019
Quantitative	Resource
Voluntary, self administered survey	For food businesses to administer
Northern Taiwan	Australia/NZ
Schools in Taoyuan City and New Taipei City	N/A
400 questionnaires distributed; 324 valid questionnaires (81%)	N/A
5 constructs	9 general criteria (capability areas) across 5 categories or stages of food safety culture maturity
5 point Likert Scale	N/A
To explore the relationship between leadership style and organisation climate on food safety in schools	Resource for food businesses
<ul style="list-style-type: none"> * Inverse study - to look at impacts of leadership style and organisational climate on food safety and hygiene behaviours * Leadership and climate are two aspects of culture * As such this study should not be included in an assessment of food safety culture measurement models, rather can inform such a study 	<ul style="list-style-type: none"> * Australasian perspective * Developed in 2019 * Resource to assess, evaluate and benchmark FS * Includes questionnaire, assessment instructions and checklist for change * Cannot see references in the document * Includes dimensions articulated in previous studies
Constructs	Dimension underpinned with 23 questions
Transactional Leadership;	Management behaviour
Transformational Leadership	
Food safety behaviour	
	Staff behaviour
	Communication

	Engagement with regulators
	Day to day operations
	Use of technology & Tools
Organisational climate	Workplace culture
Food hygiene and safety behaviour	Knowledge of food safety
	Approach to problem solving
Basic information	

Appendix 2: Doctoral Research Proposal: Management of Food Safety Risk in New Zealand; Quantitative Research Strand

Research Abstract

Food safety culture, as a contributing factor to the production of safe food and as a distinct field of research, has been studied internationally for the past fifteen years. The influential role of leadership in food safety culture, organisational character, virtue, and workplace safety is generally accepted. Research into the flow-on effects from leadership, and in particular ethical leadership, has suggested a positive impact on worker attitudes and behaviour, and organisational reputation and performance. Little is known, however, about food safety culture and ethical leadership in the New Zealand context.

Using a mixed methods approach, this doctoral research project will investigate the question “What is the nature of the relationship between ethical leadership and food safety culture”

There are three questions that flow on from this question:

1. What is the nature of the relationship between food safety culture and ethical leadership in New Zealand’s largest food company?
2. What is the nature of the relationship between food safety culture and ethical leadership from an international perspective?
3. What are the unique characteristics of ethical leadership in food companies in Aotearoa New Zealand in 2021?

These three questions will be investigated using a mixed method approach that includes surveys with staff of a major food manufacturer in New Zealand, interviews with global experts, and interviews with key staff in NZ Food companies.

The findings are expected to be of interest to researchers, policy makers, and industry.

Research Proposal: Fonterra Cooperative Group Survey

This proposal relates to Question 1; What is the nature of the relationship between food safety culture and ethical leadership in New Zealand’s largest food company? Following is a detailed proposal, outlining the research’s; description, objectives, methods, expected outcomes, ethical requirements, potential risks and mitigations, reporting, communication, confidentiality and intellectual property considerations.

Project Title	What is the nature of the relationship between food safety culture and ethical leadership in New Zealand’s largest food company?
Project Description (What is the problem to be solved?):	
<p>Fonterra Cooperative Group, the world’s largest exporter of dairy products and the top New Zealand company by revenue, has agreed to allow access to its manufacturing and distribution units, a population of 9,000 employees dispersed across 26 sites in New Zealand, for the purposes of gathering and analysing data about the status of food safety culture and ethical leadership from worker, management and governance perspectives.</p> <p>This project will operate on two levels simultaneously. It will:</p> <ol style="list-style-type: none"> 1. enable Fonterra Cooperative Group to assess its progress toward meeting its food safety and quality objectives: <i>“Food safety and quality as part of our identity We follow a structured approach to building culture and measure our progress regularly. New and innovative thinking about adult learning and behavioural science research has allowed us to engage our people and begin the journey from compliance to a safety culture”</i> (https://www.fonterra.com/nz/en/goodness-of-nz-milk/food-safety-and-quality.html) 2. provide data to inform a response to the research question, “What is the relationship between food safety culture and ethical leadership”, a doctoral research project within Massey University’s School of Management. 	
Objectives:	
<p>Fonterra’s food safety and quality system, developed over the past seven years, is well advanced and embedded within the company’s operations. Fonterra positions itself as a learning organisation and has worked with international expert, Frank Yiannas, to develop and implement a food safety culture maturity framework. Assessing organisational food safety culture, however, is a work-in-progress.</p> <p>The objective of this research is to answer the question, “What is the nature of the relationship between food safety culture and ethical leadership in New Zealand’s largest food company?”</p> <p>This will be achieved through a process of questionnaire development, implementation, analysis, evaluation and refinement resulting in a tool that may be widely applicable to New Zealand food companies.</p>	
Methods:	
9000 Fonterra manufacturing and distribution employees, dispersed across 26 sites in New Zealand, will be invited to participate voluntarily in a survey about the food safety culture and ethical leadership within Fonterra. Data will be	

gathered at two collection points separated by 12 months; the first survey will take place in September 2021 then following a process of refinement and validation, a second survey will take place in September 2022. A survey is a “a collection of data for the purpose of scholarly inquiry by the use of a standardised questionnaire...to a selected sample of respondents for self-completion” (Keuchler, 1998, pp178-179). Collection of data at two points will increase the potential for greater insights due to the ability to compare data (Keuchler, 1998).

Given the size of the available population, a democratic, mass communication approach that leads to a structured, standardised self-administered questionnaire is the most cost-effective and efficient means for data collection. This method requires minimal resourcing to administer, is available across the breadth of company sites; involves minimal disruption to business operations for staff members to complete; has a perception of anonymity and allows for rapid data collection (Cooper & Schindler (2008). In addition, the practical realities of site contact during the current global pandemic have resulted in black-out periods at Fonterra. This means that the only access possible to Fonterra workers is via an electronic survey, No face-to face contacts by means of interviews or focus groups is possible.

The first questionnaire will be made up of twenty-four, plain-English statements; twelve focused on food safety culture and twelve focused on ethical leadership using a seven point Likert scale. The Likert Scale discriminates between extreme negative and extreme positive positions and allows for participant attitudes to be quantified (Boynton & Greenhalgh, 2004; Acharya, 2010)). The twelve food safety culture questions are Fonterra’s own, developed as food safety and quality accountability goals and measures in 2018. These questions derive from Fonterra’s Cultural Maturity Framework developed in conjunction with world food safety culture leader, Frank Yiannas.

The ethical leadership questions were developed after reviewing fifteen tools for measuring ethical, servant and authentic leadership, and ethical and integrity climate and culture; across twenty-one publications. Ten of the twenty-one publications identified characteristics of ethical leadership, and from those ten publications, nine groupings of characteristics emerged. Possible questions to interrogate those characteristics were developed using cross-fertilisation from four publications, re-worded using plain English for the Fonterra New Zealand context. Tailoring questionnaire vocabulary to that of the intended participants will help to elicit responses (Acharya, 2010).

The pressure or drive for originality is suggested as a rationale for researchers not using recycled or existing questions (Hyman, Lamb & Bulmer (2006). Recycled questions are cost effective in terms of both time and money, and have likely been trialled and validated in earlier research (Hyman et al, 2006; Boynton & Greenhalgh, 2004). Bearing in mind potential issues of copyright and the context within which questions were asked originally, recycling questions is a “perfectly feasible option” when designing a questionnaire (Hyman et al 2006).

In addition to the method used by this researcher, another valid means of recycling survey questions, is one of a number of question banks that exist in the UK, Europe and the United States. These have been established to allow access to questionnaires for researchers, managers and teachers, one example being the [UK Data Archive](#) (UKDA) at the University of Essex which co-ordinates the Survey Question Bank (UK Data Archive, 2021).

The resultant questionnaire will be trialled with Fonterra Food Safety & Quality staff to ensure its efficacy. The pre-testing step will provide feedback as to whether the survey questions are likely to cause difficulty for participants (Presser, Couper, Lessler, Martin, Martin, Rothgeb & Singer, 2004).

The questionnaire will be administered online either via the Fonterra intranet, or through third-party means such as software external to the Fonterra system and as such will take place in a private space. The specific vehicle will be negotiated with Fonterra, taking into consideration their organisational requirements and constraints and the following ethical issues. Specific threats to the research integrity that will be mitigated through negotiation with Fonterra include:

- Beneficence: participant safety; ensuring staff feel comfortable both participating and providing honest input without any concern about negative consequences given they will be providing feedback about their managers/leaders
- Respect for persons; Privacy and confidentiality; the process for de-identification or anonymisation of data

The timeline for this aspect of the research is as follows:

August 2021

Pre-data collection work including finalisation of an ethical leadership instrument, any pre-testing, set-up of data collection method, determine access to the population of interest, process for de- identification or anonymisation

September 2021

Data collection using Version One of the ethical leadership instrument

October/November 2021

Analysis of the data to inform a report for Fonterra presenting the aggregates of the measures, a discussion/interpretation, and (possibly) some recommendations or suggestions for Fonterra to consider.

December 2021

Report completed and delivered to Fonterra in its final form

September 2021 – September 2022

Identification of Fonterra management actions or changes that affect food safety culture and an analysis of their intended and unintended effects.

September 2022

Version Two collection point

October/November 2022

Analysis of the data to inform a second report for Fonterra presenting the aggregates of the measures, a discussion/interpretation including a comparison with the first data set, and (possibly) some recommendations or suggestions for Fonterra to consider.

December 2022

<p>Second stakeholder report (content to be decided closer to the time)</p> <p>Data will be analysed using multi-variate methods such as Multiple Correspondence Analysis (Husson, Lê, & Pagès, 2017). These techniques will help identify patterns in the data and associations between variables. Findings will be supported through qualitative methods such as interviews and focus groups if necessary.</p>
<p>Expected results, impacts, outcomes and beneficiaries</p> <p>This independent research will lead to an understanding of the state of food safety culture and ethical leadership from worker, management, and governance perspectives within New Zealand’s largest food company. This will provide insights that are the first of their kind in New Zealand. The research will provide Fonterra with data to assess the efficacy of its food safety culture framework and to affirm or otherwise the degree to which its leaders align with its standards of ethical conduct.</p> <p>The data from this research will inform the doctoral research project, “Management of food safety risk in New Zealand” and constitutes one of three research foci to inform the overarching research question, “What is the nature of the relationship between food safety culture and ethical leadership?”</p> <p>The beneficiaries of this research, subject to Fonterra confidentiality agreement provisions binding the student and possibly two of three of the supervisory team, are Fonterra Co-operative Group, the student, New Zealand food companies, food safety science researchers and the Ministry for Business, Innovation & Employment and Ministry for Primary Industries.</p>
<p>Special ethical requirements:</p> <p>As mentioned earlier, the threats to the integrity of this research, which will be negotiated with Fonterra, are:</p> <ul style="list-style-type: none"> • Beneficence: participant safety; ensuring staff feel comfortable both participating and providing honest input without any concern about negative consequences given they will be providing feedback about their managers/leaders • Respect for persons; Privacy and confidentiality; the process for de-identification or anonymisation of data

Risk Assessment

Risk	Likelihood L/M/H	Impact L/M/H	Mitigation
Adverse outcomes impact continuation or publication of research	L	H	Possibility discussed with Fonterra and written agreement of the way forward resolved prior to research commencing
Outcomes deemed to be commercially sensitive impact publication of research	L	H	Possibility discussed with Fonterra and written agreement of the way forward resolved prior to research commencing
Disruption from global pandemic	M	M	Unforeseeable consequences. Open lines of communication maintained between researcher and Fonterra with agreed, recorded strategies to manage if and where necessary
Fonterra staff choose to not participate in survey	M	H	Develop means to de-identify data to ensure participant privacy and anonymity, agreed in writing with Fonterra Effective communication with participants about management endorsement of the survey

Reporting:	Progress Report #1 due to Fonterra	December 2021
	Final Report #2 due to Fonterra	December 2022

Communication of Outcomes:
Publications, Publicity, Reports and other communication (eg Workshops, Presentations, Conference Papers) to be negotiated and agreed with Fonterra

Confidentiality: The doctoral student anticipates being bound by a confidentiality agreement with Fonterra. Multiple connections to Fonterra may also affect two of three of the supervisory team.

Intellectual Property (IP): IP will be managed through the confidentiality agreement to be negotiated with Fonterra.
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Note: According to Massey University, the student must be able to complete the requirements of the student's candidature, and this obligation extends to submitting the student's thesis for examination and depositing a copy of the thesis in the University library. If a thesis contains information of a commercially sensitive nature, then the thesis may be subject to an embargo with such an embargo being subject to negotiation.

Submitted by: Wendy Newport-Smith

Date: 26 July 2021

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Appendix 3: Doctoral Research Proposal: Management of Food Safety Risk in New Zealand; Qualitative Research Strand

Research Abstract

Food safety culture, as a contributing factor to the production of safe food and as a distinct field of research, has been studied internationally for the past fifteen years. The influential role of leadership in food safety culture, organisational character, virtue, and workplace safety is generally accepted. Research into the flow-on effects from leadership, and in particular ethical leadership, has suggested a positive impact on worker attitudes and behaviour, and organisational reputation and performance. Little is known, however, about food safety culture and ethical leadership in the New Zealand context.

Using a mixed methods approach, this doctoral research project will investigate the question “What is the nature of the relationship between ethical leadership and food safety culture”

There are three questions that flow on from this question:

4. What is the nature of the relationship between food safety culture and ethical leadership in New Zealand’s largest food company?
5. What is the nature of the relationship between food safety culture and ethical leadership from an international perspective?
6. What are the unique characteristics of ethical leadership in food companies in Aotearoa New Zealand in 2021?

These three questions will be investigated through three workstreams: Workstream 1; surveys with staff of a major food manufacturer in New Zealand, Workstream 2; interviews with key staff in NZ Food companies, and Workstream 3; interviews with global experts.

The findings are expected to be of interest to researchers, policy makers, and industry.

Research Proposal: Characteristics of ethical leadership in food companies in Aotearoa New Zealand in 2021.

This proposal relates to Question 3; What are the unique characteristics of ethical leadership in food companies in Aotearoa New Zealand in 2021? Following is a detailed proposal, outlining the research’s; description, objectives, methods, expected outcomes, ethical requirements, potential risks and mitigations, reporting, communication, confidentiality and intellectual property considerations.

Project Title	What are the unique characteristics of ethical leadership in food companies in Aotearoa New Zealand in 2021?
Project Description (What is the problem to be solved?):	
Investigate what ethical leadership means in an Aotearoa New Zealand food industry context through semi-structured, face-to-face interviews with up to eighteen members of the New Zealand Food Safety Science & Research Centre.	
Objectives:	
To understand the importance of ethical leadership or otherwise to some of New Zealand’s largest food producers and exporters;	
To understand if there are ‘uniquely kiwi’ characteristics of ethical leadership according to some of New Zealand’s largest food producers and exporters;	
To inform the questionnaire used in Workstream 1 of the doctoral research project in preparation for the second of two surveys to be carried out with Fonterra staff in Q3, 2022.	
Methods:	
Workstream 2 uses qualitative research methods and begins with secondary data analysis (Cooper & Schindler, 2008); specifically a review of participating organisation’s publicly-available artifacts concerning food safety and quality, and codes of conduct. This is followed with primary data collection through face-to-face individual interviews. Interviews will be recorded, subject to participant approval, and the resultant recordings transcribed and analysed thematically. At the time of writing, New Zealand is in a Level 4 lockdown due to an outbreak of the delta strain of COVID-19, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Reported cases are rising daily, particularly in Auckland. If this situation continues, there will be downstream effects on the ability to gather data for this research project. Interviews will be converted to video-conferencing should travel disruptions continue. Interviews may need to be delayed given the impact of the continuing global pandemic on New Zealand’s food companies.	
1. Access and evaluate publicly available artifacts of selected NZFSSRC Members; key NZ food manufacturers and exporters eg Codes of ethical/ethical conduct, to gain insight into the stated values of those companies. Suggested companies:	

Countdown	Oceania Dairy	Foodstuffs North Island
Westland Milk	PIANZ	Open Country
United Fresh	Tatua	Zespri
Synlait	NZ King Salmon	Kono Foods
Sanford	Wakatu	Sustainable Foods
Silver Fern Farms	Green Valley Dairy	Fonterra

2. Semi-structured interviews with senior managers of selected NZFSSRC Members; key NZ food manufacturers and exporters to investigate what ethical leadership means in an Aotearoa New Zealand food industry context. Through her role as Manager of the NZFSSRC, the researcher has professional relationships with food safety and quality personnel within Industry members of the NZFSSRC. While the intention is to use a convenience sample of known contacts in these food companies, it is acknowledged that this may morph to a snowball sampling if personal referrals are made by the initial contacts.

Individuals in senior food safety and quality positions in food companies that are members of the NZFSSRC's Industry Advisory Group are the target for the convenience sample. Role designations vary across these companies, and are contingent on many factors, not the least of which is company size. What matters is the breadth of knowledge about food safety culture and ethical leadership, and participant's ability and willingness to communicate these views to the researcher.

Interview Questions:

a) **Food Safety Culture**

Please tell me about your role in xxx organisation. Who do you report to?

- Introductory statement about the business/its Code of Conduct/Code of Ethics (artifacts accessed via websites)
- What are the drivers for food safety in your organisation?
- What are the burning issues for you in terms of food safety or food safety culture?

Expectations

- What mechanisms does your organisation use to set food safety expectations (food safety policies, rules, procedures, standards, goals, KPIs)
- In your opinion, are staff aware that what they do impacts food safety?

Educate & Train

- What kind of FS training is available?
- How does the business ensure staff are given the tools or equipment they need to ensure food safety?

Communicate

- How is food safety information communicated to staff?

Goals & Accountability

- What kind of formal systems are used for staff who identify food safety problems or staff who break the rules?
- How are managers held to account for food safety in their areas? Are accountabilities clear?

Measure

- How confident are you that there is a strong commitment to food safety in your organisation?
- How do you know? What kind of system does your organisation use to evaluate food safety culture?
- If there is an evaluation system, eg survey, how often is it done? Do changes arise in the way food safety is approached as a consequence of the results?

Reinforce

- Do you think managers in your organisation show support for food safety ie walk the talk?
- Do you experience trouble getting access to funding? (strategic commitment from the Board)

These questions relate to components of Yiannas' Behaviour-Based Food Safety Management System Continuous Improvement Model (2009); this being the model that Fonterra's food safety and quality system evaluation is based upon.

b) **Ethical Leadership in Aotearoa New Zealand**

In your opinion...

- What are the drivers for your organisation positioning itself as an ethical organisation?
- How does a focus on an ethical position differ from a focus on a sustainable position?
- How does your ecosystem (network) reflect your company's ethical values? (Regulator, suppliers, resources, employees)
- How do you go about ensuring that your ecosystem (network) does reflect your company's ethical values?
- What do you consider the key characteristics of ethical leadership are?
- Do you think there are unique features or characteristics of ethical leadership in Aotearoa New Zealand? If so, what would these be?
- Why does ethical leadership matter to you?

c) **Closing Questions**

- Is there anything else you have thought of that you would like to share?
- Who else do you think I should talk to?

Following the interviews, responses will be collated, analysed thematically, and a report written to provide feedback to participating organisations for their interest.

According to Braun & Clarke (2006), thematic analysis looks for “repeated patterns of meaning” through searching “across a data set” whether interviews, focus groups or text (p.86). An inductive approach will be used in this workstream whereby themes emerge from the data as opposed to a deductive approach whereby predetermined themes will have been established (Braun & Clarke, 2006). Additionally, the data will be analysed from a semantic standpoint; the content will be analysed at face value rather than assumptions being made based on subtext; a latent standpoint (Braun & Clarke, 2006). The six-step process for thematic analysis from Braun & Clarke (2006) will guide this process:

1. Familiarising yourself with your data
2. Generating initial codes
3. Searching for themes
4. Reviewing themes
5. Defining and naming themes
6. Producing the report

The timeline for this workstream is as follows:

August 2021	Seek approval from NZFSSRC Director to engage with identified member organisations
September 2021	Trial interview questions
September 2021	Initial contact with identified organisations to gauge interest in participating
September 2021	Negotiate issues of confidentiality with participating organisations
	Finalise semi-structured interview questions
	Arrange visits/Zoom calls
September-October 2021	Face-to-face interviews or Zoom calls
November 2021	Analysis of the data to inform a report to participating organisations
December 2021	Report completed and shared with participating organisations
Prior to August 2022	Integration of unique characteristics of ethical leadership in Aotearoa New Zealand into survey instrument, version 2, for September 2022 collection point across Fonterra manufacturing and distribution businesses

Expected results, impacts, outcomes and beneficiaries

The data from this research will inform the doctoral research project, “Management of food safety risk in New Zealand” and constitutes one of three research foci to inform the overarching research question, “What is the nature of the relationship between food safety culture and ethical leadership?”

This workstream will lead to an understanding of the state of food safety culture and ethical leadership characteristics from a New Zealand food industry perspective. Any uniquely ‘kiwi’ characteristics of ethical leadership will be identified. Results from this workstream will be fed back to the participating industries for their interest and insight.

The doctoral research project is using a mixed methods approach for data gathering. As such the ethical leadership characteristics identified by NZ food businesses will be integrated into the survey instrument developed during workstream 1 in preparation for the survey’s second iteration, intended to be disseminated to Fonterra employees for completion during Q3, 2022.

The beneficiaries of this workstream are the student, New Zealand food companies, food safety science researchers and the Ministry for Business, Innovation & Employment and Ministry for Primary Industries.

Special ethical requirements:

This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University’s Human Ethics Committees.

The researcher has considered the ethical principles of: respect for persons; beneficence; justice, special relationships and trust. Execution of this workstream does not incur special ethical considerations, however the element of ‘Respect for persons’; Privacy and confidentiality of individuals; the process for de-identification or anonymisation of data if necessary will be at the forefront of this workstream.

Risk Assessment

Risk	Likelihood L/M/H	Impact L/M/H	Mitigation
Outcomes deemed to be adverse impact publication of research	L	H	Possibility discussed with participating organisations and agreement reached prior to research commencing
Disruption from global pandemic	M	M	Unforeseeable consequences. Convert face-to-face meetings to Zoom
NZ food businesses choose to not participate in interviews	M	H	Communicate purpose of research Ensure disruption from participation is minimised

Reporting:	Report due to participating businesses	31 December 2021
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Communication of Outcomes:
Publications, Publicity, Reports and other communication (eg Workshops, Presentations, Conference Papers) to be negotiated and agreed with participating organisations

Confidentiality:
The issue of confidentiality will be discussed with participants. Should issues of a sensitive nature emerge, the way in which these will be dealt with will be determined at the outset.

Intellectual Property (IP):
It is not anticipated that issues of IP will arise during this workstream
Note: According to Massey University, the student must be able to complete the requirements of the student's candidature, and this obligation extends to submitting the student's thesis for examination and depositing a copy of the thesis in the University library. If a thesis contains information of a commercially sensitive nature, then the thesis may be subject to an embargo with such an embargo being subject to negotiation.

Submitted by: Wendy Newport-Smith

Date: 27 August 2021

References

- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, 77-101.
- Cooper, D., & Schindler, P. (2008). *Business Research Methods*. 10th ed. McGraw-Hill Irwin. New York.

Appendix 4: Qualitative Research Strand Information Sheet and Consent Form

Management of Food Safety Risk in New Zealand

INFORMATION SHEET

Researcher Introduction

Allow me to introduce myself. My name is Wendy Newport-Smith. In addition to being Manger of the New Zealand Food Safety Science & Research Centre (NZFSSRC), and the New Zealand-China Food Protection Network (NZ-CFPN), both hosted by Massey University, I am a PhD candidate from Massey University, New Zealand.

Project Description and Invitation

Food safety culture, as a contributing factor to the production of safe food and as a distinct field of research, has been studied internationally for the past fifteen years. The influential role of leadership in food safety culture, organisational character, virtue, and workplace safety is generally accepted. Research into the flow-on effects from leadership, and in particular ethical leadership, has suggested a positive impact on worker attitudes and behaviour, and organisational reputation and performance. Little is known, however, about food safety culture and ethical leadership in the New Zealand context.

Using a mixed methods approach, this doctoral research project will investigate the question “What is the nature of the relationship between ethical leadership and food safety culture?”

There are three questions that flow on from this question:

1. What is the nature of the relationship between food safety culture and ethical leadership in New Zealand’s largest food company?
2. What are the unique characteristics of ethical leadership in food companies in Aotearoa New Zealand in 2021?
3. What is the nature of the relationship between food safety culture and ethical leadership from an international perspective?

These three questions will be investigated through three workstreams: Workstream 1; online survey with staff of New Zealand’s largest food company, Workstream 2; interviews with key staff in NZ Food companies, and Workstream 3; interviews with global experts.

I would be delighted if you would agree to participate in this research.

Participant Identification and Recruitment, and Project Procedures

I would be pleased to have an opportunity to interview you about the nature of the relationship between food safety culture and ethical leadership, and the existence or otherwise of unique characteristics of ethical leadership in Aotearoa New Zealand. The interview will take approximately 60 minutes. Due to the current COVID-19 alert level restrictions, interviews will be held using Zoom.

Your permission will be sought for:

- a) The interview to be audio-recorded. You may ask for the recorder to be turned off at any time during the interview. Written notes may be taken if you feel uncomfortable with the recording.
- b) Follow-up contact in case the need for clarification arises. However, you do not have to agree if you do not wish to do so.

Please note that the quotes from your interview may be published in a publication or presentation arising from this research. However, you will NOT be identified in any publication.

It is not anticipated that contributing to this research will lead to emotional and/or psychological discomfort. Should this happen, however, you can pause for a break or stop participation at any time. Please note that you do not have to answer any questions that you do not wish to.

There is no direct benefit to you and/or your colleagues by participating in this research. The knowledge gained may benefit researchers, policy makers, and industry in the future.

Privacy & Confidentiality

Only the researcher has your identifiable information, i.e., your name and contact information. This information is used to schedule interviews and meetings and will not be released to any other person without your express permission. Identifiable information will never be used in a publication or presentation. All your identifiable information and research data will be coded (i.e. only identified with a code number) at the earliest possible stage of the research. Your identifiable information will not be recorded and will not appear in the transcript. Quotes from the interview published will not identify you unless you expressly approve of this.

Data Management

All research data will be stored in a password-protected computer. After the project is completed in 2023, all your identifiable information, including any hard copies, will be deleted from all the researcher's records.

Participant's Rights (mandatory statement)

You are under no obligation to accept this invitation. If you decide to participate, you have the right to:

- decline to answer any particular question;
- withdraw from the study at any time;
- ask any questions about the study at any time during participation;
- provide information on the understanding that your name will not be used unless you give permission to the researcher;
- be given access to a summary of the project findings when it is concluded.

This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named below are responsible for the ethical conduct of this research. If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Professor Craig Johnson, Director, Research Ethics, telephone 06 356 9099 x 85271, email humanethics@massey.ac.nz.

If you have any questions please contact the researcher, Wendy Newport-Smith

w.newport-smith@massey.ac.nz

or the Primary Supervisor: Associate Professor David Tweed

d.m.tweed@massey.ac.nz

Participant Consent Form
Management of Food Safety Risk in New Zealand

By signing this form, I acknowledge that:

- I have been informed about the research project and understand the nature of the study.
- I have had the opportunity to ask the researcher questions about the project and they have been answered to my satisfaction.
- I understand that my participation is voluntary and that I can withdraw from the study at any time.
- I agree to be recorded Yes No
- I understand that I can ask for the recording to be switched off at any time.
- Access to the interview record will be limited to the research investigator, and relevant academic colleagues and researchers whom she might collaborate with as part of the research process.
- Unless agreed by me, my identity will be kept confidential and not used in any reporting.
- Any summary interview content, or direct quotations from the interview, that are made available through academic publication or other academic outlets will be anonymised so that I cannot be identified, and care will be taken to ensure that other information in the interview that could identify me is not revealed.
- I agree to take part in this research under the conditions outlined in the Participant Information Sheet.

Participant Signature

Researcher Signature

Date:

Date:

Appendix 5: Qualitative Research Strand: Ethical Leadership Guiding questions:

- What are the drivers for your organisation positioning itself as an ethical organisation?
- How does a focus on an ethical position differ from a focus on a sustainable position?
- How does your ecosystem (network) reflect your company's ethical values?
- How do you go about ensuring that your ecosystem (network) does reflect your company's ethical values?
- What do you consider the key characteristics of ethical leadership are?
- Do you think there are unique features or characteristics of ethical leadership in Aotearoa New Zealand? If so, what would these be?
- Why does ethical leadership matter to you?

Guiding food safety culture questions:

- Expectations: What mechanisms does your organisation use to set food safety expectations?
In your opinion, are staff aware that what they do impacts food safety?
- Educate & Train: What kind of FS training is available?
How does the business ensure staff are given the tools or equipment they need to ensure food safety?
- Communicate: How is food safety information communicated to staff?
- Goals & Accountability: What kind of formal systems are used for staff who identify food safety problems or staff who break the rules?
How are managers held to account for food safety in their areas? Are accountabilities clear?
- Measure: How confident are you that there is a strong commitment to food safety in your organisation?
How do you know? What kind of system does your organisation use to evaluate food safety culture?
If there is an evaluation system, eg survey, how often is it done? Do changes arise in the way food safety is approached as a consequence of the results?
- Reinforce: Do you think managers in your organisation show support for food safety ie walk the talk?
Do you experience trouble getting access to funding?

