ZERO FEES SCHEME

Title: Food Waste Management Practices in Invercargill's Food and Beverage Sector

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Degree: Master of Applied Management

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Year: 2024

Food Waste Management Practices in Invercargill's Food and Beverage Sector

by

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Research Project Submitted in Partial Fulfilment of the
Requirements for the Degree of

Master of Applied Management

in the School of Business
Faculty of New Media, Business and Arts/SIT2LRN

SOUTHERN INSTITUTE OF TECHNOLOGY
(*An affiliate of the New Zealand Institute of Skills and Technology*)

Supervisor: Dr Olufemi Omisakin

Due Date: 19 July 2024

Word Count (excluding contents and appendices): 20,071

Student Declaration

"I, Yanizelt Ramos Santamaria, declare that the Master by Research Project entitled Food Waste Management Practices in Invercargill's Food and Beverage Sector is my own work and contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work. The ideas presented are my own opinions and not necessarily those of Southern Institute of Technology".

Signature: Yanizelt Ramos Date: 19 / 7 /2024

Abstract

Food waste management is a significant concern within the food and beverage sector, and Invercargill, New Zealand, is no exception. Despite existing literature highlighting the importance of adequate food waste management practices, there remains a substantial gap in research specific to this region. This study aims to address this gap by exploring the current status of food waste management from the perspectives of managers, chefs, and servers in the Invercargill food and beverage sector. The research employs a qualitative methodology, using semi-structured interviews to gather in-depth insights from industry professionals. The study adopts an interpretivist philosophy, allowing for an understanding of participants' subjective experiences and perspectives. Data analysis was conducted using thematic analysis to identify key themes and patterns. The findings reveal that the primary sources of food waste include inefficient preparation methods, consumer behaviour and inadequate storage practices. Current management practices are found to be sufficient, but there is room for improvement, and more policy implementation and industry collaboration are needed. The study also emphasises the importance of sustainability and responsible environmental practices in mitigating food waste. Hence, this research highlights the critical role of comprehensive food waste management strategies in the food and beverage sector. It suggests that future research should expand to other regions in New Zealand, increase sample size, and incorporate mixed methods to provide a more holistic understanding of food waste management.

Keywords: Food waste management, food and beverage sector, New Zealand, sustainability, consumer behaviour, staff training, waste reduction.

Acknowledgement

First, I would like to express my deep gratitude to the participants in this study. Their openness, honesty, and willingness to contribute have been integral to the success of this research, which I believe will significantly impact our academic community. I want to thank Dr Olufemi Omisakin, my research project supervisor, for his unwavering guidance and support. His invaluable advice has kept me motivated and focused on my research goals. Furthermore, I would like to thank my friends Karen, Emma and Will, who provided guidance and support in different stages of the research process and made it possible. Additionally, I am thankful to Dr Sally Bodkin-Allen for her exceptional teaching of the MGT804 course. Her teaching has been instrumental in refining my research skills and has contributed significantly to the success of my project.

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List of Acronyms

CE	Circular Economy
EECA	Energy Efficiency and Conservation Authority
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
FIFO	First In, First Out
FL	Food Loss
FLW	Food Loss and Waste
FSC	Food Supply Chain
FW	Food Waste
FWC	Food Waste Challenge
GDP	Gross Domestic Product
GFSI	Global Food Safety Initiative
QC	Quality Control
SCP	Sustainable Consumption and Production
SDGs	Sustainable Development Goals
SFF	Sustainable Food & Fiber Futures
TBL	Triple Bottom Line
UK	United Kingdom
UNEP	United Nations Environment Programme
WMF	Waste Minimisation Fund
WTTC	World Travel and Tourism Council

Chapter 1: Introduction

1.1. Introduction

This thesis explores the current state of food waste management within the food and beverage sector of Invercargill, New Zealand. Food waste is a global predicament that threatens social, economic, and environmental sustainability. It transpires at various food supply chain stages, from agricultural production to household consumption (FAO, 2011). Given the multifaceted nature of the issue, a comprehensive approach is required to comprehend and alleviate the waste. Mitigating food waste aligns with the United Nations' Sustainable Development Goal 12, which focuses on circular behaviours, waste reduction, and sustainable practices (United Nations, 2023b). The food and beverage industry significantly contributes to waste generation, with millions of tons being discarded annually across the United States, the United Kingdom, and New Zealand (Mettler, 2023). This study endeavours to explore the management of food waste in Invercargill, New Zealand, by employing a qualitative research approach to comprehend the perspectives of managers, chefs, and waiters on reducing food wastage.

Correspondingly, the chapter of the thesis is divided into four sections. Section 1.2 provides an overview of the problem, including its background and rationale, and presents the research philosophy and method employed in the study. Section 1.3 further elaborates on the study's significance, highlighting its contributions and potential benefits. Section 1.4 outlines the research question, aim, and objectives pursued in the investigation. Finally, Section 1.5 presents the thesis structure, briefly describing the content in each chapter.

Some sections of this chapter were completed as part of MGT804, the research methodology component of the Master of Applied Management qualification, of which this research project is a part as the final element. Modifications have been made, and new paragraphs have been added to the original research proposal completed as part of MGT804. As MGT804 is the research methodology document for this research project component of the Master of Applied Management qualification, self-citation was not required.

1.2. Statement of the problem

Experts have identified food waste as the most pressing issue in waste management. It is a significant problem that requires immediate attention. Food waste pertains to the squandering or discarding of food items at any stage of the food chain, including leftovers from home-cooked meals, unconsumed food at restaurants, and various other sources (FAO, 2011).

Notably, the concept of food waste encompasses multiple subcategories. Specifically, food loss denotes the agricultural, forestry, and fishery products that remain uneaten during production and distribution due to weather conditions or disruptions in the supply chain (Safdie, 2023). Conversely, food waste pertains to human-consumable food that goes to waste or expires, including spoiled food, plate waste, discarded peels, and rinds (Safdie, 2023). To effectively capture the full extent of inefficiencies arising from unused food in the food system, researchers utilise the term "food loss and waste" to comprehensively describe both categories of this issue (Ishangulyyev et al., 2019; Safdie, 2023; Spang et al., 2019).

Moreover, the twelfth objective of the United Nations' Sustainable Development Goals (SDGs) is to achieve "Sustainable Consumption and Production Patterns" (United Nations, 2023c). This objective recognises the significance of sustainable consumption and production (SCP) in enhancing social welfare, minimising environmental damage, and ensuring the efficient utilisation of resources and energy (United Nations, 2023b). Goal 12 transforms consumption patterns and societal structure by promoting circular behaviour, reducing waste, and encouraging sustainable consumption (United Nations, 2023b). It urges economies to ponder the extraction of natural resources, allowing ecosystems to flourish and supplement human life. The goal also emphasises the importance of early access to information on sustainable living and the introduction of recycling education in schools (McCarthy, 2015). However, successfully implementing this objective is challenging, as many recyclables often end up in landfills rather than being disposed of properly (McCarthy, 2015). Additionally, the goal is primarily aimed at developing countries already undergoing industrialisation and poverty alleviation and are responsible for most poor consumption patterns worldwide. To achieve this goal, governments must implement efficient waste management systems, such as reducing food waste by 50% by 2030 (United Nations, 2023b).

Furthermore, the food and beverage sector assumes a pivotal role in the issue of food waste, with significant contributions arising from both the production and consumption facets within the industry (Mettler, 2023). According to the United Nations Environment Programme (UNEP), the global annual waste of food amounts to one billion tons. Approximately 40% of all food in the United States goes to waste, with 66 billion pounds representing commercial leftover food waste (Mettler, 2023). Similarly, in the United Kingdom (UK), the hospitality and food service sector generates 1.1 million tons (12%) of the 9.5 million tons of food waste produced annually (Mettler, 2023).

Correspondingly, restaurants throughout New Zealand contribute a staggering 24,375 tonnes of food waste each year (Mainvil et al., 2018). On average, a single café or restaurant in the country generates roughly 2.8 tonnes of food waste annually (Mainvil et al., 2018). Such alarming statistics underscore the need to implement collective efforts to reduce food waste in restaurant settings.

Similarly, effectively addressing the issue of food waste within the food and beverage sector requires a thorough identification of the underlying causes and contributing factors. One study found that food and beverage managers regarded staff performance as a significant factor in food waste (Bhajan et al., 2022). For instance, newly recruited employees undergoing training were more prone to errors during food preparation, leading to food wastage. Moreover, food and beverage managers reported that employees required additional skills to properly peel fruits and vegetables and discard edible parts of fresh produce (Bhajan et al., 2022). Conversely, employees expressed concerns about throwing away food for which guests have already paid, deeming it unethical (Mabaso & Hewson, 2018). Based on the study's findings, it is evident that employees consider food wastage unethical (Mabaso & Hewson, 2018). Thus, it is crucial to recognise the roles of managers, chefs, and waiters in reducing food waste.

The primary objective of this research study is to conduct a qualitative investigation into the present state of food waste management in the Invercargill, New Zealand, food and beverage industry. According to Huston and Rowan (1998), qualitative research enables a more profound comprehension of the participants' experiences, attitudes, and thoughts. The philosophical approach that aligns with this research study is interpretivism. This social science paradigm perceives reality as subjective and shaped by individuals based on their experiences, intending to comprehend social phenomena from their perspective (Nickerson, 2022). Furthermore, this research study adopts an inductive analysis approach, in which the researcher strives to gain an in-depth comprehension of the phenomenon under study and develop a comprehensive explanation based on the participants' reality (Merriam, 2002).

1.3. Significance of the study

This research is of great importance as it investigates the perspectives of managers, chefs, and waiters working in Invercargill restaurants regarding their efforts to reduce food wastage. Moreover, there exists a limited amount of research on food waste management practices in New Zealand, with no studies dedicated explicitly to the Invercargill food and beverage industry. Therefore, applied management's relevance to food waste reduction can prove instrumental in improving supply chain management, streamlining production processes, and enhancing consumer awareness. The advantages of reducing food waste extend beyond environmental benefits such as energy savings, reduced pollution, and lower greenhouse gas emissions (EPA, 2023). It also reduces waste generated during food production, lowers waste disposal costs, and promotes efficient food handling, preparation, and storage practices (EPA, 2023). By effectively utilising existing food resources, we can feed a more significant number of people while also reducing waste. The results of this study could significantly impact Invercargill's food and beverage sector, and it is hoped that this research will inspire further investigations in the community.

1.4. Research question/aim and objectives

The research question is: What is the current status of food waste management in the food and beverage sector of Invercargill, New Zealand, from the perspective of managers, chefs, and waiters? Therefore, the aim is to explore this question.

Research objectives

The following three research objectives are determined based on a robust assessment of the empirical literature:

1. To describe the situation of food waste generation by the food and beverage organisations in Invercargill.
2. To identify the main sources of food waste in the food and beverage organisations in Invercargill.
3. To evaluate the effectiveness of food and beverage organisations' current food waste management practices in Invercargill.

1.5. Structure of the research

The research project is divided into six chapters. Chapter One, the introductory chapter, provides background information about the food and beverage sector's food waste issue and justifies the need for research in this field. Moreover, the chapter highlights the main research problem, specifies the research objectives, and elaborates on the significance of the study. Chapter Two explores the theoretical constructs and industry analysis. The first section of the chapter discusses theoretical models related to food waste, such as the food waste pyramid and the circular economy. The second section discusses the industry analysis using the PESTEL framework to examine the external factors surrounding the food waste issue. A literature review follows in chapter three. The literature review consists of four main themes. It is primarily focused on the food and beverage industry, covering the issue of food waste and critical players in reducing the problem management, staff and customers. In chapter four, the methodology will be explained more fully, including the research philosophy and study design. Then, the data collection method, a semi-structured interview, will be discussed. Finally, the study's limitations, delimitations, reliability and bias will be discussed, followed by the ethical considerations of the study. Chapter Five presents the results of the present study and the themes identified. This chapter also discusses the overall findings and links them with relevant literature. The concluding chapter, the sixth in this thesis, presents a summary and recommendations. It will address the study's objectives, its connection to prior research, the limitations of the current study, and suggestions for future research.

Chapter 2: Theoretical Constructs and Industry Analysis

2.1. Introduction

This chapter comprises two sections. The first section delves into theoretical analysis, exploring the various constructs concerning food waste, such as the food waste pyramid and the circular economy. A clear understanding of these frameworks is crucial for comprehending the root causes of food waste generation and developing effective strategies to manage it. The second section of this chapter presents an in-depth analysis of food waste in the food and beverage industry. It sheds light on the impact of these companies and their significant contributions to the food wastage issue in New Zealand. Furthermore, a PESTEL analysis is conducted to identify external factors, such as political, economic, sociocultural, technological, environmental, and legal, that can affect the direction and performance of businesses in the food and beverage industry.

2.2. Theoretical Constructs

The European waste framework directive defines waste as any substance or object the holder discards, intends to discard, or is required to discard (European Commission, 2018). This definition highlights the importance of adequately managing waste to protect the environment and ensure a sustainable future for future generations. By taking action to reduce waste production, properly disposing of waste, and supporting recycling initiatives, we can all play a role in creating a cleaner and healthier world (European Commission, 2018).

Furthermore, food loss (FL) in the food supply chain (FSC) is primarily caused by the functioning of the food production and supply system and the institutional framework (FAO, 2014a). Food waste (FW) is a significant part of food loss, referring to the removal of food that is not fit for consumption or has been left to spoil due to negligence by the actors, primarily at the household level (FAO, 2014a). Similarly, FW is recognised as a distinct part of food loss due to different reasons, economic frameworks, and motivations (FAO, 2014a). Moreover, 'food loss and waste' (FLW) refers to food wastage (Lemaire & Limbourg, 2019). FLW is a significant food supply chain (FSC) issue, affecting product quality from production to consumption. The FSC is complex due to logistic processes, manufacturing, processing, distribution, and consumption (Manzini et al., 2014). Food industry challenges include food security, waste, farming, public health, climate change, oil dependency, fair trade, and localism (Li et al., 2014). Further, food waste is a serious concern as it contributes to food shortage, insecurity, and hunger while posing a significant environmental threat. Therefore, excessive natural resource consumption and greenhouse gas emissions throughout the FSC significantly impact the economy and environment (Lombardi & Costantino, 2021).

Over the past few years, there has been a significant effort to find and implement solutions to prevent food waste at various supply chain stages (Mourad, 2016). These solutions prioritise waste management, with prevention being the primary focus, followed by reusing and recycling options (Papargyropoulou et al., 2014). First, the European Union (EU) developed the Waste Framework Directive, a set of guidelines for waste management in the EU, outlining principles such as waste, recycling, and recovery (European Commission, 2023). It ensures waste is managed without endangering human health, harming the environment, causing nuisance, or affecting the countryside. The directive also outlines when waste becomes a secondary raw material and distinguishes between waste and by-products (European Commission, 2023). The Waste Framework Directive is the foundation for EU waste management, establishing a five-step waste hierarchy (Figure 1).

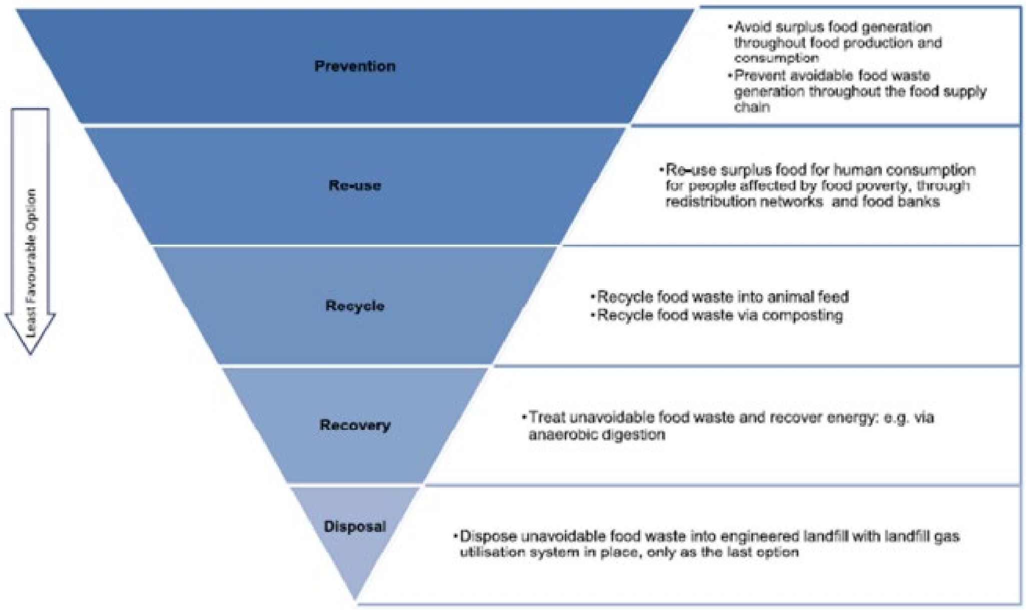
Figure 1 *Waste Framework Directive*

Note. European Commission, 2023

Accordingly, Papargyropoulou et al. (2014) designed a food waste prevention pyramid to address this issue, which follows a hierarchy that applies to all waste categories (Figure 2). He stated that to address food waste, focusing on reducing surplus food production at the upstream level of the food chain and avoiding disposal of avoidable food waste at the downstream level is recommended. When such measures are not feasible, it is advisable to repurpose surplus food for human consumption through redistribution initiatives (Papargyropoulou et al., 2014).

Subsequent levels of the food waste hierarchy prioritise recycling and energy recovery of food waste to avoid the least desirable option of landfilling.

Figure 2 *Food Waste Prevention Pyramid*



Note. Papargyropoulou et al., 2014, adapted from European Parliament Council 2008

Moreover, significant steps taken by organisations such as the EU by implementing the Waste Directive to reduce food waste encourage member states to develop sustainable waste prevention programs that consider the environmental impacts and the entire lifecycle of products and materials (Stenmarck et al., 2016). For instance, the Circular Economy Package supports the EU's primary objective of reducing food production resources and minimising environmental impact (Giordano et al., 2020). The directive highlights waste prevention as the first step in waste management, and landfilling is considered the least preferred option due to its strong environmental impact perspective (Giordano et al., 2020).

2.2.1. Circular Economy

The notion of Circular Economy (CE) has gained immense popularity and is being widely endorsed by the European Union, national governments, and businesses across the globe (European Commission, 2020). CE revolves around production-consumption systems built on a linear nature-society-nature material and energy throughput flow to maximise service (Korhonen et al., 2018). It operates on the principles of cyclical materials flows, renewable energy sources, and cascading-type energy flows. The success of CE lies in its ability to contribute to sustainable development by restraining the throughput flow within a limit that respects ecosystem cycles and natural reproduction rates (Korhonen et al., 2018).

Indeed, CE aims to establish a sustainable relationship between businesses and resources (Sze Ki Lin et al., 2020). This involves reducing waste, promoting efficient resource consumption, ensuring worker and customer safety, developing innovative products, and making a profit. However, the main challenge lies in the lack of tools for sustainability-based decision-making (Sze Ki Lin et al., 2020). To achieve sustainable economic growth and minimise environmental and societal impacts, commercially applicable environmental, social, and cost assessment methods must be developed (Sze Ki Lin et al., 2020).

Accordingly, CE has a relationship between waste generation and management, which plays a fundamental role. Ensuring that profit-driven waste generation does not obstruct environmental protection is critical (Lehtokunnas et al., 2022). While the research on CE has primarily focused on consumers and their consumption, it has overlooked the everyday food wastage practices in households (Mylan et al., 2016). A study by Raippalinna (2020), which takes place in Finland, addresses this gap. Households in Finland generate a considerable amount of food waste annually, ranging from 120-160 million kilograms. The study adopts a practice-theoretical approach, which focuses on collective aspects of consumption and agency distribution among people, objects, and infrastructures (Warde, 2014).

Although social science research on sustainable consumption and food waste has been extensive, limited attention has been given to the transition towards CE, except for Mylan et al. (2016) work on domestic food provisioning. Moreover, practice-theoretical food waste research highlights the importance of social, material, and temporal contexts in understanding household food waste production, which requires diverse culinary skills and knowledge (Southerton & Yates, 2014). Additionally, it acknowledges the significance of nonhumans in reducing food waste. Overall, the approaches to food waste reduction as a social practice emphasise the dynamics between ethical action and persistent socio-material practices that limit transformation (Lehtokunnas et al., 2022).

2.2.2. Triple Bottom Line

The Triple Bottom Line (TBL) is a concept John Elkington introduced in the mid-1990s to measure sustainability in corporate America (Slaper & Hall, 2011). It is a framework that encourages organisations to consider their business's social, environmental, and economic impacts. The TBL goes beyond just financial profits and emphasises a holistic approach to sustainability. Businesses, nonprofits, and governments use the TBL to evaluate their performance and support sustainability goals. Unlike traditional reporting frameworks, the

TBL incorporates ecological and social measures, making it a comprehensive accounting framework with three performance dimensions: social, environmental, and financial (Slaper & Hall, 2011). The three dimensions of the TBL are often called the three Ps: people, planet, and profits (Slaper & Hall, 2011). By measuring the impact of an organisation's activities on profitability, shareholder values, and social, human, and environmental capital, the TBL captures the essence of sustainability (Slaper & Hall, 2011).

The Triple Bottom Line (TBL) framework applies to food waste in various ways. First, the environmental impact of food waste is significant, including resource depletion during production, transportation, and storage, as well as greenhouse gas emissions from rotting food in landfills, which produce methane, a potent greenhouse gas (Alsaleh & Aleisa, 2023). Overproduction and waste also harm ecosystems and lead to biodiversity loss (Alsaleh & Aleisa, 2023). Second, social food waste exacerbates hunger and poverty, and redirecting surplus food to those in need can address this issue (Palumbo, 2015). Proper food management positively impacts public health and fosters community engagement (Palumbo, 2015). Initiatives to reduce food waste involve communities and foster collaboration. Third, economically efficient food management reduces businesses' costs while repurposing food waste can create new revenue streams (Fuentes Diaz, 2023). Responsible food sustainability practices also enhance a company's image and brand reputation (Fuentes Diaz, 2023). Organisations can adopt TBL approaches to reduce food waste, such as collaborating with food banks for donation programs, implementing efficient logistics and inventory management for supply chain optimisation, and educating consumers about reducing food waste at home (Bhattacharya et al., 2022). Addressing food waste through a TBL lens benefits the planet, people, and profits. Organisations can positively impact and contribute to a better world by adopting sustainable practices and minimising waste.

2.3. Industry Analysis

As per the World Travel and Tourism Council (WTTC), the tourism sector stands out as one of the most lucrative industries at the global level. Considering both direct and indirect income, along with induced earnings, tourism contributes nearly 10% of the overall gross domestic product (GDP) worldwide. In 2019, international and domestic tourism generated a record US$8.9 trillion in revenue, marking a growth rate of 3.5%, surpassing the global economic growth rate of 2.5% (WTTC, 2020). The tourism sector's significance can also be attributed to its extensive utilisation of human resources, as it, directly and indirectly, employs about 10%

of the global workforce, thus creating a whopping 330 million job opportunities (WTTC, 2020).

As per the report published by the Food and Agriculture Organization of the United Nations (FAO), approximately one-third of the food produced for human consumption is lost or wasted annually (FAO, 2011). This results in a colossal 1.3 billion tons of waste and a financial loss of US$936 billion, excluding the environmental and social costs (FAO, 2014b). Moreover, the FAO has projected that FW will increase by 60% by 2030, reaching 2.1 billion tons, leading to a staggering financial loss of over US$1.5 trillion (Boston Consulting Group, 2018). In the hospitality sector, restaurants contribute 56%, and hotels contribute 28% to the overall volume of FW produced globally (Gandhi et al., 2020). In addition, it is worth noting that food and beverage businesses make a substantial amount of waste, encompassing food items, packaging materials, and operational supplies (Chen et al., 2009). Similarly, developed countries experience the highest food waste during consumption, while developing nations often struggle with inadequate post-harvest management practices (Ellison & Lusk, 2018). For example, estimates that food waste in the UK's hospitality and food service sectors is projected to reach 920,000 tonnes per year, 75% of which is avoidable (Parfitt et al., 2013). Beijing alone, in 2009, witnessed 60,000 restaurants discarding 1700 tonnes of food per day (Liu et al., 2009). These figures demonstrate that a substantial amount of food is being wasted globally.

The PESTEL analysis is a valuable tool utilised to evaluate external market factors that may influence an organisation's direction, performance, and position in the marketplace (Fosher, 2018). PESTEL analysis serves two primary purposes for businesses. Firstly, it helps the organisation to identify the environment in which it operates (Yüksel, 2012). Secondly, it provides vital data and information that allows the organisation to forecast future conditions and circumstances (Yüksel, 2012). Below, this thesis examines the issue of food wastage in New Zealand and analyses the situation from a PESTEL analysis perspective.

Political

The New Zealand government has regulated food waste through various policies and legislation. These aim to reduce waste across the entire supply chain, from production to consumption. One key legislation that plays a crucial role in governing waste management practices is the Waste Minimisation Act 2008. Its goal is to push New Zealand towards a future of a circular economy (Ministry of the Environment, 2021b).

Moreover, the government offers support and incentives for businesses that adopt sustainable and waste-reducing practices. They have initiatives such as the Waste Minimisation Fund (WMF), which supports waste reduction projects and is generated from a levy on landfill waste (Ministry of the Environment, 2022). The Sustainable Food & Fiber Futures (SFFF) initiative invests in food and fibre sectors to boost sustainability and productivity (Ministry for Primary Industries, 2023). At the same time, the New Zealand Plastic Packaging Declaration encourages businesses to adopt sustainable packaging solutions (Ministry of the Environment, 2021a). In addition, the Love Food Hate Waste Campaign educates businesses and consumers about reducing food waste (Love Food Hate Waste, 2024a). The Energy Efficiency and Conservation Authority (EECA) also funds projects that improve energy efficiency and reduce carbon emissions, including food and beverage industry technologies that minimise waste (EECA, n.d.).

Economic

Reducing food waste can result in significant cost savings for businesses in the food and beverage industry (United Nations, 2023a). Companies can reduce overhead costs and increase their bottom line by improving inventory management and adopting more efficient production techniques (United Nations, 2023a).

The economic impact of food waste is substantial. Properly disposing of wasted food involves expenses such as transportation, landfill fees, and processing (Goodwin, 2023). Additionally, unsold goods due to spoilage or expiration result in lost revenue. By reducing food waste, businesses can improve the overall economic efficiency of the food and beverage sector, ultimately leading to increased profitability and sustainability (Goodwin, 2023).

Sociocultural

The awareness among consumers in New Zealand about food wastage is increasing, and they prefer businesses that adopt eco-friendly practices. Consequently, companies are under pressure to revise their practices to meet consumer expectations (O'Shea, 2022). Although some consumers (66%) express concern about climate change, only 35% are willing to pay extra for sustainable products and services (O'Shea, 2022). This highlights the need to close the gap between consumer awareness and willingness to invest in sustainable options. In addition, food-sharing and redistribution apps such as OLIO and Food Rescue NZ are gaining popularity among New Zealanders, reflecting their direct engagement with reducing food wastage (AFRA, 2024; Carter, 2019). Māori concepts of Kaitiakitanga and Whanaungatanga that emphasise environmental guardianship and community relationships are being adopted by businesses, especially in the food and beverage sector, to ensure sustainable resource use, reduce waste, and promote community involvement (McKenzie, 2022). Community Marae is leading in sustainable food practices, using local ingredients and promoting food sharing (Deep South, 2022).

Technological

New Zealand is leveraging innovative technologies to reduce food waste across the entire supply chain, from farms to consumers (Mason, 2024). Biodegradable and intelligent packaging, food redistribution platforms, and advanced food processing technologies are being developed to extend food's shelf life and maintain its nutritional value (Carter, 2019; Consumer NZ, 2022). Additionally, leveraging big data and analytics enables businesses to predict demand more accurately, thus reducing the amount of overproduced food (Seyedan & Mafakheri, 2020).

Environmental

The environmental impact of landfills is a pressing concern, and food waste plays a significant role in landfill volumes, leading to environmental issues such as methane emissions (FAO, 2011). Therefore, minimising the environmental footprint necessitates reducing food waste (Mason, 2024). Additionally, food production involves using valuable resources, such as water and land. Implementing efficient food waste practices ensures that these resources are not dissipated, promoting sustainability (Mason, 2024).

Legal

Local and national laws, international standards, and agreements influence New Zealand's food waste management system. The Waste Minimisation Act 2008 provides a legal framework for reducing waste, while the Resource Management Act 1991 mandates environmentally friendly waste management (Ministry of the Environment, 2021b; New Zealand legislation, 2023b). The Health and Safety at Work Act 2015 also addresses waste management, focusing on worker health and safety (New Zealand legislation, 2023a). Many businesses adopt ISO 14001 Environmental Management Systems to improve environmental performance and reduce waste (Yin & Schmeidler, 2009). The Global Food Safety Initiative (GFSI) standards, benchmarked by food producers and processors, also include waste management requirements (GFSI, n.d.). By adhering to these laws and international standards, New Zealand's food and beverage industry contributes to global sustainability efforts, reducing food waste's environmental impact and promoting efficient resource use.

Analysing New Zealand's food waste practices using the PESTEL framework reveals a complex interplay of factors, including governmental policy, consumer expectations, technological advancements, and societal shifts towards environmental consciousness. These factors will play crucial roles in influencing future food waste practices in the country.

2.4. Summary

Chapter 2 of this study presents a detailed analysis of food waste in New Zealand's food and beverage industry. The chapter delves into theoretical constructs and industry dynamics, focusing on the European Waste Framework Directive and the food waste prevention pyramid.

The chapter also explores the potential role of the Circular Economy (CE) in promoting sustainable relationships between businesses and resources. The connection between CE and food waste is emphasised, highlighting the need for a transition towards CE and the importance of social, material, and temporal contexts in understanding and addressing food waste. Further, the Triple Bottom Line (TBL) concept is also discussed in the chapter, emphasising the need to address food waste holistically to benefit the planet, people, and profits. In addition, an industry analysis is conducted to examine the food and beverage industry's role in food waste and the external factors affecting it.

The PESTEL analysis of New Zealand's food waste reveals the complex interaction of these factors, including governmental policies, consumer expectations, technological advancements, and societal shifts towards sustainability. Overall, this chapter provides essential insights into the causes of food waste in New Zealand's food and beverage industry and the potential solutions to address it.

Chapter 3: Literature Review

3.1. Introduction

As sustainability and responsible environmental practices become increasingly important, efforts to manage and reduce food waste have become crucial. This literature review explores several aspects of these efforts, such as management techniques, collaborations, staff involvement, customer education, and communication strategies. As the hospitality industry moves towards sustainable development, this literature review provides a foundation for a more comprehensive exploration of the numerous approaches required to address food waste at various levels within the industry.

This literature review was completed as part of MGT804, the research methodology component of the Master of Applied Management qualification, of which this research project is the final element. Only minor amendments have been made from the original literature review completed as part of MGT804. As MGT804 is the research methodology paper for this research project component of the Master of Applied Management qualification, self-citation was not required.

3.2. The Issue of Food Loss and Waste in the Hospitality Industry

It has been demonstrated that the hospitality industry significantly contributes to food loss and waste (FLW) in many countries, primarily due to the rise in out-of-home food consumption and increased disposable income (Papargyropoulou et al., 2016; Wrap, 2024). Wrap (2024) reported that the UK and the US are among the highest producers of FLW, with the UK generating over 10.7 million tons annually and the US is potentially holding a world record (Chen & Chen, 2018; Hotel Kitchen, 2016). According to Dodds and Graci (2008); Kasim and Ismail (2012) the hospitality industry, it has a significant environmental impact, and many businesses are exploring the feasibility of adopting environmental management practices to reduce their carbon footprint and improve their brand image. As a result, it has been suggested that one of the biggest challenges in this regard is FLW, which requires innovative solutions to reduce waste disposal costs, improve corporate image, and contribute to environmental conservation and social well-being (Martin-Rios et al., 2018).

3.3. Management Efforts in Reducing Food Waste

Star-rated hotels can assure responsible environmental practices and promote sustainability by implementing effective food waste management procedures. Several studies have identified that star-rated hotels are working towards sustainable food waste management and practices (Aditya & Kurniawati, 2023; Amicarelli et al., 2022; Kattiyapornpong et al., 2023; Sandaruwani & Gnanapala, 2016). For instance, Kattiyapornpong et al. (2023) reported that five-star hotels significantly influence food waste management policies. Further, their study asserted that chain-owned hotels have specific waste management guidelines focusing on holistic sustainability. Moreover, their study showed that self-managed properties promote waste management policy, mainly influenced by awards recognition (Kattiyapornpong et al., 2023). Additionally, Aditya and Kurniawati (2023) found that two five-star hotels in their study applied measures such as quality control (QC) and the first in, first out (FIFO) system in receiving and storage. Similarly, Amicarelli et al. (2022) reported that both four-star hotels in the analysis follow similar management styles based on three crucial pillars: guest attendance control, efficient departmental communication, and proper storage and management of perishable goods. Likewise, Sandaruwani and Gnanapala (2016) revealed that twenty Sri Lankan star-class hotels use various techniques to reduce food waste and save money, including setting kitchen department targets, operating according to hotel front office instructions, forecasting guest numbers, and using live cooking to store uncooked raw materials. The literature indicates that properties in the hospitality industry are playing their role in integrating food waste policies in their operations, regardless of the size or scope of the effort.

Collaboration to reduce food waste can create a sustainable future. Research suggested different types of partnerships that are beneficial in reducing food waste (De Visser-Amundson, 2022; Demetriou, 2022; Kattiyapornpong et al., 2023). De Visser-Amundson (2022) showed through a food waste challenge (FWC) involving 172 restaurants in the Netherlands the significance of cross-sector associations in tackling societal issues such as food waste. The FWC involves interdisciplinary and outcome-driven approaches, including behavioural interventions like social norms, block leaders, prime nudges, and pre-commitment manipulations. The study results reported a 21% decrease in food waste across 172 restaurants, resulting in an average reduction of 17.1 kg per week and 2.44 kg per day per restaurant, resulting in savings of 75.240 kg of food and 150.480 kg of CO2 (De Visser-Amundson, 2022, p. 11). Similarly, Demetriou (2022) suggested that the Cypriot hospitality sector should develop partnerships with charities to donate unsold food, and local authorities should provide support with free logistics to collect food from hotel units. Furthermore, Kattiyapornpong et al. (2023) identified two hotels in the research that found that partnering with local farmers is necessary for food waste management, as hotels use fresh ingredients, reduce downtime and transportation costs, and reduce waste in food preparation and operation. Therefore, cooperation between stakeholders can be a helpful strategy in the fight against food waste.

The hospitality sector is prepared to take on the challenge of sustainable growth. According to Melissen et al. (2015) hoteliers are aware of the importance of sustainability, but their future perspectives are not aligned with systemic changes or radical innovations. Instead, they focus on applying advanced technologies for sustainable development, such as water, energy use, and minimising waste, but face barriers to implementation due to guest experiences, building structure limitations, and investment costs. Melissen et al. (2015) study revealed that hoteliers prioritise human resources and social sustainability, focusing on training employees, providing career opportunities, and team building. Return on investment is vital for sustainability initiatives, but none of the interviewees recognised the need to adjust their business model or repurpose their company (Melissen et al., 2015). Although most sustainability initiatives focus on environmental aspects, some express positive experiences. Further research is necessary to understand guests' needs and preferences and the industry's alignment with environmental and sociocultural needs.

3.4. Staff Efforts in Reducing Food Waste

Adopting an ethical food waste approach by staff can lead to cost savings and promote sustainability in the food service industry. Min-Yen and Wen-Hwa (2023) conducted a study that surveyed males aged 21-40, focusing on non-management positions in Taiwan's catering industry, including hotels, restaurants, and group meal companies. Their research found that ethical sustainability positively impacts professional competence in food waste prevention and self-efficacy. Additionally, the study concluded that females are more cognitively advanced, and self-efficacy is necessary for enhancing knowledge and skills (Min-Yen & Wen-Hwa, 2023). In contrast, Chawla et al. (2022) examined factors influencing pro-environmental behaviour in luxury hotels and found that employees' approach to food waste prevention is primarily driven by financial interests rather than moral considerations. They also found that employees view waste prevention from a pragmatic-rational perspective, challenging traditional ethical perceptions. The study suggests that understanding the interplay between attitudes and subjective norms is crucial for designing effective interventions for food waste reduction (Chawla et al., 2022).

Training staff is crucial in reducing food waste and improving sustainability practices. For example, Chi-Mei and Chih-Ching (2023) interviewed chefs, store managers, and servers from a Taiwanese chain restaurant company. Their research revealed the importance of employees' awareness of food waste issues. As a result, the restaurants offer online training courses on food safety, waste management policy, and customer relations through a smartphone application. Moreover, participation is based on positions, and reducing food waste requires cooperation between management, employees, and customers (Chi-Mei & Chih-Ching, 2023). Further, the results of a study by Diaz-Farina et al. (2023) reported that establishments providing employee training generate an average of 34.5% less mixed waste. Similarly, Mabaso and Hewson (2018) found that training employees in food waste management improves their perception and implementation of related strategies, encouraging them to adopt a food waste reduction culture and maintain good practices. Mabaso and Hewson (2018) concluded that staff training should focus on food waste practices and financial, environmental, and social responsibility aspects of the hotel's best practices.

Buffets are responsible for increased food waste, as reported by (Bhajan et al., 2022) in a study conducted with food and beverage managers, chefs and servers from the Mauritius hotel sector. The study stated that hotel buffets offer various food and culinary themes to satisfy customers during important events. Moreover, food and beverage managers emphasise freshness and appealing displays, prompting staff to refill the buffet, making this service a challenge in food waste reduction, as it is typically done until the end of the buffet, even when customer numbers decline (Bhajan et al., 2022). Accordingly, Lee and Huang (2023) revealed that the most influential factors contributing to food wastage in buffets are consumers, promotions, unexpected factors, menu planning, food preparation, and purchasing. The research results showed that the top contributing factor to food waste was the amount of food taken by consumers. However, it is worth considering the impact of procurement practices on food wastage (Lee & Huang, 2023). Hotels should adopt a multifaceted approach to combat this issue, including raising consumer awareness, optimising menu planning, and implementing stricter procurement and promotional controls.

3.5. Customers Efforts in Reducing Food Waste

According to Pirani and Arafat (2016), the primary cause of food waste in the hotel industry is imprecise consumer demand forecasts, which are linked to the percentage of guests that check-in. Food waste generation is predicted to increase with a lower value of this ratio. Pirani and Arafat (2016) stated that hospitality organisations prioritise precise forecasts of the number of guests to reduce food expenses. However, the forecasted customer volume did not always accurately align with the actual number of customers. These businesses, however, are hesitant to take the chance of underestimating the amount of food required to satisfy patron demand; they would instead fall on the side of excess. Pirani and Arafat (2016) discovered that striking the right balance when determining how much food to prepare depends on variables, including prior visitor trends, the predictability of guest counts, menu size, and outside variables like nearby hotels and restaurants. Even though computational equipment can predict cooking portions, many chefs still rely on their experience. Similarly, buffet operations and preparing 30% more food than needed for reservations resulted in a food surplus, which contributed to excessive food waste, as identified by Papargyropoulou et al. (2016) through an interview with the restaurant's head chef. This highlights the significance of accurately predicting the number of customers to prepare food for, as it is essential to avoiding food surplus. Hotels need to enhance their guest show-up percentage because it is one of the key elements influencing the amount of food waste produced in a hospitality facility.

Consumer awareness regarding food waste is crucial in reducing it, as asserted by a considerable amount of literature (Amicarelli et al., 2022; Bhajan et al., 2022; Chi-Mei & Chih-Ching, 2023; Kattiyapornpong et al., 2023; Nair et al., 2019). For instance, Amicarelli et al. (2022) posited introducing an online platform for donating food and promoting awareness campaigns at various levels to reduce unsustainable behaviour among guests. Bhajan et al. (2022) found that 40% of daily food waste occurs at the consumer's plate, indicating a lack of awareness and sensitivity to food waste's environmental, social, and economic impacts. Similarly, Chi-Mei and Chih-Ching (2023) showed that restaurants can reduce food waste by adjusting menus based on guest preferences and quality and educating customers on proper portioning since they are the primary contributors to food waste. Likewise, Kattiyapornpong et al. (2023) suggested the need for awareness and practice in organisations to reduce food waste. Finally, Nair et al. (2019) reported that visually engaging methods, such as using colourful illustrations that display the rights and wrongs of proper food consumption, effectively control guests' actions. Hence, customer education and aggressive sensitisation are essential to foster a zero-food wastage culture.

Effective communication strategies can encourage customers to participate in food waste reduction efforts. Olavarria-Key et al. (2021) conducted a significant study that examined various interpretations of patrons' viewpoints regarding communication for food waste reduction in restaurants. Study 1 conducted focus groups with nine university students studying hotel management in the South of the United States (Olavarria-Key et al., 2021). The interview discussed topics such as communication techniques, ordering patterns, awareness, and possible results of successful food waste reduction communication. Accordingly, study 2 was built on the insights of study 1 that revealed the impact of communication modality, presentation order, and mindfulness on customers' intention to follow food waste reduction policies in airport food service settings. Olavarria-Key et al. (2021) found that hunger, satiation, habits, and financial consciousness influence food waste messages during the ordering stage. People with high mindfulness consistently supported food waste reduction efforts, irrespective of communication modality. Individuals with low mindfulness demonstrated intentions influenced by communication methods, showing decreased support for food waste reduction when messages were delivered verbally before meals. The studies suggested that the impact of hunger on attention to food-related information could explain increased support for food waste reduction in a food service context (Olavarria-Key et al., 2021). Moreover, Antonschmidt and Lund-Durlacher (2021) confirm that specific communication strategies can successfully encourage hotel customers at the all-you-can-eat sun and beach resort hotels to reduce food waste. Edible plate waste immediately decreased due to context modification, and the attitude-behaviour-context theory demonstrated that the tools' context alteration raised the total attitude-context combination above the behavioural threshold. The most effective point of contact was the guest table's tools, which many visitors thoroughly studied, demonstrating that lowering environmental impact was a deliberate and thoughtful choice (Antonschmidt & Lund-Durlacher, 2021). The research indicated that by using specific written and graphic communication methods, customers can be persuaded to act more responsibly.

3.6. Summary

To conclude chapter three, it is noted that the imperative of managing and reducing food waste has escalated in the current landscape, where sustainability and responsible environmental practices are gaining prominence. This comprehensive literature review examines various strategies for addressing food waste in the hospitality industry, encompassing management techniques, collaborations, staff engagement, customer education, and communication strategies. The review serves as a robust groundwork for delving into diverse approaches necessary for combating food waste across various industry levels. The first theme pointed out that the hospitality industry significantly contributes to food loss and waste (FLW) due to the surge in out-of-home food consumption and escalating disposable income. Notably, countries such as the United States and the United Kingdom rank among the highest producers of FLW.

Hence, effectively reducing food waste in this sector mandates innovative solutions to curtail waste disposal costs, enhance corporate image, and champion environmental preservation.

The second theme of star-rated hotels is pivotal in advancing sustainability by implementing effective food waste management procedures, including quality control and first-in, first-out systems, streamlined interdepartmental communication, and appropriate storage and handling of perishable goods. Collaboration among stakeholders, entailing partnerships with local farmers, charitable organisations, and cross-sector associations, is required to diminish food waste and foster a sustainable future. The third theme is that engaging staff in reducing food waste is crucial for promoting sustainability in the food service industry. Research shows that ethical sustainability significantly impacts employees' ability to prevent food waste, and training staff to enhance their understanding and use of waste management strategies is essential. Comprehensive staff training should focus on food waste practices and the financial, environmental, and social responsibilities related to these practices. Additionally, buffets emerge as significant contributors to food waste, necessitating a multifaceted approach to confront this issue, encompassing consumer awareness, optimised menu planning, and rigorous procurement controls. Finally, effective communication strategies also wield the potential to incentivise customer participation in food waste reduction endeavours, underscoring the imperative of education and robust sensitisation to incubate a culture of zero food wastage.

This study acknowledges existing research on food loss, waste usage, and awareness in first-world countries such as the United States and the United Kingdom. However, existing literature underscores the exigency for additional research to unravel the complex nuances of food waste management across diverse industry levels, intending to foster more potent and sustainable practices. Furthermore, the lack of academic research on food loss and waste (FLW) accentuates the need for a more comprehensive understanding of the factors underpinning effective mitigation. Consequently, further research is indispensable to demarcate the extent of FLW, pinpoint critical influencers, and underscore prevailing management strategies. The literature dearth in New Zealand, particularly in Invercargill, has inspired this research to address the gap in existing literature.

Chapter 4: Methodology

4.1. Introduction

This chapter outlines the methodology employed in this research to achieve the study objectives. It addresses the research design, encompassing the research philosophy, approaches to theory development, methodological choice, the purpose of the research design, and the data collection method. In each section, the researcher details the methodologies selected for this study and explains each choice. Furthermore, the procedural method is detailed, providing an in-depth explanation of various aspects of the process, such as the interview location, duration, participant demographics, and contact method. This is followed by a summary of the participants and an explanation of the data analysis approach. The chapter then details the study's limitations, delimitations, and biases. Finally, it describes the ethical considerations of the study.

Some sections of this chapter were completed as part of MGT804, the research methodology component of the Master of Applied Management qualification, of which this research project is the final component. While modifications have been made and new paragraphs have been added to the original methodology completed as part of MGT804, self-citation was unnecessary, as MGT804 is the research methodology paper for this research project component of the Master of Applied Management qualification.

4.2. Research Philosophy

The concept of philosophy revolves around the need to develop a profound understanding of a particular subject and to question its fundamental principles. In the context of research, the study of philosophy can be leveraged to support a particular perspective or approach, particularly by employing specific philosophical frameworks (Burke, 2007). Further, research philosophies refer to sets of beliefs and assumptions that guide the progress of knowledge (Saunders et al., 2023). It is important to note that these philosophies are not neutral but are embedded with significant presumptions about one's worldview. As a researcher, your initiatives are bound to be influenced by these presumptions in numerous ways (Saunders et al., 2023). Therefore, it is imperative to develop the skill of reflexivity, which involves critically examining and questioning your assumptions and views with the same rigour that you would apply to others' beliefs (Saunders et al., 2023). This will enable you to gain a deeper understanding of your research philosophy.

The inherent nature of philosophical approaches promotes a profound analysis of the research topic, leading to additional inquiries relevant to the study (Crossan, 2003). Furthermore, researchers should incorporate philosophy into research to improve their ideas and skills (Holden & Lynch, 2004). Understanding the researcher's perspective on "Why research?" is crucial for comprehending "How to research?" and "What to research?" (Holden & Lynch, 2004). Philosophy is vital in addressing "Why research?" within research science. When researchers adopt a hypothetical methodology while not believing in the existence of reality, it contradicts the philosophical basis of the research effort, undermining the fundamental principles of the research discipline (Holden & Lynch, 2004).

Accordingly, Saunders et al. (2023) identified five significant philosophies in business and management: positivism, critical realism, interpretivism, postmodernism and pragmatism. Ryan (2018) found that positivism, a philosophical approach commonly associated with experiments and quantitative research, is a form of empiricism that aligns with rationalist or empiricist beliefs. Empiricism posits that knowledge ought to be objective and devoid of bias. Conversely, positivism is founded on the premise that reality is universal and comprehension of reality is best achieved through observation and measurement (Ryan, 2018). Key distinguishing features of positivism include phenomenalism, deductivism, objectivity, and inductivism (Ryan, 2018). Critical realism aims to connect the apparent phenomena and the underlying structures of reality that influence them (Saunders et al., 2023). Additionally, critical realists employ various techniques to conduct historical analyses of evolving or stable societal and organisational structures. Alternatively, interpretivism, rooted in anthropology, opposes positivism and is sometimes called anti-positivism (Ryan, 2018). It posits that truth and knowledge are subjective, culturally and historically situated, and influenced by people's experiences and understanding. Researchers' values and beliefs influence data collection, interpretation, and analysis (Ryan, 2018; Saunders et al., 2023). Another view is that postmodernism emphasises language and power dynamics in shaping the world (Farhan, 2019). Its objective is to challenge conventional wisdom and amplify underrepresented viewpoints marginalised and oppressed by dominant ideologies. Postmodernists aim to deconstruct data to uncover its inconsistencies and gaps (Farhan, 2019). Finally, pragmatism allows researchers to incorporate quantitative and qualitative assumptions in mixed methods research, enabling them to select methods that align with their research objectives (Creswell & Creswell, 2018). This approach acknowledges that research is situated in diverse social, historical, and political contexts. Mixed methods studies may integrate a postmodern theoretical framework that reflects social justice and political goals, creating space for diverse methods, worldviews, and assumptions (Creswell & Creswell, 2018).

The primary goal of this research was to explore the current status of food waste management in the food and beverage sector of Invercargill, New Zealand. This study indicates a significant association between sustainable practices and the hospitality industry among professionals in this domain. Hence, an interpretivism framework is a suitable fit. Interpretivism refers to a social science approach that emphasises comprehending individuals' beliefs, motivations, and reasoning within a social context (Nickerson, 2022). Furthermore, a phenomenological approach is suitable, as it is a philosophy-driven methodology that involves delineating the lived experiences of individuals concerning a particular phenomenon, typically through interviews, intending to capture the essence of multiple individuals' experiences through this in-depth approach (Creswell & Creswell, 2018).

4.3. Approaches to Theory Development

Theory development is an indispensable aspect of research (Hassan, 2024). It enables the construction of explanatory frameworks that aid in comprehending, illustrating, and forecasting phenomena. It furnishes a systematic structure for arranging observations, data, and research findings (Hassan, 2024). Theories act as guiding beacons for researchers, assisting in the formulation of hypotheses, experimentation design, and result interpretation (Dankasa, 2015). The absence of well-crafted theories leads to incoherence and disorientation in research, but numerous approaches offer distinctive perspectives and methodologies (Dankasa, 2015).

Saunders et al. (2023) identified three main approaches to theory development: inductive, deductive, and abductive. Inductive reasoning entails transitioning from concrete observations to more comprehensive generalisations and theories (Streefkerk, 2023). It commences with data collection and analysis, identifying recurring patterns or themes, and ends with general conclusions. Inductive reasoning is especially suitable for exploratory research, which aims to derive new insights or theories from empirical data (Streefkerk, 2023). The process of deductive reasoning runs contrary to inductive reasoning, as it begins with overarching principles or theories and proceeds towards specific predictions or hypotheses (Merriam-Webster, 2024). Its methodology involves evaluating hypotheses generated from existing theories against empirical evidence to confirm or negate their validity. Deductive reasoning frequently applies in confirmatory research, which aims to authenticate or expand current theories through empirical testing (Merriam-Webster, 2024). Finally, abductive reasoning, also known as retroduction by critical realists, involves utilising data to investigate a particular phenomenon, recognise themes, and interpret patterns to construct a new theory or revise an existing one (Saunders et al., 2023). The developed theory is then tested frequently via additional data collection. This study used inductive reasoning, characterised by generating theories based on observed and collected data (Thomas, 2006). It entails identifying data patterns, themes, and relationships to develop a comprehensive conclusion (Streefkerk, 2023; Thomas, 2006).

4.4. Methodological Choice

Creswell and Creswell (2018) found that identifying and selecting appropriate data collection methods is crucial to research design. Generally, quantitative, qualitative, or mixed methods can be implemented to gather data about the research problem. Firstly, quantitative research is a methodical and rational approach that aims to discover precise and objective truths by utilising hypotheses, variables, and statistical analysis (O'Leary, 2021). This approach is typically broad in scope but lacks the qualitative depth that other research methods may offer. It is closely associated with realism, empiricism, and positivism and is founded upon the scientific method, deductive reasoning, and objectivity (O'Leary, 2021). Hence, quantitative research places great importance on quantification and numerical analysis and upholds a firm belief in the value of the scientific method. Subsequently, qualitative research investigates attitudes, behaviours, and experiences using interviews or focus groups to gain in-depth insights from participants (Dawson, 2019). This type of research involves fewer participants, but the interactions with them are more extensive, focusing on the significance of attitudes, behaviours, and experiences. Qualitative methodologies encompass action research, ethnography, feminist research, and grounded theory (Dawson, 2019). It is essential to note that both qualitative and quantitative studies are valid despite their differences; each has advantages and disadvantages (Dawson, 2019). Finally, mixed methods research integrates qualitative and quantitative data in a study, enabling researchers to adopt question-driven approaches that are not confined by paradigm (Creswell & Creswell, 2018). This approach enhances the depth and insights of numerical data, adds precision to qualitative information, and permits the use of diverse research protocols in sequential stages while also enabling the capture of multiple perspectives and facilitating triangulation (O'Leary, 2021).

The selected research methodology was qualitative, which is well-suited for investigating food waste management in the food and beverage industry of Invercargill, New Zealand. Qualitative methodology is well-suited to data on this thesis because it allows the researcher to assess the current attitudes and behaviours of food waste, reduction strategies and motivators to reduce food waste through the view of professionals' experiences in this sector, which is usually performed in the field, providing an understanding of the situation (Golafshani, 2003; Vishnevsky & Beanlands, 2004). This approach will comprehensively understand waste generation, considering socio-cultural, economic, and environmental factors. The qualitative data for this study was gathered through semi-structured interviews, covering topics such as knowledge of food waste, challenges, and approaches. Its holistic nature allows for exploring various aspects and comprehending the interconnected factors influencing food waste management practices. The rich data from qualitative research offers a deeper insight into food waste management issues in the industry.

4.5. Purpose of the Research Design

When undertaking a research study, the researcher must acknowledge the significance of the research design in addressing the primary research problem. Depending on the nature of the research question, research can be categorised as exploratory, descriptive, or explanatory (Saunders et al., 2023). Exploratory studies seek to investigate the initial stages of topics, often with limited prior research, to generate new ideas and hypotheses without proper verification (Swedberg, 2020). It assesses the feasibility of more extensive studies and determines data collection methods, often involving new phenomena and curiosity-driven research (Creswell & Creswell, 2018). Descriptive studies illustrate individuals, events, or conditions in their natural state without altering variables (Siedlecki, 2020). These studies can examine multiple variables or focus on a single variable. They help identify population characteristics, issues within specific units, or differences between institutions or countries (Siedlecki, 2020). In contrast, explanatory studies seek to explain and justify descriptive findings by addressing "why" and "how" inquiries (Boru, 2018). They extend exploratory and descriptive research by pinpointing the underlying reasons for a phenomenon. These studies offer evidence to validate or challenge explanations or forecasts and unveil connections among various facets of the investigated phenomenon (Boru, 2018).

Therefore, this study opted for a descriptive method to provide a comprehensive account of the events experienced by individuals or groups within Invercargill's food and beverage sector, specifically from the perspectives of managers, chefs, and servers. The choice of this method was deliberate and based on careful consideration. A well-structured, meticulously designed research framework is crucial for guiding the study's trajectory, offering a systematic path throughout the research process (Lambert & Lambert, 2012). By using a descriptive approach, the study aims to deliver an all-inclusive account of these experiences, ensuring thorough and detailed insights into the sector's dynamics (Lambert & Lambert, 2012). As illustrated in Table 1, a detailed overview of the research methodology is presented.

Table 1 Overview of the Research Methodology

Research Philosophy	Overall Approach	Design	Method(s)	Role of researcher	Kind of data collected	Intended Analysis
Interpretivism	Descriptive	Phenomenology	Interviews	Involved	Qualitative	Inductive

4.6. Method: Interviews

4.6.1. Purpose of Interviews

Interviews are a widely used method for researchers to gather qualitative data. Qualitative research interviews are preferred to understand individual perspectives rather than generalise about large groups (McGrath et al., 2019). The interview can be viewed as a form of communication, with both the interviewer and interviewee playing active roles (Dilley, 2000). Research interviews aim to comprehend individuals' perspectives, experiences, beliefs, and motivations on specific subjects, offering more profound insights into social phenomena than quantitative methods such as questionnaires (Gill et al., 2008). Interviews are particularly appropriate when there is limited knowledge about the study phenomenon or when in-depth insights are required. Saunders et al. (2023) highlighted the importance of asking targeted questions and actively listening to interview responses to explore a phenomenon effectively. Furthermore, creating an interview schedule involves formulating open-ended, neutral, and easily understood questions that can provide valuable insights into the study phenomenon and research objectives (Gill et al., 2008). It is essential to begin with straightforward questions and gradually move to more complex topics to establish a good rapport with the interviewees and encourage them to share rich and detailed information, which can be further explored during the interview (Gill et al., 2008).

As a result, interviews were chosen as the preferred method for gathering information, enabling researchers to explore the meanings constructed by the participants themselves (Kendall, 2014). This method promoted empathy and understanding due to the open-ended and conversational nature of the interview process (Kendall, 2014). Moreover, interviews were well-suited for studying complex situations, enabling the interviewer to pose and elaborate on intricate questions in person (Kumar, 2014). They helped collect in-depth information, capturing non-verbal reactions and ensuring that questions were comprehensible to the respondent (Kumar, 2014). Therefore, interviews could uncover insights into the generation of food waste and current practices by Invercargill's food and beverage sector.

4.6.2. Interview Design

In the field of social research, various types of interviews are commonly employed, including unstructured, semi-structured, and structured interviews (Dawson, 2019). Unstructured interviews are characterised by informal, open-ended discussions that lack predetermined theories or concepts (Gill et al., 2008). They typically commence with an open question and evolve based on the initial responses. These interviews are challenging to manage and time-consuming due to the absence of predetermined questions and limited guidance (Gill et al., 2008). They are commonly employed when in-depth exploration is required, limited knowledge about the subject matter, or an alternative perspective is sought. Semi-structured interviewing is widely utilised in qualitative social research as it allows researchers to gather specific information that can be compared with data obtained from other interviews (Dawson, 2019). In this type of interview, consistent questions are asked in each session to facilitate comparison. However, the interview also maintains flexibility to allow for the emergence of other important information (Dawson, 2019). Conversely, structured interviews involve verbally asking predetermined questions, making them efficient and straightforward (Gill et al., 2008). By minimising variation and follow-up inquiries, these interviews can help address potential literacy or numeracy challenges among respondents (Gill et al., 2008).

The researcher employed a semi-structured interview design because it is a method widely used in development research that emphasises specific themes through a conversational approach (Raworth et al., 2012). This method provides valuable insights into individuals' motivations, attitudes, beliefs, and the effects of policies or events on their lives, revealing unexpected information from diverse sources such as ministry officials, farm workers, and head teachers (Raworth et al., 2012). Semi-structured interviews were a powerful tool for gathering qualitative data. They combined the formal structure of structured interviews with the flexibility of in-depth interviews, making them great for collecting structured and unstructured information (Moore, 2013). The interview schedule was similar to a structured interview, with closed and open-ended questions. During the interview, the interviewer recorded responses accurately, using prompts and probes to obtain spontaneous views from the interviewee (Moore, 2013). Overall, this interview design allowed the collection of verbal statements from professionals in the food and beverage sector that revealed their knowledge of food wastage and strategies against food waste (see Appendix A for Interview Schedule).

4.6.3. Procedure

The researcher initiated the approach to food and beverage organisations through a written invitation via the email address found on their official websites or social networks, follow-up emails, and face-to-face invitations where necessary to secure an interview (See Appendix B for Invitation Letter). This is called purposive sampling, in which the researcher deliberately chooses individuals based on their judgment to collect the most pertinent information for a study (Kumar, 2014). This approach is valuable for uncovering historical facts or describing unfamiliar phenomena. Further, an invitation letter campaign was established, which relied on interpersonal relations and connections between people to connect with experienced professionals in the local restaurant industry, known as the snowballing sample technique (Browne, 2005). Only those who accepted the invitations participated in the Invercargill interviews. The interviews were conducted in their workplace at convenient hours for the participants, always avoiding busy hours or any interruptions for the participants. The data was recorded using Microsoft Teams and a mobile phone during interviews. It was password-protected, and the speech was transcribed using the Microsoft Teams transcription function. A participant information sheet (See Appendix C) provided details about the study, and a consent form (See Appendix D) was given to the participants before they began the interview. The researcher initiated the interview only after the participants had read the information sheet and signed the consent form. The target was to interview ten to fifteen participants. The researcher secured ten interviews, which were conducted between May and June 2024. Moreover, the researcher previously defined the interviews as lasting between 30 and 45 minutes.

4.6.4. Participants

Four women and six men from various backgrounds participated. Some had over ten years of experience in the food and beverage sector, while others had worked in the industry for a year. Table 2 presents the demographic information of each participant.

Table 2 Demographic Information

Code	Gender	Age	Education Level	Role	Work Experience in the Food and Beverage Industry
1	Male	21-30	Diploma	Manager	One year
2	Male	41-50	Diploma	Owner/Chef	Twenty-five years
3	Female	41-50	Other	Owner	Fourteen years
4	Female	21-30	Undergraduate	Server	One year
5	Male	31-40	Postgraduate	Operation Manager	Three years
6	Female	41-50	Undergraduate	Manager	Seven years

7	Male	31-40	Postgraduate	Assistant Manager	Six years
8	Male	21-30	Diploma	Manager	Seven years
9	Male	31-40	Postgraduate	Co-owner	One year and a half
10	Female	31-40	Other	Co-owner	Fifteen years

4.6.5. Data Analysis

Analysing qualitative data typically involves a complex and time-consuming process, mainly due to the initial task of organising the data into a manageable format. This may include sorting through questionnaires with written responses of varying lengths to open-ended questions or transcribing recorded interview responses, which can be extensive (Walsh, 2001). Regardless of the form in which the data is presented, reorganising it is necessary. Various approaches to qualitative analysis encompass thematic analysis, grounded theory, narrative analysis, template analysis, and content analysis (Saunders et al., 2023). The chosen analytical approach for the study was thematic analysis, a commonly used qualitative descriptive research method for analysing qualitative data (Riger & Sigurvinsdottir, 2016). This method involves identifying, analysing, and interpreting recurring patterns or themes in the data. Thematic analysis typically consists of six stages: familiarisation with the data, coding, generating, reviewing, defining, naming, and writing up (Braun & Clarke, 2022; Riger & Sigurvinsdottir, 2016). This method is particularly suitable for studies seeking insights into individuals' perspectives, opinions, knowledge, experiences, or values from various qualitative data sources, such as survey responses, social media profiles, or interview transcripts. Furthermore, the thematic analysis was conducted using an inductive or bottom-up approach. Inductive analysis is data-driven, with the identified themes strongly linked to the data and not driven by the researcher's theoretical interests (Braun & Clarke, 2006). Moreover, data collection was stopped after the 10th participant as no new information emerged from the interviews with the 10th interviewee. At this stage, the researcher recognised that data saturation had been reached. According to Braun and Clarke (2021) saturation is often defined as the point at which no new information, codes, or themes are obtained from data. It originates from the more precisely defined concept of theoretical saturation in grounded theory. Saturation has also been recognised as the most frequently cited rationale for sample size in qualitative research (Braun & Clarke, 2021). Further, data saturation has become closely associated with thematic analysis (Braun & Clarke, 2021).

4.7. Limitations, Delimitations, Reliability and Bias

This section addresses the study's limitations, deliberate boundaries, reliability measures, and potential sources of bias. It acknowledges potential weaknesses and underscores the significance of comprehending these elements for precise interpretation and recognising the study's contributions within the relevant context.

4.7.1. Limitations

The study explored the current status of food waste management in the food and beverage sector of Invercargill, New Zealand, from the perspective of managers, chefs, and waiters. The recruitment of the participants became the main limitation of this research. Moreover, since the topic remains unexplored, the participants who have accepted the invitation are generally interested in the issue and, as a result, may not be an average representation. Consequently, offering comprehensive solutions may prove challenging, and the study could reflect a small-scale qualitative research effort. Further, the maximum expected number for this study was 15, which has limited the findings since it reached data saturation, meaning that after ten interviews, no new codes emerged from the analysis (Bragaru et al., 2013). Another limitation of the study relates to the timeframe, and the researcher's time to conduct the research influenced the sample size. Firstly, from the researcher's side, the allocated time to complete the master's thesis is insufficient to reach a broader population and represent an average representation. Secondly, from the participant's side, they can be reluctant due to work commitments, inability to attend interviews, and to give some of their personal time. A more comprehensive study would have preferably involved a significantly larger sample size. Baker and Edwards (2012) stated that the researcher's time for data collection can impact the sample size.

4.7.2. Delimitations

The study's geographical location, Invercargill, New Zealand, delimited it. Although ten semi-structured interviews were conducted, the sample size was inadequate and did not represent the big picture of New Zealand as a whole. Hence, the results cannot be generalised in studies with in-depth interviews because "small samples are chosen, and random sampling methods are not used" (Boyce & Neale, 2006, p. 4). Furthermore, qualitative research methods can generate "moderate generalisations," which are practical generalisations based on personal experiences (Payne & Williams, 2005). These generalisations uphold order and consistency in social interaction and are inevitable in qualitative studies, given their focus on specific contexts (Payne & Williams, 2005).

4.7.3. Reliability and Bias

The concepts of reliability and validity are vital components of research. Ritchie et al. (2013) asserted that these methods demonstrate the strength of the research process and the credibility of the findings in a study. Reliability refers to the consistency of the analytical procedures, which includes addressing personal and research method biases that may have influenced the findings (Noble & Smith, 2015). Conversely, validity pertains to the precision with which the findings accurately reflect the data (Noble & Smith, 2015). The researcher in this study has a background in hospitality and took an entirely impartial approach to ensure unbiased data analysis. This involved exclusively depending on the perspectives offered by the interviewees while intentionally refraining from incorporating personal viewpoints or interpretations (Creswell & Poth, 2016). Such a meticulous approach was implemented to uphold objectivity and to accurately reflect the experiences and insights of the participants in the study's findings (Creswell & Poth, 2016). Ensuring the credibility of a research report is essential for establishing dependability in qualitative research (Golafshani, 2003). The principles of rigour and quality were adapted to align with the intricacies of qualitative research, given the pivotal role of a research report's credibility in producing high-quality studies (Golafshani, 2003). Therefore, acknowledging the intricacies, the researcher applied measures to be available for the participants since the first approach, such as considering their valuable time to share their insights from their experience and respecting their time frame availability. This allowed them to express their opinions and beliefs without any factors rushing their responses.

4.8. Ethical Considerations

Research ethics are crucial in ensuring ethical conduct across various research fields. They encompass the ethical implications of researchers' interventions on participants and the protocols for safeguarding them (Bouma & Ling, 2004). In qualitative research, there is often a need for theoretical discourse and specific codes of ethics tailored to each discipline (Flick, 2018). However, a challenge within qualitative research lies in aligning general codes of ethics with the unique challenges of the field (Flick, 2018).

An ethics application was submitted to the Human Research Ethics Committee of the Southern Institute of Technology | Te Pūkenga to obtain approval. The application comprehensively outlined the study, including its aims, objectives, and the type of participants involved in the research (see Appendix E for Ethics Application). The committee approved the research project after reviewing the information provided in the ethics application (see Appendix F).

4.8.1. Method: Interviews

Before the interviews began, participants were provided with a participant information sheet (see Appendix C) containing a summary of the overall study. All participants were explicitly informed that they had the right to withdraw from the study at any time, even after providing informed consent. The researcher further clarified that participation was voluntary and that refusal to participate or withdrawal from the study would not impact the quality of the research or the participants themselves. Once the participants understood the requirements, a consent form (see Appendix D) was provided, and each participant provided their signature before the interview commenced.

The study used pseudonyms to safeguard participant anonymity during data analysis, as the researcher was not authorised to publish private information. The data is stored online and password-protected, with only the supervisor and researcher having access. After five years, the data will be deleted.

4.9. Summary

This chapter examined the suitable research design and the methodologies utilised in this research. The initial section of the chapter expounded on and justified the most suitable research philosophy for this study. The study employed interpretivism and descriptive philosophy and collected data through semi-structured interviews with Invercargill food and beverage managers, chefs, and servers. Furthermore, inductive reasoning was chosen as the appropriate approach to theory development. Moreover, qualitative data analysis was conducted using thematic analysis, and a protocol was established to ensure qualitative reliability. Ethical considerations were necessary, and participants were fully informed about the purpose and use of the interviews.

Chapter 5: Findings and Analysis

5.1. Introduction

This chapter provides a comprehensive discussion and thorough presentation of the present study's main findings from the data analysed. The primary focus of this study was to address the main research problem: What is the current status of food waste management in the food and beverage sector of Invercargill, New Zealand, from the perspective of managers, chefs, and servers? To answer this research question, the study aimed to describe the situation of food waste generation, identify the main sources of food waste, and evaluate the effectiveness of current food waste management practices in Invercargill's food and beverage organisations. Section 5.2 focused on interpreting and discussing the findings derived from the interview data. Finally, Section 5.3 compares and synthesises the pertinent findings of the data concerning the main research problem and objectives.

5.2. Results

The data was meticulously gathered through ten semi-structured interviews involving individuals from management, chef, and waiter positions in the food and beverage industry of Invercargill, New Zealand. The interviewees comprised six men and four women aged between 21 and 50. The previous chapter offered a comprehensive overview of the participants. To uphold ethical considerations, pseudonyms were used to ensure the confidentiality of the participants. Hence, the findings are attributed to Participants 1 through 10. Furthermore, the study employed a thematic analysis model to identify the prevalent themes within the data. Thematic analysis is a systematic approach that allows researchers to spot recurring themes within the data through interpretation and analysis of theme frequency (Braun & Clarke, 2006).

5.2.1. Theme: Understanding Food Waste

The participants' discussions started with their interpretations of food waste, which shed light on the various aspects of food waste, covering topics such as food preparation methods, consumer behaviour, environmental impacts, and the difficulties in managing excess food. The insights shared by the participants offer valuable perspectives on the intricate nature of food waste in diverse settings, including food service establishments and individual consumer practices.

"I would say food waste is the disorganised food we make, and we do not forecast if it is going to be used in a particular quantity. The ones that are wasted are leftovers; you can say food leftovers usually are food waste. It could be vegetables or the whole meal. The rice could be anything. Basically, in my opinion, the leftovers are not used, and you do not know how to use them." (Participant 7)

"Food waste is anything that is part of the food that is wasted by whoever is consuming it. It can be waste off of the plate, waste from the kitchen, or waste from homes." (Participant 8)

"Things that have been harvested, grown and then ended up in landfills." (Participant 10)

Subtheme: Perception of Food Waste

The subtheme from this question allowed the researcher to understand that each participant has unique perspectives and diverse viewpoints on food waste and their establishments. One participant emphasised the importance of minimising waste by preparing food only upon order, thus reducing waste at their end. Another participant expressed a strong aversion to food waste, highlighting efforts to keep waste to a minimum and disliking the idea of food being thrown away unnecessarily. In addition, a participant mentioned discarding food waste without considering the environment. This diversity of viewpoints adds depth and richness to our understanding of food waste management.

"There is no waste on our end because everything we make is by order, but there is on the customer's end." (Participant 2)

"I do not like it. Do not like food waste. We have personally been here trying to keep it to a minimum. Obviously, it can be a wee bit hard. But always try to keep it to a minimum. And, no, I do not like food waste." (Participant 3)

"I am close to beverage waste. If there were leftovers, I chuck it out to the basin. I never thought about the environment." (Participant 4)

Participants also delved into various aspects of food waste, including customers' disposal of leftovers, the potential reuse of food items such as carrots for soups, and the challenges of managing leftovers and forecasting food quantities to prevent waste. Furthermore, participants described instances of food waste occurring due to overordering and excess consumption, leading to uneaten food being discarded.

"The customer here and then if they do not take like if the leftover usually they take away they do takeaways, but if not that also is food waste." (Participant 6)

"Ingredients like a carrot, and then we can still use them at the end, like the part and for making soup or something else." (Participant 3)

"Food waste would be the disorganised food we make, and we do not forecast if it will be used in a particular quantity." (Participant 7)

Overall, the analysis reveals a shared understanding of food waste as a significant issue that occurs at various stages, from production to consumption, and efforts are being made to address and reduce this waste.

Subtheme: Identification of food waste in different categories

This interview question mainly focused on categorising the waste into nonavoidable, avoidable, and possibly avoidable groups. The objective was to gain insights into the sources of waste, recognise any recurring patterns, and pinpoint opportunities for enhancing waste reduction initiatives.

Nonavoidable Food Waste: This category comprises eggshells, vegetable skins, and animal bones. According to participants, these items are inevitable in food production and cannot be avoided.

"Most here probably like eggshells, vegetable and fruit peels, and things like that." (Participant 3)

"Nonavoidable (eggshells, vegetable skins, animal bones)." (Participants 6, 9, and 10)

Avoidable Food Waste: Participants emphasised that avoidable food waste primarily stems from uneaten food on client plates and cooking mistakes.

"The food left by the client; you have to dispose of them." (Participant 2)

"Quite a lot of uneaten food." (Participant 5)

"I would say from our restaurants would be the extra food left by the customers." (Participant 7)

"It is avoidable that the customers do not finish their food from the place that's the most common." (Participant 8)

Possibly Avoidable Food Waste: This category includes expired food and overripe fruits. One participant acknowledged that these items could be minimised or repurposed with better management practices to reduce overall waste.

"Sauces, spices. Stuff is outdated." (Participant 5)

In summary, the insights provided by the participants indicate that the primary sources are avoidable food waste, which is leftover food on customers' plates, and non-avoidable waste, which is viewed as an inherent part of food preparation.

5.2.2. Theme: Awareness and Perception of Food Waste in the Restaurant

The theme determines the awareness and perceptions of food waste within the participant restaurants. It scrutinises the factors contributing to waste and potential strategies for waste reduction and promoting sustainable practices. Addressing these aspects aims to enhance the understanding of food waste dynamics in restaurants and facilitate the development of more effective solutions to address this pressing issue, as pointed out by two participants.

"I think we all do, really." (Participant 1)

"Always". (Participant 5)

Subtheme: Recognition of the Food Wastage Problem

This interview question mainly addressed how restaurant owners and managers perceive the issue of food wastage in their establishments. Some acknowledge and work to minimise the issue, while others appear to downplay its significance or deny its existence entirely.

"We are not too bad. I mean, we do have food wastage, but I would not say it is a problem. Minimal." (Participant 3)

"Many restaurants, including ours, as well, but we try to keep it to a minimum. But yes, we do face a problem every now and then." (Participant 7)

For example, one participant reflects on the early days of their restaurant operation and admits to facing a substantial amount of wastage initially due to a need for knowledge on utilising all food items efficiently. However, they developed strategies to reduce waste over time, such as creating new menu items to use leftover ingredients effectively. This proactive approach demonstrates a clear recognition of the food wastage problem and a willingness to address it.

"We have been here for six years. At the beginning of the operation of this restaurant, we had a lot of waste because we did not know how to use them, and we then, you know, time goes on, and then we find that the way to use it for like properly like knows the without any waste." (Participant 6)

Further, some participants need to pay more attention to the extent of food waste in their establishments. One participant mentioned that they offer small portions of food, believing this mitigates the issue significantly.

"We offer small portions of food, so it is not too big a problem." (Participant 4)

Some restaurant participants claimed not to have a problem with food waste in their establishments.

"No, we do not have a problem with food waste." (Participant 8)

"No." (Participant 10)

Interestingly, there are also contrasting perspectives on customer behaviours impacting food waste. One participant observed that their customers consumed all the food on their plates, leaving minimal waste. This suggests that customer habits and preferences can influence restaurant food wastage.

"I believe my restaurant does not have that too much food waste from the kitchen, and sometimes I can see how much the customers eat on their menu but hardly leave any food. They squeeze all even the sauces and eat all of them." (Participant 9)

The analysis reveals various perceptions of food wastage recognition in the restaurant industry. It underscores the importance of recognising the varying degrees of awareness and actions taken towards food waste management. This recognition is crucial as it paves the way for a tailored approach to promoting sustainable practices within the food service sector, considering the different engagement levels among stakeholders.

Subtheme: Mealtimes Where Food Waste is Most Observed

The question under this subtheme focused on mealtimes to identify a pattern on wasted food. There was a clear consensus among participants on the meal during which food waste was most prevalent. Some participants highlighted dinner as the meal with the highest food wastage due to the larger portion sizes served and the tendency of customers to overestimate their appetite, leading to leftovers that are often not taken home.

"Dinner. We are not busy enough; then the food can only be kept for a certain amount of time." (Participant 1)

"Dinner time. Because dinner is a bigger meal, and then, as I say, people cannot think it is a big food, and then they cannot finish it, and they do not want to take it home the next day." (Participant 2)

"Dinner time, the family is willing to have so much food because it is the end of the day; they will be hungry because it is six hours from lunchtime. They may be a little bit greedier to eat more." (Participant 9)

In contrast, one participant pointed towards lunchtime as the period when food wastage is most prevalent, attributing it to rushed eating habits and ordering more than necessary due to time constraints.

"From my experience, I have witnessed that most of the lunch. That causes food wastage. It could be because people are in a rush. They want to go back to work. They feel hungry. They order too much food, but they do not realise they can finish it." (Participant 7)

Moreover, breakfast was mentioned as a meal where food wastage occurs, primarily because the dishes are available until a specific time. This indicates a time-bound aspect contributing to wastage.

"Breakfast, because the chefs' dishes are available by 2:00 pm." (Participant 4)

Additionally, insights from another participant suggested that in their setting, lunch was identified as the meal with the highest wastage, which they attributed to serving more lunches than dinners.

"Probably lunch. I think here people order food but do not realise how big the meal is going to be." (Participant 3)

"I would say lunch, but I am only saying that because we serve more lunch than dinner." (Participant 8)

Interestingly, one participant highlighted that while uneaten food was minimal in their establishment, the food preparation stage generated the most waste, particularly in vegetable items, which were managed by segregating and repurposing the scraps for animal consumption, thus minimising landfill waste.

"We get very little uneaten food. It would be in the food prep area, where we probably have the most volume. However, all our food scraps go to bins, so they do not go to landfills. It would be vegetable items for us that have the highest volume of waste and the preparation of them." (Participant 10)

Therefore, the analysis reveals that the meal during which food wastage is most prominent can be influenced by factors such as portion sizes, customer behaviour, time constraints, and kitchen operations. The findings underscore the importance of understanding these factors to implement effective strategies for reducing food waste in different meal settings.

5.2.3. Theme: Attitudes Towards Food Waste

This theme primarily focuses on attitudes towards food waste, which indicates a heightened awareness among restaurant owners and customers about the environmental and economic consequences of throwing away food. By emphasising creative solutions and nurturing a sense of responsibility, the restaurant industry can take significant steps towards minimising food waste and advocating for a more sustainable future. One participant expressed their level of concern internally and externally.

"It is only an area of concern from a larger environmental point of view. I feel like, from a macro point of view. I feel like if people take care not to waste food while going out or in their homes, it is just that there will be more food for us, you know, just globally to distribute among people. We can all be more mindful of how much food is, like making sure we only use as much as we consume. Yeah, but from a restaurant manager's perspective, it is not a problem for this cafe because we have ways to manage that. I wish our customers would finish their dishes, but we do not have an issue". (Participant 8)

Subtheme: Concern Level Regarding Food Waste in the Restaurant

This interview question was mainly about the issue of food wastage in restaurants, which is complex and multifaceted, as revealed through insightful discussions with various participants. Different perspectives emerged regarding the extent to which food waste is considered a critical issue within restaurant operations. The discussions highlighted contrasting attitudes and approaches toward addressing this challenge.

One prevalent viewpoint is the significance of minimising food waste in restaurants, which reflects a consensus among participants. They emphasised that reducing food wastage is connected to broader environmental and economic considerations. Participants recognised that food waste directly translates to food costs, highlighting the strategic imperative for restaurants to mitigate wastage. This financial perspective aligns with a broader view that emphasises the global implications of food conservation and distribution.

"We are always thinking about how to reduce the waste food waste we consider because it can connect to restaurant expenses. If we reduce, then we save more money." (Participant 6)

"I think to a very high extent, considering that people are very environmentally friendly these days. It could be, I will not say, that was the same case back ten years ago." (Participant 7)

"Food waste equals the food cost. We are really trying not to make food waste." (Participant 9)

On the other hand, individual perspectives highlighted the sources and impacts of food waste within restaurant settings. While some pointed out customer behaviours as a significant contributor to food wastage, others emphasised the role of internal processes and policies in waste management. The focus on customer behaviour signals a recognition of the need for enhanced consumer awareness and engagement in reducing food waste.

"It is but probably from customers. The customer's food waste, the leftovers and things." (Participant 3)

"It is from customers who have only 2 or 3 bites." (Participant 4)

Similarly, the internal focus on operational strategies and protocols reflects a proactive approach toward waste reduction from within the restaurant's sphere of influence. Furthermore, insights from these discussions revealed varying management practices concerning food waste in restaurants. Responses ranged from a minimalistic view of waste occurrence to a more proactive stance guided by structured policies.

"It is minimal, but it is something that we do look at all the time." (Participant 1)

"Minimising food waste is a high priority for us. It is in the area of concern of our waste. We have really good policies in place to minimise it. We have very minimal." (Participant 10)

Overall, the analysis highlights the multifaceted nature of food wastage as a concern in restaurants. It underscores the complex interplay of environmental, economic, and operational factors that shape attitudes and actions toward waste reduction.

5.2.4. Theme: Current Practices and Policies

This theme determined the current practices and policies aimed at reducing waste through strategic procedures at every stage of the food supply chain. Effective storage techniques help extend the shelf life of ingredients, while kitchen staff implement portion control and find creative ways to use leftovers. These coordinated efforts illustrate a comprehensive approach to food waste prevention, emphasising the significance of collaboration and innovation across all departments. For instance, one participant remarks on the importance of documenting and finding the issue's root cause.

"Anything that ends up in waste is recorded documentation and why it ends up in the bin. Sometimes, it might be an item that is not being sold enough; it might be a human error." (Participant 10)

Subtheme: Existing Policies and Procedures to Manage Food Waste

The question under this subtheme focused on the establishment's implementation of various policies and procedures to tackle food waste. The analysis indicates they take reactive and proactive approaches to address this issue. One notable strategy involves offering discounts to prevent food from being wasted and selling surplus food to the public before it needs to be discarded.

"We tend to do discounts to get rid of the food, to sell it to the public before it gets thrown out." (Participant 1)

Additionally, these establishments use targeted practices to repurpose food items that would otherwise be wasted, such as reusing vegetables and takeaway items. Proactive measures include structured processes for handling food waste, such as segregating it for collection by local farmers to feed their livestock. Training programs are also emphasised to educate staff on best practices to minimise waste, including proper food handling and portion control.

"Kitchen dates on everything rotate. Obviously, the oldest things get used first. We have people who drop off kindly pig buckets for their farm. That is just sort of our procedure. Any leftovers or food waste that we have always put into the pig bucket that can go in there so that the pigs and things can eat them; that is pretty much the process here." (Participant 3)

"We tried to focus on the training, and the other is the re-usage of the food." (Participant 7)

"We have a separate bucket in the kitchen, but we have a few separate buckets in the kitchen that's only for food waste and goes to farms around Southland." (Participant 8)

Monitoring and evaluation play a crucial role in food waste management. A participant mentioned documenting and analysing wasted items to identify trends and improve. These policies and procedures demonstrate a comprehensive and integrated approach to reducing food waste and promoting establishment sustainability.

"We document why things are ending up there or how they have ended up there so that we can review systems, processes and policies." (Participant 10)

Subtheme: Staff Role in Food Waste Prevention

This interview question mainly focused on understanding the staff's role in preventing food waste, which is crucial in food establishment operations. They are vital in managing and minimising food waste through various strategies and practices. One significant approach highlighted in the interviews is the focus on portion control and standardisation. Staff members ensure consistent portion sizes and avoid excessive servings. This not only aids in reducing unnecessary waste but also maintains uniform serving sizes, enhancing customer satisfaction.

"I want to say portion sizing, making sure that all the portions are the same, not too much of things." (Participant 3)

Furthermore, the discussions underscore the staff's responsibility for efficient inventory management and stock rotation. Staff members actively monitor ingredient usage, calculate averages, and track expiry dates to prevent spoilage. By closely monitoring supplies and adopting a 'first in, first out' approach, staff significantly minimise food waste and ensure effective utilisation of fresh produce.

"I record how much I buy of the ingredients. Then, record in the Excel file and calculate the average amount used monthly or weekly." (Participant 9)

"We bring stock, and we rotate. Keeping an eye on expiry dates and setting and coming up to expiry date, making sure that they utilised before their past those time periods." (Participant 10)

Moreover, staff training and adherence to strict recipes play a crucial role in waste reduction. It is highlighted that detailed recipes with specific ingredient quantities help mitigate the risk of errors that could lead to wastage. By following standardised recipes and maintaining consistency in food preparation, staff members contribute to efficient resource utilisation and minimise unnecessary food discard.

"We have particular recipes that are all written down. We have hard copies and files in the kitchen." (Participant 8)

However, the discussions also emphasise the importance of staff behaviour and attitudes towards food waste prevention. Staff members are encouraged to lead by example, avoid overproduction, maintain food presentation without causing waste, and actively participate in donation initiatives.

"We try to train our staff and lead by example by not burning food or anything. And we do not go for the presentation of the food as well. I think that causes a lot of food wastage. We still manage to make our plates pretty much presentable." (Participant 7)

In conclusion, the analysis emphasises that the staff plays a multifaceted role in preventing food waste within the establishment. Through practices such as portion control, inventory management, recipe adherence, and promoting a waste reduction culture, staff members significantly optimise resources, reduce environmental impact, and encourage social responsibility.

5.2.5. Theme: Communication and Collaboration

The questions for this theme were primarily centred on the crucial role of effective communication and collaboration in food waste management. As one participant mentioned, open channels and staff involvement are essential. Managers should support strategies involving all staff members to ensure waste reduction and common goals are understood and achieved.

"Multiple times a week, because of their documentation process, they are required to be raising it down. All the time, there is a constant narrative around minimising waste. At the moment, we have roadwork, sales are slower, and we are having conversations about reducing batch sizes, so we do not get food wasted. Knowing that the sales are slowing down, we need to respond and make smaller amounts of each thing so that we do not have things that are not sold. Conversations like that are happening all the time for varying different reasons." (Participant 10)

Subtheme: Interactions Among Staff Regarding Food Waste

This subtheme highlights a consistent effort to address and prevent food waste within the organisations through staff interactions. Staff members engage in regular conversations and training sessions to ensure everyone understands the importance of minimising waste. They have developed a keen sense of responsibility towards managing food waste and addressing the environmental and financial implications for the business.

"We do talk about it. Kind of when we notice that it is becoming an issue because we try to deal with it, and if it starts coming and becoming an issue again, we look at it again." (Participant 1)

"Every day and every time. Check the quality; both shifts communicate with each other." (Participant 5)

"It would definitely be just a conversation that we have with the staff, just letting them know how to take the proper measurements and how to avoid that wastage in the future. And it will be the same thing in the kitchen as well, like if there is a particular staff member happens to waste a little bit of extra product in the process of base making something, it will just be like a teaching approach that we say, as in this is what you have to do next time. This is how you avoid that wastage." (Participant 8)

"Always every day. Because, for example, the food is really hard to take care of." (Participant 9)

Through continuous communication and training, they have established effective strategies for handling food waste. The staff interactions are collaborative and supportive, fostering a culture of open communication, feedback, and empowerment. Hence, the staff interactions demonstrate a proactive and holistic approach to preventing food waste within the organisation.

Subtheme: Involvement of Key Personnel in Addressing Food Waste

The other subtheme that emerged during the interview was the collaboration among key personnel, which is essential in addressing food waste within the organisation. The discussions highlight proactive measures taken by individuals in different roles to mitigate food waste effectively. The involvement of managers, kitchen staff, front staff, and external partners like farmers collecting food waste underscores a comprehensive approach to tackling the issue. There is a shared responsibility and understanding that each member plays an essential role in the process. Training and instilling a waste-reducing culture among staff are evident throughout the discussions, emphasising a proactive approach to addressing the issue. Strategic coordination and scheduling of food waste collection demonstrate a structured and proactive approach to waste management, showcasing a commitment to upholding food safety standards and environmental consciousness.

"Everyone. And we teach it." (Participant 2)

"All the staff, because if the customer left the food and our part, just ask them to collect it, you know, for take away." (Participant 6)

"All the staff in the kitchen, including the chef and the manager. And as I said, the chicken or pig farmer who comes to collect our buckets is also involved in that. We have a rotating schedule." (Participant 8)

"The head chef and I, but all of our team because they all need to take responsibility for stock inventory and ensuring that products are utilised and at their freshest, but also making sure we can serve food safely, which means not letting food expire." (Participant 10)

Overall, the collaborative efforts and shared accountability among key personnel reflect a commitment to sustainability and a culture of responsibility and efficiency within the organisation, serving as a model for effective food waste management practices.

5.2.6. Theme: Strategies and Future Plans

The central theme is the urgent need to continually reduce food waste, which requires innovative strategies and forward-thinking solutions. Participants have made significant progress in their establishments by implementing creative and resourceful approaches to minimising food waste.

"I am always looking at information where there might be better practices that we can adapt and adopt within our team. Wherever we see new ideas, we onboard and bring them in and integrate them as part of our processes where they apply to us." (Participant 10)

Subtheme: Plans for Addressing Food Waste

This subtheme emphasises that participants actively implement strategies to reduce food waste in their establishments. They have shown significant progress, with one participant noting a substantial decrease in daily food waste since the business started.

"We are trying our best at the moment. We are not doing too badly now. For example, when we first opened it, we had a lot of food waste. There was so much." (Participant 1)

One notable example of their efforts is making their vegetable broth from leftovers, demonstrating their creativity in utilising food items that would have been wasted otherwise. This proactive approach indicates a shift towards sustainability and resourcefulness in their operations, showing their commitment to minimising wastage.

"We have just started making our vegetable broth with all our leftovers, like peels or vegetables." (Participant 3)

Moreover, the participants stress the importance of ongoing training and communication to address food waste issues effectively. They recognise the need for continuous improvement, such as regularly monitoring food quality and reinforcing proper handling practices among staff members. This commitment to training and attentiveness in daily operations demonstrates a proactive stance in maintaining food quality and reducing waste in their kitchen.

"The training is every day." (Participant 2)

"Good communication, journaling between shifts." (Participant 5)

The participants display a forward-thinking attitude by considering adjustments to portion sizes and exploring technological solutions like food management applications to track and minimise waste. This proactive approach to problem-solving and openness to innovation reflects their long-term commitment to sustainability and efficiency in their food management practices.

"There is one food-based management application. We have not worked on it officially, but we will discuss it with the higher managers and everything to download those and keep track of the food managed." (Participant 5)

5.3. Discussion

This research explores the experiences of managers, chefs, and waiters in food waste management working in the food and beverage sector of Invercargill, Zealand. To delve deeper into their experiences, three research objectives were determined. Firstly, we will describe the situation of food waste generation by the food and beverage organisations in Invercargill. Secondly, the main sources of food waste in Invercargill's food and beverage organisations must be identified. Thirdly, to evaluate the effectiveness of food and beverage organisations' current food waste management practices in Invercargill. This section discusses the study findings, considering the research objectives and the results of previous studies in the same field.

5.3.1. First Research Objective

To describe the situation of food waste generation by the food and beverage organisations in Invercargill.

The study revealed a comprehensive understanding of food waste within the food and beverage industry in Invercargill. Participants discussed various aspects of food waste, including food preparation methods, consumer behaviour, and environmental impacts. Accordingly, food waste-related studies have explored food service settings, including educational entities, domestic households and supermarkets (Brancoli et al., 2017; Engström & Carlsson-Kanyama, 2004; van Geffen et al., 2020). Specific international studies have been undertaken regarding the food and beverage sector that address various aspects of food waste arising within this sector (Lee & Huang, 2023; Papargyropoulou et al., 2016; Pirani & Arafat, 2016). However, these studies lack consistency in methodology and quantification measures and may not apply to New Zealand's sector (Chisnall, 2017). Until recently, new sources from the academic and non-academic areas have emerged to acknowledge this growing issue of food waste in New Zealand (Jones, 2017; Love Food Hate Waste, 2024b; Mainvil et al., 2018). The insights highlight that food waste occurs at multiple stages, from production to consumption. Participants emphasised minimising waste by preparing food only upon order and reusing food items, such as carrots, for soups. Similarly, several studies have mentioned an appropriate and practical approach, such as the food hierarchy pyramid, which discusses strategies for food management aimed at reducing food waste and repurposing discarded food (Lombardi & Costantino, 2021; Papargyropoulou et al., 2014; Srijuntrapun et al., 2022). These strategies are based on the waste hierarchy principles and highlight the most environmentally beneficial waste management options for each step. Hence, recognising food waste as a significant issue is evident, with efforts being made to address and reduce it among the participants.

5.3.2. Second Research Objective

To identify the main sources of food waste in the food and beverage organisations in Invercargill.

The research findings reveal various sources of food waste, which have been classified into three main groups: non-avoidable, avoidable, and possibly avoidable. Firstly, non-avoidable food waste: this category encompasses items such as eggshells, vegetable skins, and animal bones, considered inevitable byproducts of food production. Secondly, avoidable food waste primarily arises from uneaten food on client plates and cooking errors; this category was identified by participants, with leftover food being highlighted as the primary source of avoidable waste. This phenomenon often arises from the disparity between individual preferences and actual appetite, resulting in substantial leftover food (Lee & Huang, 2023). However, it is important to note that consumer knowledge of ingredients significantly influences food waste (Lee & Huang, 2023). When diners are familiar with the taste, characteristics, or proper preparation of specific ingredients, they can make more informed choices, reducing the likelihood of food waste. This should empower consumers to play a more active role in reducing food waste. Thirdly, possibly avoidable food waste: expired food and overripe fruits are included in this group, and participants expressed that with improved management practices, these sources of waste could be minimised or repurposed. Moreover, Mainvil et al. (2018) reported that 61% of food waste is avoidable, while 39% is unavoidable. The smallest recorded amount of avoidable food waste was 13%, with the highest recorded amount reaching 96%. These findings indicate that certain New Zealand businesses have lower avoidable food waste levels than others. Furthermore, the study findings underline that dinner and lunch were the most susceptible to waste due to more significant portions and rushed eating habits. As a result, the total amount of food waste generated appeared to correlate with the business's size and the quantity of diners served (Mainvil et al., 2018).

5.3.3. Third Research Objective

To evaluate the effectiveness of food and beverage organisations' current food waste management practices in Invercargill.

The research assessed existing practices and policies geared towards minimising food waste, outlining both reactive and proactive strategies:

- ✓ **Current Policies and Procedures**: The study participants detailed initiatives such as offering discounts to discourage food waste, repurposing food items, segregating waste for collection by local farmers, and conducting training programs for staff. Kattiyapornpong et al. (2023) found that recreating new menus from leftovers, either from buffets or excess pre-cooked food, is a common practice.
- ✓ **Staff Responsibilities in Food Waste Prevention**: The emphasis was placed on portion control, inventory management, adherence to precise recipes, and fostering a culture of waste reduction. The results of a study by Bhajan et al. (2022) showed that

participants discussed preventive practices against food waste, including colour-coding systems and the FIFO approach. The colour-coding system tags products closer to expiry dates, ensuring timely use. The FIFO method prioritises products received earlier, reducing spoilage and minimising food waste.

- ✓ **Communication and Collaboration**: The importance of regular discussions, training sessions, and collaboration among key personnel in addressing food waste was highlighted. Diaz-Farina et al. (2023) emphasised the importance of providing training since it was identified that establishments that offer employee training to prevent and manage waste produce 34.5% less mixed waste compared to those that do not offer training.

The effectiveness of these approaches is evident in their comprehensive involvement across all departments, from procurement to service. Furthermore, the study participants deliberated on plans to tackle food waste, including initiatives to create vegetable broth from leftovers, explore food management applications, and enhance training and communication efforts.

5.4. Summary

This chapter explored the experiences of managers, chefs, and waiters working in the food and beverage sector of Invercargill, Zealand, with food waste management. The chapter was divided into two main sections. In Section 5.2, the data collected through semi-structured interviews was presented and analysed. The results were interpreted and analysed using the thematic analysis approach, outlining the themes and subthemes that had emerged from the data. Section 5.3 discussed the analysis of the findings, their connection to the research objectives, and their links to previous studies.

The study's findings align with the research objectives, comprehensively portraying the food waste scenario within Invercargill's food and beverage industry. It successfully identifies the primary sources of waste and assesses the efficacy of existing management practices. The proactive steps taken, such as staff training and policy implementation, demonstrate a dedication to reducing food waste and advancing sustainability within the industry. These insights can serve as valuable inputs for future strategies and policies to reduce food waste and improve food management practices in comparable contexts.

Chapter 6: Recommendations and Conclusions

6.1. Introduction

This chapter summarises the thesis, links it with existing and relevant literature, and provides recommendations. It begins by citing the purpose of this research in section 6.2. Section 6.3 discusses the relationship of the findings to previous studies. Section 6.4 discusses the limitations of the present study. Section 6.5 discusses the recommendations for future research, and finally, the chapter concludes in Section 6.6.

6.2. Purpose of the Research

This research aimed to explore the current status of food waste management in Invercargill, New Zealand. To meet this research aim, the objectives of this research were:

Objective 1: To describe the situation of food waste generation by the food and beverage organisations in Invercargill.

The findings suggest that the participants comprehensively understand the food waste issue in the food and beverage industry in Invercargill, New Zealand. Emphasising its multiple stages, from production to consumption, participants underscored the importance of waste reduction by preparing food on demand and reusing and repurposing items. The study underscores the significance of addressing and minimising food waste, highlighting the necessity for sustainable practices.

Objective 2: To identify the main sources of food waste in the food and beverage organisations in Invercargill.

The study identified three types of food waste: non-avoidable, avoidable, and possibly avoidable. Non-avoidable waste includes eggshells, skins, and bones. Avoidable waste includes uneaten food and cooking mistakes. Possible avoidable waste includes expired food and overripe fruits. Regarding wastage, dinner and lunch are the most wasteful meals, primarily due to larger portions and hurried eating habits.

Objective 3: To evaluate the effectiveness of food and beverage organisations' current food waste management practices in Invercargill.

The study assessed current food waste reduction practices, focusing on reactive and proactive approaches. Strategies included discounts, repurposing, waste collection by local farmers, staff training, portion control, and collaboration. The effectiveness of these practices was demonstrated through a comprehensive approach involving all departments.

Chapter Two presents a detailed analysis of food waste management in the New Zealand food and beverage industry, emphasising the significance of theoretical frameworks such as the food waste pyramid and the circular economy. These frameworks are essential for understanding the causes of food waste and developing effective strategies to address it. The food waste prevention pyramid prioritises reducing surplus food production, repurposing food for human consumption, and recycling to avoid landfilling. The circular economy aims to create sustainable production-consumption systems that reduce waste and ensure resource efficiency. The Triple Bottom Line (TBL) framework further emphasises the need for a holistic approach to food waste management, considering social, environmental, and economic impacts. The chapter also provides an in-depth industry analysis, highlighting the significant contribution of the food and beverage sector to food waste in New Zealand. A PESTEL analysis identifies external factors influencing the industry, including governmental policies, economic incentives, consumer expectations, technological advancements, environmental concerns, and legal frameworks. Policies like the Waste Minimisation Act 2008 and initiatives like the Waste Minimisation Fund and the Love Food Hate Waste campaign support waste reduction and sustainability. Technological innovations, such as biodegradable packaging, food distribution platforms, and data analytics, play an essential role in minimising food waste across the supply chain. Overall, the chapter emphasises the importance of integrating theoretical constructs and practical industry analysis to address food waste effectively. It underscores the need for comprehensive strategies encompassing waste reduction, repurposing, and recycling, supported by governmental policies in New Zealand, which can significantly reduce food waste and benefit the environment, society, and the economy.

6.3. Relationship to Previous Research

Chapter Three explored the existing literature highlighting the substantial contribution of the hospitality industry to food loss and waste (FLW), attributed to increased out-of-home food consumption and higher disposable incomes (Papargyropoulou et al., 2016; Wrap, 2024). Notably, major producers such as the UK and the US generate significant FLW, with the UK alone producing over 10.7 million tons annually (Chen & Chen, 2018; Hotel Kitchen, 2016). To address this issue, many businesses are exploring environmental management practices to reduce their carbon footprint and enhance their brand image (Dodds & Graci, 2008; Kasim & Ismail, 2012). On the other hand, star-rated hotels have been recognised for their effective food waste management procedures, including quality control and FIFO systems (Aditya & Kurniawati, 2023; Amicarelli et al., 2022; Kattiyapornpong et al., 2023). Further, collaborative efforts, as evidenced by initiatives like the food waste challenge in the Netherlands, have proven successful in significantly reducing food waste (De Visser-Amundson, 2022). Moreover, staff involvement encompassing training and ethical approaches to waste management, in conjunction with consumer education and efficient communication strategies are essential in waste reduction (Min-Yen & Wen-Hwa, 2023; Olavarria-Key et al., 2021). However, despite these ongoing efforts, further research is necessary to comprehend food waste management's complexities and devise more effective, sustainable practices, particularly in regions with limited literature on the subject, such as New Zealand. This allowed the present study to be relevant in research in the food and beverage sector of Invercargill, New Zealand, and to add to the body of knowledge relating to the current practices in this sector.

6.4. Limitations of the Present Study

The study sought to investigate how food waste is managed in the food and beverage industry in Invercargill, New Zealand, from the perspectives of managers, chefs, and waitstaff. However, recruiting participants proved challenging due to the limited research on the topic and the small scale of the study. After conducting ten interviews, data saturation was reached, limiting the findings and yielding no new themes. The research timeline and the researcher's availability also affected the sample size. Several businesses declined to participate, resulting in a significant time burden on the researcher. The fast-paced nature of restaurants and cafes often made owners time-poor. Additionally, the Invercargill Licensing Trust (ILT), which oversees various businesses and is mandated to provide excellent hospitality, prioritise public well-being, and support the community, did not participate in the study. No response was received despite sending invitations to each ILT-managed restaurant and the organisation. The research was carried out independently and objectively, without affiliations to the industry or food waste organisations.

6.5. Recommendations for Future Research and Practice

Future Research

Chapter Four of the research delves into the methodology employed to achieve the study's objectives, with a specific focus on research design, data collection, and analysis. It underscores the importance of the chosen research philosophy, interpretivism, in understanding one's assumptions and beliefs. This philosophy, among five significant ones in business and management, is identified as the most suitable framework for this study. The chosen methodology, phenomenological, centres on in-depth interviews to capture multiple perspectives within the food and beverage sector of Invercargill, New Zealand. The chapter details the approaches to theory development, with an emphasis on inductive reasoning and qualitative research, particularly semi-structured interviews. The descriptive research design provides a comprehensive account of the experiences and perspectives of professionals in the sector.

Based on the described methodology, future research in food waste management within the food and beverage sector of Invercargill, New Zealand, can explore various potential pathways to expand on the current study's findings. This future research holds the promise of addressing the limitations of the current study, offering hope for a more comprehensive understanding of the issue. To begin with, broadening the geographical scope beyond Invercargill to encompass other regions in New Zealand would strengthen the applicability of the findings. This broader approach could involve comparative investigations between urban and rural areas or regions with differing economic activity and cultural norms. Such comparative analysis could uncover regional disparities in food waste management practices, offering a more comprehensive insight into the issue on a national level. Secondly, augmenting the sample size and incorporating a more diverse array of participants can address the limitation concerning the representation in the study. Future research could integrate viewpoints from diverse roles within the food and beverage sector, such as supply chain managers, policymakers, and consumers, to obtain a holistic perspective of the food waste management ecosystem. Furthermore, longitudinal studies tracking changes in attitudes and practices over time would be valuable in evaluating the impact of interventions and evolving industry standards.

Additionally, embracing mixed methods research could yield a more comprehensive and nuanced comprehension of food waste management practices. While qualitative methods provide in-depth insights into individual experiences and attitudes, quantitative approaches could quantify the extent of food waste and the efficacy of various reduction strategies. Surveys and experiments could be used to gather data on the measurable impact of specific interventions, such as public awareness campaigns or technological innovations in waste reduction. Finally, forthcoming studies should investigate the socio-cultural, economic, and environmental factors influencing food waste practices. Examining the interplay among these factors can reveal underlying motivations and barriers to effective waste management. Researchers could explore the role of education and training in promoting sustainable practices or the economic incentives and disincentives shaping industry behaviour. Understanding these dynamics would facilitate the development of more targeted and efficient policies and initiatives to reduce food waste in the food and beverage sector.

Future Practice

Firstly, enhancing staff training and regular communication is crucial to continuously improve food waste management in Invercargill's food and beverage sector. Regular training sessions on waste reduction techniques, such as portion control, inventory management, and precise recipe adherence, are essential. Open communication among staff members across shifts ensures consistent practices and effective knowledge sharing. This collaborative approach empowers staff to handle food more efficiently and minimise waste.

Secondly, advanced food management technologies are also being pursued to reduce waste significantly. Moreover, implementing food management applications that provide real-time inventory and waste data can help identify areas for improvement. Additionally, creative strategies for reusing leftover ingredients, such as creating new menu items from vegetable scraps, are being developed to promote sustainability and resourcefulness. Structured waste management policies, like waste segregation for local farmers to use as animal feed, further enhance waste reduction efforts while supporting local agriculture.

Thirdly, promoting a culture of waste reduction within the establishment is considered essential. Involving key personnel in waste management discussions and ensuring that all team members understand their roles in reducing waste fosters a collective responsibility. Further, adjusting portion sizes based on customer consumption patterns and planning menus that utilise ingredients efficiently minimises leftovers and reduces waste from over-preparation. This proactive approach ensures that waste reduction becomes integral to the establishment's operations.

Finally, continuous monitoring and evaluation of waste reduction efforts are crucial to ensure ongoing progress. Regularly assessing the effectiveness of implemented strategies allows for timely adjustments and improvements. Educating customers about reducing food waste and encouraging informed choices is also significant. Further, informational campaigns, menu labelling, and promoting the option to take leftovers home are engaging customers in the establishment's waste reduction initiatives. By implementing these comprehensive recommendations, food and beverage establishments in Invercargill are achieving significant reductions in food waste, promoting sustainability, and enhancing overall operational efficiency.

6.6. Conclusion

In conclusion, this research comprehensively examines food waste management within Invercargill’s' food and beverage sector. It offers valuable insights into primary sources of waste, the effectiveness of current management practices, and the proactive measures taken to mitigate waste. The study highlights the significance of sustainability and responsible environmental practices in addressing food waste. Further, key findings emphasise the importance of staff training, policy implementation, and collaborative efforts within the industry, such as partnerships with charities and local farmers. Moreover, the research points out the crucial roles of management and customers in reducing food waste. It suggests that increased education and awareness campaigns can promote responsible consumption habits among customers. Additionally, the study identified gaps in existing literature, particularly in the context of Invercargill, and suggests that further research is needed to explore the complexities of food waste management across different industry levels and geographic locations.

When it comes to future research, the researchers should consider broadening the geographical scope to include other regions in New Zealand, increasing the sample size, and incorporating a more diverse population. This would help address representation limitations and provide a more holistic view of food waste management practices. Furthermore, adopting mixed methods research could offer a more comprehensive understanding of the issue, combining qualitative insights and quantitative data to evaluate the effectiveness of various interventions. For practical applications, the research recommends enhancing staff training, implementing advanced food management technologies, and promoting a culture of waste reduction within establishments. Continuous monitoring and evaluation of waste reduction efforts are essential to ensure ongoing progress. Educating customers and engaging them in waste reduction initiatives can further contribute to significant reductions in food waste. By implementing these recommendations, food and beverage establishments in Invercargill can substantially reduce food waste, promoting sustainability and enhancing overall operational efficiency. This study provides a robust framework for future research and practice, aiming to develop more effective and sustainable food waste management strategies in the food and beverage sector.

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Appendix A

Interview Schedule

1. Could you kindly inform your gender?
2. What is your age range? Options: below 20, 21–30, 31–40, 41–50, 51–60, above 61.
3. What is your level of education? The available options include diploma, undergraduate, postgraduate, or other.
4. Please inform your current job title or position.
5. How long have you worked in the food and beverage industry?
6. What is food waste, in your opinion?
7. Do you think the restaurant has a food wastage problem?
8. Which of the following categories would you classify most food waste?
    Nonavoidable (eggshells, vegetable skins, animal bones)
    Avoidable (uneaten food from client plates, cooking mistakes)
    Possibly avoidable (expired food, over-ripe fruits)
9. From your experience, during which meal of the day is the food most wasted?
10. To what extent is food waste considered an area of concern in the restaurant?
11. What are the specific policies/procedures in place to address this challenge?
12. What is the role of procurement/receiving/storage/kitchen/service in preventing food waste?
13. Who are the key people involved, and how?
14. Tell me about your interactions with other staff. Is food waste something that is often discussed and communicated?
15. What are the future plans to address this challenge (training, infrastructure provision, measuring food waste)?
16. Any other comments or feedback that might be relevant to this research?

Appendix B

Invitation Letter

[NOTE: This was sent from the researcher's official university email address]

Subject: Invitation to Participate in a Research Project on Food Waste Management Practices.

Dear Participant,

My name is Yanizelt Inette Ramos Santamaria. I am a Master of Applied Management student in the Faculty of New Media, Arts, Business, and Computing, School of Business at Southern Institute of Technology | Te Pūkenga. I am working on a research project under the supervision of Dr Olufemi Omisakin.

I am writing to you today to invite you to participate in a study entitled "Food waste management practices in Invercargill's food and beverage sector." This study aims to explore the current status of food waste management in Invercargill, New Zealand.

This study involves a single interview session that will take 30 to 45 minutes and can be scheduled at a safe and mutually convenient location. With your consent, the interview will be recorded on a password-protected cell phone and Microsoft Teams software. The interviews will be transcribed using the Microsoft Teams transcription function. Once the recording has been transcribed and verified, the audio recording will be destroyed.

While this project does involve some professional and emotional risks, care will be taken to protect your identity. All responses will be anonymised, and you can request that certain responses not be included in the final project.

You will have the right to end your participation in the study at any time, up to the point at which the data is anonymised and amalgamated without explanation, disadvantage or disincentive.

All research data, including audio recordings and any notes, etc., will be encrypted/password-protected. Any hard copies of data, including (any handwritten notes or USB keys, etc.) be stored in a locked filing cabinet. Research data will only be accessible by the researcher (and the research supervisor).

This research has been cleared by the Southern Institute of Technology | Te Pūkenga Human Research Ethics Committee; Clearance SIT Ref 2024/53.

Should you have any **ethical concerns** with this research or the researchers, the following procedure should occur.

Write to the following:

The Secretary of the Human Research Ethics Committee
Southern Institute of Technology
133 Tay St
INVERCARGILL 9840 NZ
Tel: 03 211 2699

If you would like to participate in this research project or have any questions about the research, do not hesitate to get in touch with me at 2021007503@student.sit.ac.nz

Sincerely,

Yanizelt Inette Ramos Santamaria

Appendix C

Participant Information Sheet

FOOD WASTE MANAGEMENT PRACTICES IN INVERCARGILL'S FOOD AND BEVERAGE SECTOR

Information Sheet for Participants

Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you choose to participate, I thank you. If you decide not to take part, there will be no disadvantage to you of any kind, and I thank you for considering my request.

Introduction

My name is Yanizelt Ramos, and I am a Master of Applied Management student in the Faculty of New Media, Arts, Business, and Computing, School of Business at Southern Institute of Technology | Te Pūkenga.

What is the aim of the project?

The main objective of this study is to examine how food waste is managed in Invercargill, New Zealand. The research will mainly focus on various aspects, such as waste generation, the primary sources of food waste, and the effectiveness of current waste management practices. The goal is to investigate and understand the status of how food waste is being managed in this specific area.

What type of participants are being sought?

The study participants consist of food and beverage managers, waiters, and skilled chefs who are invited to share their individual perspectives and practical knowledge on food waste management.

What will participants be asked to do?

Should you agree to take part in this project, you will be requested to attend a single interview session that will take 30 to 45 minutes at a safe location convenient for both parties. Your participation is entirely voluntary. You will be asked about your knowledge of food waste generation, the primary sources contributing to waste, and the strategies implemented at your workplace. Please be aware that you may decide not to take part in the project at any time without any disadvantage to yourself of any kind.

Can participants change their minds and withdraw from the project?
You may withdraw from participation in the project at any time up until the point at which the data is anonymised and amalgamated into the report without any disadvantage to yourself.

What data or information will be collected, and what use will be made of it?
The interview will be recorded on a cell phone and Microsoft Teams software with your consent. The information will be protected using password-only access. The transcription will be completed with the help of the Microsoft Teams transcription function. Research data will only be accessible by the researcher (and the research supervisor).

Your name will not be used in the final report, and you will not be able to be identified in any way. All information will be kept confidential, and the data will be used by the researcher only for this study.

What will happen to the results?
The project results will be written up for assessment purposes for the Master of Applied Management. They may be available in the Research Bank. You are most welcome to request a copy of the project results if you wish.

How will the data be stored?
All research data, including audio recordings and any notes, etc., will be encrypted/password-protected, etc. Any hard copies of data, including (any handwritten notes or USB keys, etc.) be stored in a locked filing cabinet. At the end of the project, any personal information will be destroyed immediately except that, as required by SIT's research policy, any raw data on which the project's results depend will be retained in secure storage for five years, after which it will be destroyed.

What if you have any questions about the project?
Give your contact details and ethics approval information here, for example:
If you have any questions about the project, either now or in the future, please feel free to contact: -

Researcher: Yanizelt Ramos
Southern Institute of Technology
Email: 2021007503@student.sit.ac.nz

Supervisor: Dr Olufemi Omisakin
Email: Olufemi.Omisakin@sit.ac.nz

This research has been approved by the Human Research Ethics Committee at SIT.

If you have concerns about the **ethical conduct** of this research or the researchers, the following procedure should occur.

Write to the following:

The Secretary of the Human Research Ethics Committee
Southern Institute of Technology
133 Tay St
INVERCARGILL 9840 NZ
Tel: 03 211 2699

All information is confidential and will be handled as soon as possible.

Appendix D

Consent Form

Declaration of consent to be interviewed for "Food waste management practices in Invercargill's food and beverage sector".

I have had the scope and nature of the research fully explained to me. Any questions about the research have been satisfactorily answered, and I understand that I may request further information at any stage. I accept and note that:

1. My participation in this research is entirely voluntary.

2. I may withdraw from participation in the research at any time up to the point at which the data is anonymised and amalgamated without explanation, disadvantage or disincentive.

3. The information given during the interview is being utilised solely for the purpose of the specific research project and will not be disclosed to any other person or agency without my express consent.

4. The interview will be recorded with Microsoft Teams in a password-protected cell phone for later transcription.

5. This information may be incorporated into the research report, but actual names or other characteristics that may lead to identification of individuals or organisations will not be disclosed.

6. I may at any time request to view any completed drafts or sections of the research report to which I have contributed.

7. A copy of the completed research report will be made available to me, on request, at the conclusion of the research.

DECLARATION

I have read and understood the information set out on this form and give my informed consent to be interviewed in accordance with the stated terms and conditions.

Name of Participant:	Name of Researcher/Interviewer:
………………………………………………………………	………………………………………………………………
Signature …………………………………………………	Signature …………………………………………………
Date ………………………………………………………	Date ………………………………………………………

Appendix E

Ethics Application

<table>
<tr><th colspan="4">Southern Institute of Technology | Te Pūkenga
Ethics Application</th></tr>
<tr><td colspan="4">If you require assistance filling out this form, please contact the Chair of the Ethics Committee.</td></tr>
<tr><td rowspan="2">1. Name of Applicant</td><td>Lead Researcher/ Supervisor (for student projects)</td><td>Researcher 2/ Student (for student projects)</td><td>Researcher 3</td></tr>
<tr><td>Dr Olufemi Muibi Omisakin</td><td>Yanizelt Ramos</td><td></td></tr>
<tr><td>2. Faculty/School</td><td colspan="3">Faculty of New Media, Arts, Business, and Computing, School of Business</td></tr>
<tr><td>3. Title of Research Project</td><td colspan="3">Food waste management practices in Invercargill's food and beverage sector</td></tr>
<tr><td>4. Is this research being carried out for a programme of study?</td><td colspan="3">Yes</td></tr>
<tr><td>If yes give details:</td><td colspan="3">Master of Applied Management, MGT910</td></tr>
<tr><td>5. Summary of the Research Project
150 word explanation of the purpose and objectives of the project inclusive of why, who, what, where and for what benefit</td><td colspan="3">Food waste is a significant problem in waste management, with experts identifying it as the most challenging issue we face. The food and beverage sector contributes the most to the growing issue; nowadays, they are working towards being more responsible. This research aims to learn about the status of food wastage in the food and beverage sector in Invercargill, New Zealand, how it is handled and if their current practices are effective. The reason is that there is so little information about the topic-related focus in Invercargill and New Zealand in general. The research will focus on the restaurants of the food and beverage sector through semi-structured interviews. The benefits are that it will shed light on this current issue, and they will be able to learn about each other's practices to improve.</td></tr>
<tr><td>6. Please outline your research process and methods</td><td colspan="3">A qualitative approach will be used to examine the state of food waste management in Invercargill's food and beverage sector. The methodology used will be Interpretive Phenomenal Analysis (IPA). Semi-structured interviews will be the method of data collection, with 10-15 food and beverage managers, chefs, and waiters participating. Participants will be invited using invitation letters and techniques like networking, snowball, and purposive sampling. The interviews will take place in a preferred, convenient location, and an information sheet and consent will be provided before the interview. The interviews will last between 30 to 45 minutes and will be recorded and transcribed. The data will be analysed thematically.</td></tr>
<tr><td>7. Dissemination of Results</td><td colspan="3">Results will be written up as a report for assessment purposes for the Master of Applied Management degree. The final report may be available through the SIT Library Research Bank. Findings may also be presented at a conference and/or written up in a journal.</td></tr>
<tr><td rowspan="2">8. Ethical Procedures</td><td colspan="3">Who is the research population? How many participants are you seeking?</td></tr>
<tr><td colspan="3">The research population is food and beverage sector at Invercargill. Participants that will be selected from this population will include food and beverage managers, chefs, and waiters from restaurants in Invercargill, New Zealand. I am seeking 10-15 participants.</td></tr>
</table>

<table>
<tr><td rowspan="16">Answer each question</td><td>How much time will participants be asked to give to the project?</td></tr>
<tr><td>Participants will be invited to take part in a semi-structured interview lasting between 30 to 45 minutes.</td></tr>
<tr><td>Are there potential areas that are of interest to or of concern for Māori?</td></tr>
<tr><td>It is possible that some participants may identify as Māori and ethnicity information will be recorded as part of collecting demographic data on the group of participants. However, ethnicity will form no part of the analysis.</td></tr>
<tr><td>Where and how will the project be conducted?</td></tr>
<tr><td>The project will be conducted upon participants' availability, in a preferred convenient venue. It will be recorded on a cell phone password-protected and Microsoft Teams software, with all information protected using relevant password-only access. The interviews will be transcribed using the Microsoft Teams transcription function.</td></tr>
<tr><td>How will participants be selected and found?</td></tr>
<tr><td>Various methods will be employed to identify and recruit participants, including:
Initially, establishing contact with two restaurants to initiate and secure their involvement in the project.
Next, the snowball technique will be use, whereby referrals from one restaurant to another will be sought.
Finally, I will use purposive sampling to send invitations to restaurants that I have personally selected.</td></tr>
<tr><td>Will participants be identified at any stage?</td></tr>
<tr><td>Because this research adopts qualitative interview data collection approach and for the purpose of sourcing and interviewing participants, participants' name and companies will be identified. However, participant names, companies, and personal information will be anonymised after data collection.</td></tr>
<tr><td>What is your process for informed consent?</td></tr>
<tr><td>An information sheet and consent form will be provided prior to the beginning of the interview.</td></tr>
<tr><td>Who will have access to the research data? How will it be securely stored?</td></tr>
<tr><td>My supervisor and I will have access to the research data. Electronic files will be stored on a password-protected computer, and hard copies of consent forms and the transcript will be stored in a locked filing cabinet.</td></tr>
<tr><td>What information will be given back to participants?</td></tr>
<tr><td>Participants will be provided with a summary of the results if they are interested.</td></tr>
<tr><td rowspan="10">9. Ethical Concerns
Answer each question</td><td>Are there vulnerable participants (e.g. minors, recent immigrants)?</td></tr>
<tr><td>No</td></tr>
<tr><td>Are there any conflicts of interest? How will this be managed?</td></tr>
<tr><td>No</td></tr>
<tr><td>How will you ensure confidentiality for participants?</td></tr>
<tr><td>Data will be kept in locked, password-protected formats and destroyed after five years.</td></tr>
<tr><td>Do any potential risks exist for the research participants? How will these be resolved?</td></tr>
<tr><td>No risks.</td></tr>
<tr><td>Will any deception be employed? If so, please indicate the nature of this and why it is necessary for the research.</td></tr>
<tr><td>No deception.</td></tr>
</table>

	Is compensation (money/rewards/koha) to be offered to research participants? Please provide details.	
	No.	
	Any other issues not covered previously?	
	No.	
10. Attached Documentation **Give details**	X	Information Sheet
		Questionnaire
	X	Interview Questions
		Focus group questions
	X	Consent form
		Other

Signed:			
Applicant:	*Dr Olufemi Omisakin*	*Date:*	***12/03/2024***

Appendix F

SIT Ethics Committee's Approval

SOUTHERN INSTITUTE OF TECHNOLOGY | Te Pūkenga

17th of April 2024

Yanizelt Ramos
2021007503@student.sit.ac.nz

Kia ora koutou

HUMAN RESEARCH ETHICS APPLICATION – SIT Ref 2024/53
Food waste management practices in Invercargill's food and beverage sector

Thank you for your response to the SIT Ethic Committee's request and I am pleased to confirm that the amendments to your application are satisfactory.

Congratulations, you may now proceed with your research project.

Ngā mihi

Yours sincerely

S. Bodkin-Allen

Dr Sally Bodkin-Allen
Human Research Ethics Committee Chair

Private Bag 90114 ■ Invercargill 9840 ■ New Zealand ■ Telephone: (03) 211 2699 ■ Toll Free 0800 4 0 FEES