MAKING SENSE OF FOOD SAFETY AND FOOD WASTE: LIVED EXPERIENCES IN FOOD CATERING USING SYSTEMS THINKING

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Making Sense of Food Safety and Food Waste: Lived Experiences in Food Catering Using Systems Thinking

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ABSTRACT

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Title: Making Sense of Food Safety and Food Waste: Lived Experiences in Food Catering Using Systems Thinking

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Food safety and food waste have many strands and perspectives; one is how managers and staff make decisions. There is limited research on food catering services, how managers and staff deal with food safety and waste, and their decision approaches. To obtain a better understanding, this research sought the lived experiences of managers and staff. The research aim is to explore the lived experiences of managers and staff to better understand their decision behaviour approaches in controlling food safety and food waste.

The way forward is to conduct a qualitative phenomenological research focusing on twenty-five purposefully selected managers and staff in Vancouver. Using organisational theory as a lens, data were obtained through semi-structured interviews and non-participant observations. The research used inductive thematic analysis, resulting in nineteen themes.

The key findings were inadequate training and planning, improper practices and customer behaviours attributed to internal and external processes and systems; managers and staff lacked appreciation for using a specific approach to support decisions. The researcher introduces systems thinking as one approach to support decision making to enhance control of food safety and waste.

The implications include appreciating the interrelationship of factors influencing food safety and food waste. The research limitations were the COVID-19 pandemic, time and resources, and insufficient participant experiences. The research contribution was using systems thinking as one of the approaches to make decisions to enhance control of food safety and food waste in food catering services.

DEDICATION

This dissertation is dedicated to my late grandfather, Fabiano Mugolooza, for his words of wisdom and encouragement, my parents, those who provided support, and those who cherish controlling food safety and food waste.

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I thank my supervisor, Prof Amir Sharif and the Director DBA Program, Prof Tillal Eldabi, for their invaluable ideas and suggestions during the writing and completion of this research.

I can not forget to thank all the participants who participated in this research during the most challenging COVID-19 pandemic, especially when food ca

tering services were closed and other preventive strategies such as restricted travel and direct contact. Special thanks go to my weekly discussion group, which kept me up to this stage.

Finally, I thank my family for their patience, advice, support, understanding and encouragement while studying and working. The research was a long and very tiring journey.

Thank you all!

Paul I Tenywa

Vancouver, Canada, 2023

PUBLICATIONS/PRESENTATIONS ARISING FROM MY RESEARCH

1. Ph.D. /DBA Conference, University of Bradford, Feb 23/24, 2021: Paper title: Food Safety and Food Waste Management in Restaurants. Application of the Systems Thinking Perspective

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LIST OF ABBREVIATIONS

COVID-19   Coronavirus disease of 2019 that spreads through exhalation, coughing, or sneezing from an infected person

CLDs   Causal Loop Diagrams

ECCC   Environment and Climate Change Canada

FAO   United Nations Food and Agricultural Organisation

FLW   Food Loss and Waste

FS   Food Safety

FSC   Food Supply Chain

FSMS   Food Safety Management System

FW   Food Waste

GHG   Green House Gases

HACCP   Hazard Analysis Critical Control Point

IPs   Intelligent Packaging

MAP   Modified Atmosphere Packaging

MCDM   Multi-Criteria Decision Making

NZWC   National Zero Waste Council

SOPs   Standard Operational Procedures

WHO   World Health Organisation

WRAP   Waste and Resource Actions Programme

VCMM   Value Chain Management Model

CHAPTER 1 : INTRODUCTION

1.1 Background

Globally, food safety and waste impact society, the economy, and the environment. Food safety alone accounts for more than 600 million illnesses, hospitalisations, and 420,000 deaths annually (Havelaar et al. 2015; WHO 2017). On the other hand, food waste contributes to one-third of unconsumed food—an equivalent of 1.3 Billion tons valued at $750 Billion (Gustavsson et al. 2011; FAO 2019). In Canada, at least 4 million people become sick after eating contaminated food, with 11,500 hospitalizations and 240 registered deaths annually (PHAC 2016; Murray et al. 2017). At least 58 percent of food produced for human consumption, valued at $49 Billion, is wasted in Canada annually (Van Bemmel and Parizeau 2019); together with the current COVID-19 pandemic, food safety and food waste is threatening the food security of the population.

Food safety incidents and food waste occur throughout the food supply chain and in the food systems (Panghal et al. 2018; Özbük and Coskun 2020). Despite knowing the causes of food contaminations, e.g., personal hygiene, inadequate storage, improper training and behaviours of food handlers (Arendt et al. 2015; Guchait et al. 2016) and the factors that lead to food waste, e.g., excessive food purchases and preparations, serving big portions and inadequate storage facilities that are well described(Gooch et al. 2019; Nikkel et al. 2019) both food safety and food waste remain common. Further, these challenges have persisted in developed countries despite high education, emerging technology, existing food safety systems, regulations, and policies (NZWC 2018; ECCC 2019; Gooch et al. 2019). Earlier studies in the United States (with similar systems and polices as Canada) pointed out that food safety practices were responsible for 90 percent of food safety incidents reported in food service establishments (Neal et al. 2012). Martin-Rios et al. (2018) emphasised that more food waste occurs in the retail and consumer stages of the food supply chain. Hence, food safety and food waste are complex to understand because of the multiple factors involved, such as consumption, culture

and social elements of settings (Papargyropoulou et al. 2016) and interventions to control food waste and improve food systems (Snyder et al. 2018). In addition, tools such as food safety management systems (FSMS) have been used in the food industry for years to minimise the impact of food safety (Rafeeque and Sekharan 2018), with reported success in the aerospace and manufacturing industry (Wallace et al. 2018). Food catering services have adopted tools or techniques such as food safety management systems (FSMS) that successfully control contamination in the aerospace and manufacturing industry. However, due to limited resources in some food catering services, techniques such as FSMS have not been successful (Wallace et al. 2018; Lytton 2019).

Considering that food catering services are part of the downstream stages of the food supply chain. The general problem is that food safety and waste have continued throughout the supply chain. Food waste in the food catering services accounts for about 10 percent of the total waste at the retail and consumption stage (Galli et al. 2019; Gooch et al. 2019). Further, food waste impact society through business loss, litigations leading to business closures and employment loss. The economy loses tax revenue associated with business closures and employment loss. At the same time, the environment and climate are impacted by massive water loss used in food production and the emitted gases (Principato 2018). Consumption of unsafe food leads to sickness, hospitalizations, and deaths, without mentioning the self-medicated and unreported cases. The World Health Organisation (WHO) reported that these effects decrease productivity, as indicated by the Disability-Adjusted Life Years (DALYs) (WHO 2017). Food waste ends up in landfills, decomposing to generate methane—a greenhouse gas (GHG) 25 percent more potent than carbon dioxide—with the potential to cause 34-fold global warming (Irani and Sharif 2016; Nikkel et al. 2019).

This research focuses on food catering services to try and make sense of what the key service providers, such as managers and staff, make of what they experience. Further, this research is about knowing how these key service providers

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make decisions, and the approaches used to control food safety and food waste. The importance of understanding the manager's and staff's roles in restaurants has been demonstrated in previous research that showed that their attitudes resulted in safe food provision (Arendt et al. 2013) and minimal food waste (Principato et al. 2018). However, earlier research found that food safety training enhanced staff awareness of food safety (Roberts and Barrett 2011) and the quality of services is controlled by the food catering services managers and staff (Özbük and Coskun 2020). This suggests that how managers and staff deal with food safety and food waste and how decisions are made are not fully understood, necessitating an exploration.

At the heart of this research, food catering services are organisations with structures, roles and activities and make decisions. The managers and staff make daily decisions amidst many strategies or interventions. Accordingly, Coskun and Ozbuk (2020) argue seeking the experiences of restaurant managers and staff to understand the influences of food waste and their actions. Moreover, using systems thinking tools to support decisions and solve problems in similar situations (Mella 2012) could enhance control of food safety and food waste.

1.2 Problem Statement

Food safety and food waste in restaurants appear to be increasing, especially in developed countries. Food safety incidents have resulted in customer illness, hospitalizations and even deaths (Guchait et al. 2016). Food waste impacts society and affects the economy and the environment (Gustavsson et al. 2011; FAO 2019). Numerous studies on food safety and food waste in the food supply chain and food systems have focused on different stages, suggesting several strategies and solutions (See, e.g.Principato 2018; Nikkel et al. 2019; von Massow et al. 2019). These strategies included planning food orders and menus, monitoring food storage and shelf life, managing food portions, staff training, and managing leftovers (Martin-Rios et al. 2018; Principato 2018). Coskun and Ozbuk (2020) argue to seek the

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experiences of managers and staff that provide services in food catering. These studies do not discuss how managers deal with food safety and food waste and the ways or approaches used in making decisions to ensure control of food safety and food waste in food catering services. Therefore, this research seeks the lived experiences of food catering services managers and staff to better understand how they deal with food safety and food waste and make decisions. Exploring the lived experiences of the restaurant managers and staff will facilitate us to know the decision approaches that are used and provide suggestions of approaches that could enhance control of food safety and food waste in food catering services.

1.3 Research Aim

The research aim is to explore the lived experiences of managers and staff in food catering services to better understand their decision behaviour approaches in controlling food safety and food waste.

A better understanding of the decision behaviours and approaches facilitates practitioners in implementing interventions that would enhance control of food safety and food waste in their settings. As a result, the process reduces the consequences of food safety and food waste.

1.4 Research Objectives

This research has four objectives, indicating the steps the researcher needs to achieve the above-stated aim.

1. To obtain the experiences of food catering service managers and staff to understand how they make sense of food safety and food waste.
2. To explore the causes and influences of food safety and food waste experienced in restaurants and catering services
3. To review and evaluate the strategies restaurants and catering services experienced and used in controlling food safety and reducing food waste
4. To examine the experiences and approaches such as systems thinking in controlling food safety and reducing food waste.

1.5 Research Questions

In this research study, the researcher posed the following research questions seeking answers to address the research problem. Three sub-questions supported the main research question to narrow the research focus (Miles and Huberman 1994; Creswell and Creswell 2018).

This research asked the main research question, "In what ways do food catering services managers and staff lived experiences use the systems thinking approach to control food safety and minimise food waste?" The following sub-questions support the main research question

1. How do food catering managers and their staff make sense of their food safety and food waste experience in food catering services?
2. What are the lived experiences of the causes and influences of food safety and food waste in food catering services?
3. What decision behaviours are experienced in controlling food safety and minimizing food waste in food catering services?

1.6 Research Design and Methodology

A suitable research approach and technique are important in exploring a research problem and addressing the research questions (Bottery and Wright 2019). Through interactions, this research sought to obtain the lived experiences of food catering service managers and staff on food safety and food waste in their settings. The researcher adopted the qualitative phenomenological approach. According to Stake (2010), a qualitative research approach is most suitable when the researcher seeks to explore, explain and understand a phenomenon based on the participant's experiences. Creswell and Creswell (2018: 13) further stated that a qualitative phenomenological approach assisted researchers in understanding and describing the participants' lived experiences.

According to Sekaran and Bougie (2016), researchers have philosophical paradigms or stances they bring to research. The social constructivist paradigm was

the most practical philosophy to frame this qualitative phenomenological research. This philosophical position explains the research approach's choice and determines the nature of reality (ontology) and acceptable research knowledge (epistemology). As a result, the researcher's philosophical stance was social constructivism.

The participants included managers and staff in the food catering services in Vancouver, Canada. The participants were managers because they are the key providers of food catering services, and previous research called for further research targeting managers and staff (Principato et al. 2018; Blum 2020; Özbük and Coskun 2020). The choice of Vancouver was based on accessibility and available resources to obtain the data to answer the research questions in the stated time frame of the doctoral program. Twenty-five participants were purposely selected. One-on-one unstructured interviews that lasted forty-five to one hour were conducted and supplemented with non-participant observations.

The gathered data from the interviews and field notes were entered into Nvivo 12 software and thematically analysed. The analysis was based on Braun and Clarke (2019) and resulted in the reported themes under each research question.

Figure 1-1 illustrates key steps in conducting the current research. Details are explained in Chapter 4 (Research Design and Methodology). However, to ensure rigor in the research and minimise bias, the researcher distanced himself from what he knew to obtain the participants' experiences. The gathered data was managed to ensure privacy and maintain confidentiality because the study involved real businesses. The researcher was keen on credibility and trustworthiness through triangulations, lengthy interactions, peer reviews and conducting participant checks to verify the accuracy of the discussions. These were done to ensure readers read a credible and trusted research report.
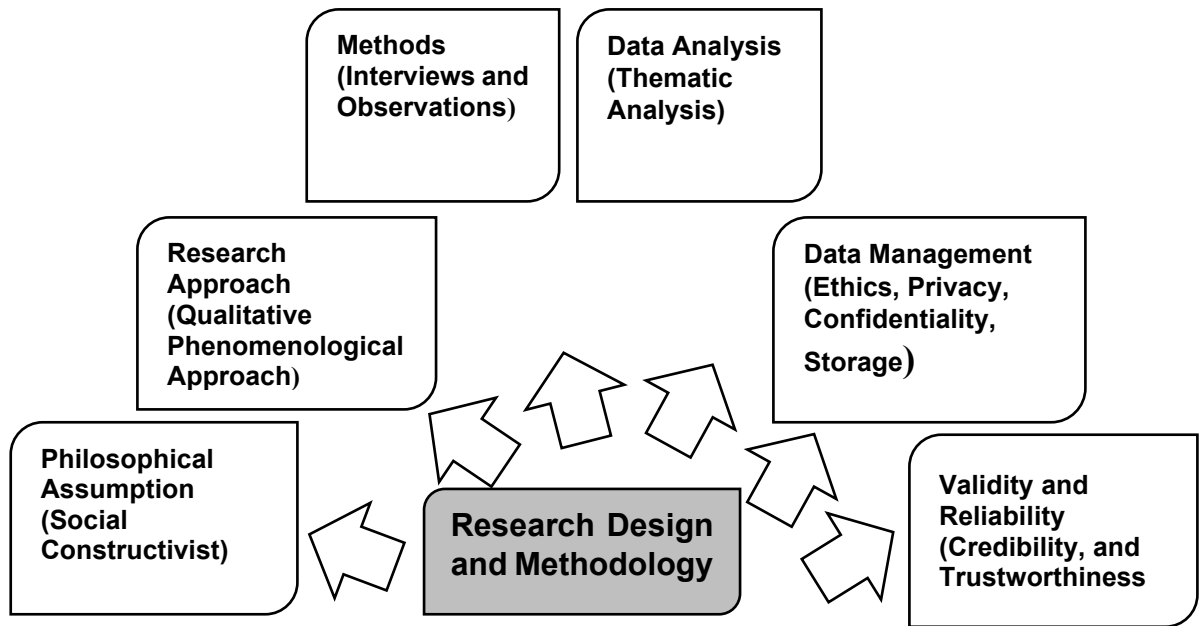
Figure 1-1 Summary of the Research Design and Methodology

1.7 Research Scope and Delimitations

This research explores food safety and food waste as an experienced phenomenon in food catering services, including restaurants and food catering. The research does not investigate the relationship between food safety and food waste. The research also focuses on managers and staff in restaurants and food catering that met the purposive selective criteria. The research does not include stakeholders who are not key service providers and do not make decisions targeting control of food safety and food waste.

1.8 Significance of the Research

This research focused on understanding how food catering service managers and staff deal with food safety and the approaches used in decisions to control food safety and food waste. First, the research contributes to existing knowledge and a better understanding of the interrelation between the strategies or interventions used in controlling food safety and food waste. Second, this research contributes to both knowledge and practice of the need to use approaches such as systems thinking

that have successfully been used in similar situations to enhance decision making in controlling food safety and food waste. Finally, the research findings and implications may assist practitioners, policymakers, and regulators in developing tools based on the interrelations and connectedness of the strategies that could assist in enhanced control of symptoms associated with food safety and food waste. In doing so reduces costs attributed to training tools, training staff, food safety, and food waste.

There are links, similarities and tension between food safety and food waste. Food safety and food waste require quality control, proper handling of food and storage, and an efficient and sustainable food supply chain.

Food safety is about protecting consumers, where food free of contamination is consumed. Food safety requires proper hygiene and practices, ensuring food is stored at optimal temperatures and properly labelled to avoid contamination. The tensions are stringent policies and regulations on food safety that result in increased food waste (Martin-Rios et al. 2018) and food packaging to reduce contamination leading to waste.

Whereas the goal of food waste is minimizing the disposal of edible food and reducing the impact on the environment and the climate. The needs for food waste include controlling the inventory and ensuring an efficient supply chain to reduce excess food production and unnecessary food losses in transportation, ensuring that there are controlled food purchases and a clear understanding of food labels, and recycling or donating edible food to the less privileged. The tension is that as emphasis is placed on food waste, the challenge shifts to food safety. For instance, donating surplus food or leftovers must be done with a food safety standard. Also, reducing food waste might conflict with ensuring a long shelf life-specific packaging that meets food safety standards.

The increase in food waste is attributed to the disposal of food products that would otherwise be safe for consumption—moreover, a compromise of food safety with aggressive efforts to reduce food waste. There are reports of more than 3000

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food safety recalls, provincial monitoring and inspection reports of restaurant closures (PHAC 2016), and more than 4 million reported cases of foodborne illnesses that have led to the hospitalisation and even death in Canada (PHAC 2016). Similarly, there has been an increase in food waste due to expiration dates, poor storage that lowers quality and food safety and failure to recycle cooked food (Principato 2018)

Both food safety and food waste have economic and environmental impacts. Food safety increases the burden on the healthcare system by increasing the cost of treating foodborne illnesses and affecting productivity (WHO 2017). On the other hand, food waste is dumped in landfills that generate methane gas that affects the ozone layer, affecting the environment and climate (Nikkel et al. 2019).

Therefore, the researcher focused on a lived experience to bring managers and staff experience to the readers to better understand food safety and food waste control in the food catering services. This gives readers a better connection of how the problem affects the managers and staff in their setting and the importance of addressing the phenomenon of controlling food safety and food waste.

1.9 Chapter Summary and Dissertation Outline

This chapter introduced this research on food safety and food waste. It has provided a chapter overview, background and context, problem statement, the aim and objectives and research questions. The chapter also provided an overview of the adopted methodology, the scope and the research significance. Next is a summary of the reason for conducting this research, followed by the dissertation outline.

Despite extensive research on food safety, food waste, and related regulations, we do not understand why there are reported food safety incidents and food waste in food catering. In addition, limited research on food safety and food waste in food catering services targets managers and staff. This makes the research relevant and important to conduct in the food catering services in a diverse social

and cultural setting such as Vancouver. The author's position was to obtain an in-depth insight and understanding of the manager's and staff's lived experiences regarding food safety and food waste and which approaches support the decisions to influence the control of food safety and food safety.

Chapter two reviews related research studies and sources on food safety and food waste and presents a summary of the themes explaining the link to the current research. The chapter critiques and explains what previous studies did and identifies the applied theories and theoretical framework. Further, the chapter describes the theories and methodologies used in the studies. It also states the strengths and limitations of earlier studies, noting the gaps; this research attempted to answer and provide a contribution to knowledge and position the current research in the broader literature body on food safety and food waste.

Chapter three presents the theoretical framework that guided and framed the research and linked all the different parts. In this chapter, the researcher describes how the theoretical framework was constructed based on the organisational theory and concluded with the effects or advantages of the theoretical framework on this research.

Chapter four describes the research design and methodology used in conducting this research and presents the rationale for the author's decisions. The chapter starts by explaining ontology and epistemology, and then the philosophical paradigm indicates the researcher's lens or frame to shape and position the research. It describes the how and why of the research design, data collection, validity and reliability of the study, data analysis, the participant selection strategy, the study participants, research limitations, and the ethical considerations in conducting the research.

Chapter five presents the research findings from analyzing the textual data from the interviews and observation notes. Organisational theory guided the inductive thematic analysis.

Chapter six discusses the findings compares, and contrasts the research findings with existing literature and previous studies. The chapter shows the points of inconsistencies and how the study attempted to fill the identified gap and address the inconsistencies. The chapter describes the causal loop diagrams (CLD) as part of systems thinking and explains how this could enhance food safety control and food waste in food catering services.

Finally, Chapter seven concludes the research and provides the study conclusion drawn from the research findings, states the research implications, contribution, limitations, and recommendations, and suggests the areas for further research. The chapter focuses on reflection on the DBA Program and how the researcher came to know and understand what was unclear in the phenomenon investigated, contributing to knowledge and practice.

The next chapter reviews the related literature, discusses the theoretical concepts of food safety and food waste, and presents the taxonomy for managing food safety and food waste.

CHAPTER 2 : REVIEW OF FOOD SAFETY AND FOOD WASTE-RELATED RESEARCH AND THEORIES

2.1 Introduction

Chapter one introduced this research and identified the research problem. The chapter also stated the research aim and objectives and the research questions answered in this dissertation, a summary of the research design and methodology adopted. In addition, the chapter discussed the significance of the research and listed an outline of the dissertation.

In this chapter, the researcher discusses relevant studies related to research exploring the lived experiences of managers and staff in food catering services. Doing so would lead us to a better understanding of the decision behaviors of restaurant managers and staff in controlling food safety and food waste. Therefore, the purpose of this chapter was to review related studies on existing literature on food safety and food waste, the debates around food safety and food waste and the concepts and methods that are used in food safety and food waste research (See, e.g.Hart 2018; Efron and Ravid 2019). Critical reading and asking what was done in the previous studies identified the research gap and justification for the importance of conducting this research (Hunziker and Blankenagel 2021: p.62). The review also identified concepts, themes, and theories within the studies relevant to the current studies and discussed in this chapter.

The broad areas are food supply chain and food safety and food waste, food systems and food safety and food waste, food safety and food waste management, and the consequences of food safety and food waste. In each broad area, there were themes and subthemes. Under the broad scope of food supply chain and food safety and food waste, the theme was the relationship between food safety and food waste and the drivers of food safety and food waste. Food systems and food safety and food waste had themes such as causes of food safety incidents, causes of food

waste and the socio-cultural effects of food safety and food waste. Whereas in food safety and food waste management, the themes and subthemes were training, education and communication, food sharing and meal planning, and re-purposing and recycling.

Figure 2-1 summarize the themes in the literature review and assists the readers in understanding what was investigated, what had been done previously, and the theories used (Creswell 2013; Glesne 2016). The process to arrive at the model started with reviewing comprehensive, relevant, and related academic articles, books and documents on food safety and food waste. The literature sources were organised using End Note software and NVIVO. The sources were routinely monitored for the latest research and information during the research process. The gathered literature was read, analysed, summarised, and synthesised. In the process, key ideas, themes, and concepts were noted, emphasizing those repeated across multiple sources. In addition, the pattern in the literature was observed. Next was the categorisation of themes based on the most common message. This led to the four main themes: food safety and food waste management, food supply chain and food systems, food safety and food waste causes, and consequences of food safety and food waste. Further, the themes and sub-themes were categorised and organised into the literature map (Figure 2-1) with the assistance of the mind map software. The themes and related sub-themes are the concepts discussed in the different literature sections.
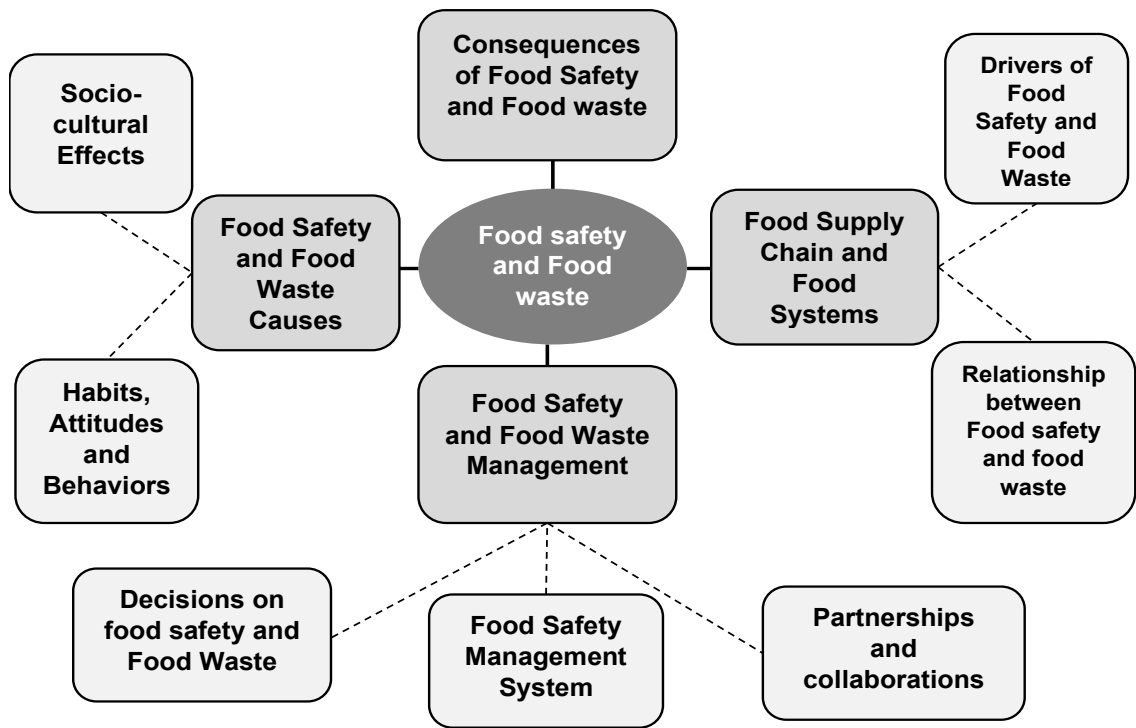
Figure 2-1 The Literature Map　　　　　　　　　　　**Source: Author (2022)**

2.2 The Food Supply Chain and Food Safety and Waste

The food catering services are downstream of the food supply chain. Therefore, as food passes through production, handling, storage, processing, and distribution before consumption, unexplained food safety incidents, food loss, and waste are experienced at all these stages. The causes are unclear, with limited information in the literature (Gustavsson et al. 2011). However, subsequent studies suggested globalization, international trade, and the business environment are responsible for the food loss, waste, and spoilage experienced in the food industry (Gustavsson et al. 2011; Priefer et al. 2016; Thyberg and Tonjes 2016). It was further argued that the food supply chain was long and complicated (Priefer et al. 2016); food traversed long distances, exposing it to damage in handling and uncertain changes in cold chain storage conditions.

The long distances to markets, customer changing needs, and migration complicate food supply. For instance, customers' expectations included food variety, choice, quality, and freshness (Priefer et al. 2016). Conversely, a recent quantitative study identified the failure to address multiple risks within the food supply chains and doing little to assist managers in using the available resources to cut down food attributes (Ali et al. 2019). However, the study's limitation was using a survey instrument with a small sample size and low response that targeted experts only.

Figure 2-2 provides an overview of activities in the food supply chain and potential areas for food safety and food waste. As a result, we are explaining the convergences and divergences of food safety and food waste. Biological, chemical, or physical contamination at the different stages of the supply chain causes food safety incidents. In contrast, contaminated or spoiled food is considered unsafe and of lower quality, hence discarded as food waste.

Handling and storage practices contribute to food safety incidents through improper staff handling, storage, or temperature controls. The growth of microbial organisms causes outbreaks of food-borne illnesses. On the other hand, mishandling food and poor food storage practices potentiate food spoilage and waste because it is unfit for human consumption (NZWC 2018).

Food supply chains are globalised; food being transported across nations complicates oversight, monitoring and tracing, increasing the chances of food contamination. The process has resulted in reported food safety incidents. Similarly, traversing food in global supply chains results in logistical inefficiencies, long transportation times, and other food inadequacies that cause food spoilage and food waste (Gooch et al. 2019).

The advancement in technology has enhanced food safety monitoring. For instance, rapid testing and blockchain are used to assist with traceability. Whereas advancement in innovation in packaging, storage techniques and distribution technologies has resulted in reduced food waste (Heising 2017)

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According to the Value Chain Management Model (VCMM), food waste happens at all stages of the food supply chain following the actions and decisions of the food handlers (NZWC 2018). These actions and decisions included washing and cleaning produce with contaminated water, improper food storage temperatures, overproduction, product and equipment defects, non-essential inventories, poor processing techniques, packaging inadequacies, challenges in transportation and distribution, and planning (Gooch et al. 2019). These led to food damage, spoilage, and contamination (Nerin et al. 2016; Scutti 2018) and generated food loss and waste (Hermsdorf et al. 2017). In addition, the actions and decisions led to the deterioration of food quality and food safety; for example, 50 percent of food waste occurred between food production and food service stages (Van Bemmel and Parizeau 2019), and the final consumer accounted for the other half (NZWC 2018). These studies generalised the causes of food safety incidents and food waste with limited information on the food handlers' extent and responsibility. Therefore, this research identified food catering managers' roles and responsibilities to understand their lived experiences and how they made their decisions and used approaches such as systems thinking.
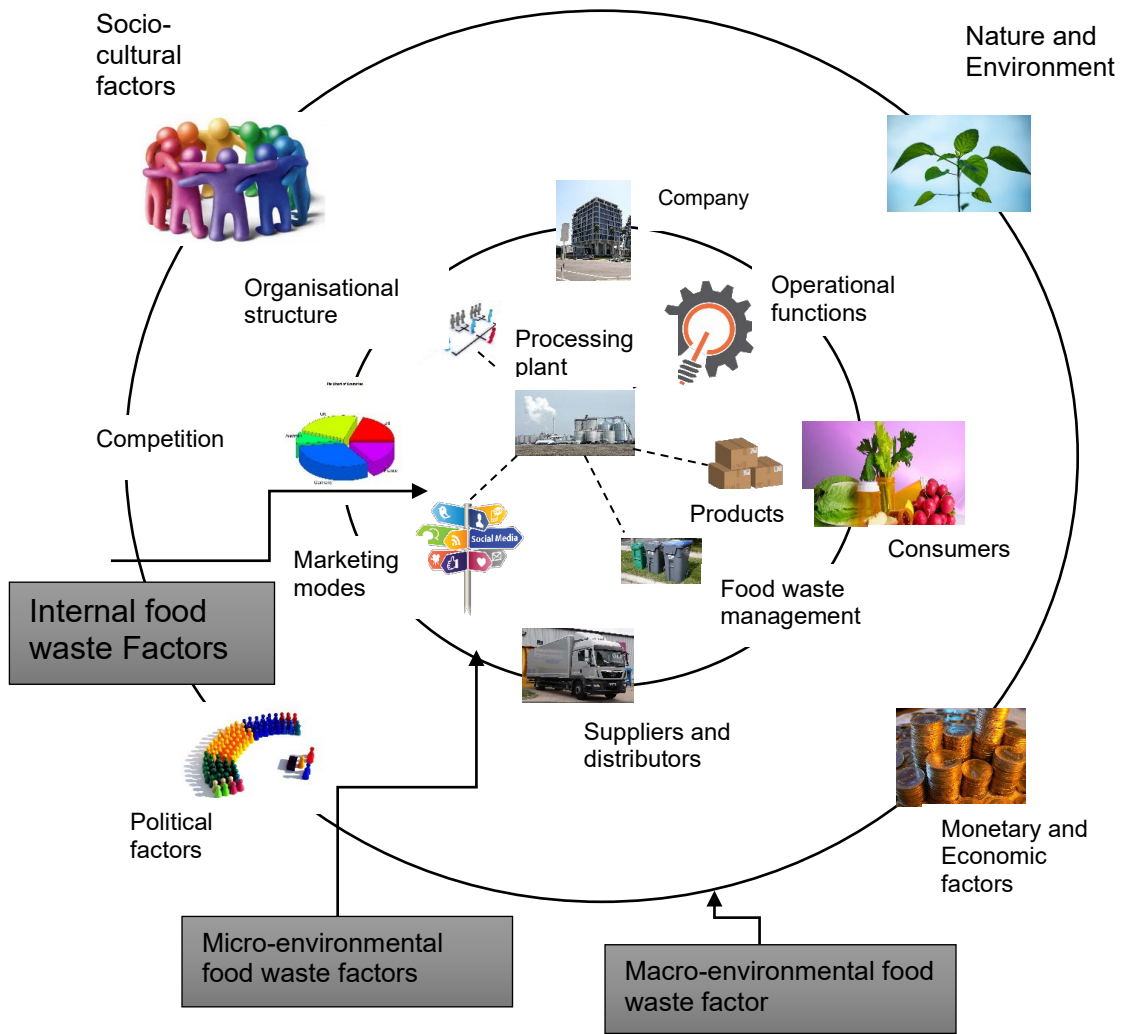
Source: Özbük and Coskun (2020)

Figure 2-2 Factors Influencing Food Waste in the Food Supply Chain

Figure 2-3 summarises the food supply chain, showing food's stages from the farm to the fork. The model demonstrates an upstream and downstream of the food supply chain. The upstream stages include food production (e.g., harvesting fruit and vegetables), storage and handling (e.g., washing fruit and vegetables, packaging and storing at optimum temperatures), and processing (e.g., another packaging for transportation). In contrast, the downstream stages comprise distribution and consumption. There is a potential for food safety incidents and food

waste at all these stages, though most food loss occurs in the upstream stages and food waste downstream.

Recent studies focused on households with limited sources at other stages of the food supply chain (Van Bemmel and Parizeau 2019). Consequently, Thyberg and Tonjes (2016) posited that limited prevention initiatives along the food supply chain, specifically food waste, occurred because of the difficulties in obtaining data. The observation compelled other researchers to ask: *"Why does food waste occur, and what are the barriers to preventing and recovering food waste?"* (Van Bemmel and Parizeau 2019). Hence, Mourad (2016) emphasised that the consumption stage reported surplus food, where restaurants and food catering services are. Chalak et al. (2018) noted that 35 percent of food waste across the food supply chain was related to consumption, excluding households.
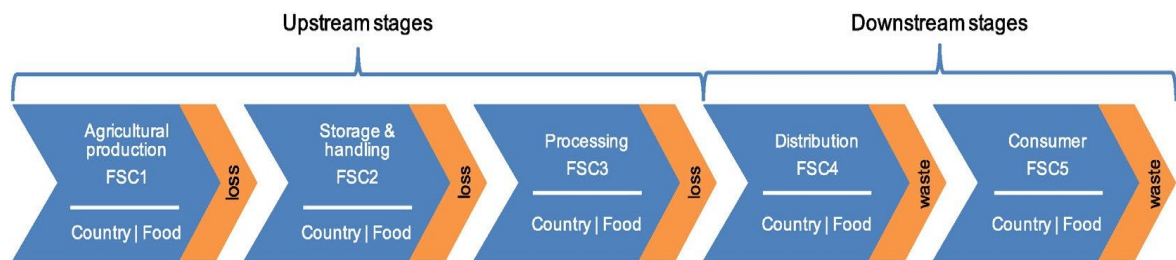
Source: Porter et al (2016)

Figure 2-3 The Food Supply Chain

Several sources (see, e.g.MacRae et al. 2016; Galli et al. 2019; Özbük and Coskun 2020) explored the causes of food waste along the food supply chain. MacRae et al. (2016) study was qualitative and triangulated with document analysis and participant interviews; other studies were critical systematic reviews. MacRae et al. (2016) found that food loss was prevalent in developing countries' food production, distribution, and storage. The retail and consumption stages in developed countries experience food waste. In contrast, an earlier study stated that food waste occurred mainly at the retail and consumer stages (Parfitt et al. 2010). In their study, Galli et al. (2019) noted that food waste falls into the avoidable and non-avoidable parts—even though these are fit for human consumption.

Figure 2-4 demonstrates that more food wastage occurred in developed countries than in the least developed countries. The development is attributed to levels of infrastructure and technology. It is argued that food loss and waste were moderate in mid-income countries. Similarly, the level of technology explained how long food could be stored before it spoiled or got contaminated, presenting the danger of food safety incidents. The damaged or bad food was unconsumed and generated food waste.

Increase in urbanization, income and dietary needs/wants

Developed Nations

Advanced technology and infrastructure (cold chains, inspections)

Mid-income Nations

Moderate technology and infrastructure

Source:Parfitt et al. (2010)

Developing Nations

Food production with low technology and poor infrastructure

Low infrastructure, technology, and long distances to markets

Figure 2-4 Food Safety and Food Waste in Developing and Developed Nations

The sources reviewed in this section showed that food safety and food waste occurred most downstream of the food supply chain. It is where the restaurant and catering services are, and most food waste happens in developed countries such as Canada, where the research site was situated. However, there was no specific discussion on managers and staff in restaurants and catering services, justifying this research on multiple aspects of food safety and food waste in restaurants and catering services.

2.2.1 Relationship between Food Safety and Food Waste

The relationship between food safety and food waste lies at the intersection between food loss and waste (FLW) and public health. Food that has been deemed unsafe is not consumed and discarded. For instance, contaminated fruit, vegetables, or meat is unsafe for consumption and contributes to a significant food waste stream. American consumers found food safety the main reason for wasting food—with much of it discarded (Neff et al. 2015). Likewise, studies in other jurisdictions argued that consumers contaminated food, making them the primary sources of food waste. Households alone contribute up to 50 percent of food waste in Canada (Van Bemmel and Parizeau 2019). Food establishments such as restaurants and hospitality providers showed a nine percent food waste (Gooch et al. 2019). However, it was not clear whether its origins were food safety. Participants exhibited different levels of awareness, knowledge, and ability to influence food waste. For instance, in a mixed-method study, one participant's response was:

"*for as long as I reheat the leftovers thoroughly, it does not matter how long I store it in the refrigerator*" (Nesbitt et al. 2014).

In contrast, consumers preferred fresh food for fear of food-borne illnesses (Neff et al. 2015), which led to discarding edible food. For instance, Canada's 3000 annual food recalls were associated with food contamination (PHAC 2016). A review conducted in the United States demonstrated that food recalls are due to bacterial contaminations, explaining the generation of food waste (Gorton and Stasiewicz 2017). Figure 2-5 a) shows the proportion of food waste generated at the different food supply chain/ food system stages, highlighting nine percent of food waste in food service operations. Figure 2-5 b) shows the numerous causes of food waste in developed countries, including microbes, adulterations, chemicals, inferior additives, genetic modifications, outdated, and mislabelling (Gooch et al. 2019). The argument is that food safety contributed to large volumes of food waste. When microbes affect food, they render it unconsumable, discarded or wasted.

a) Proportions of Food Waste in Canada
- Processing 34%
- Production 24%
- Manufacturing 13%
- Distribution 2%
- Retail 3%
- Hotels, Restaurants & Institutions 9%
- Households 15%

b) Food Safety causes in developed countries
- Genetic modifications 5%
- Out-dated Food 5%
- Microbes 22%
- Chemicals 19%
- Adulterations 3%
- Wrong additives 8%
- Mislabelling 38%
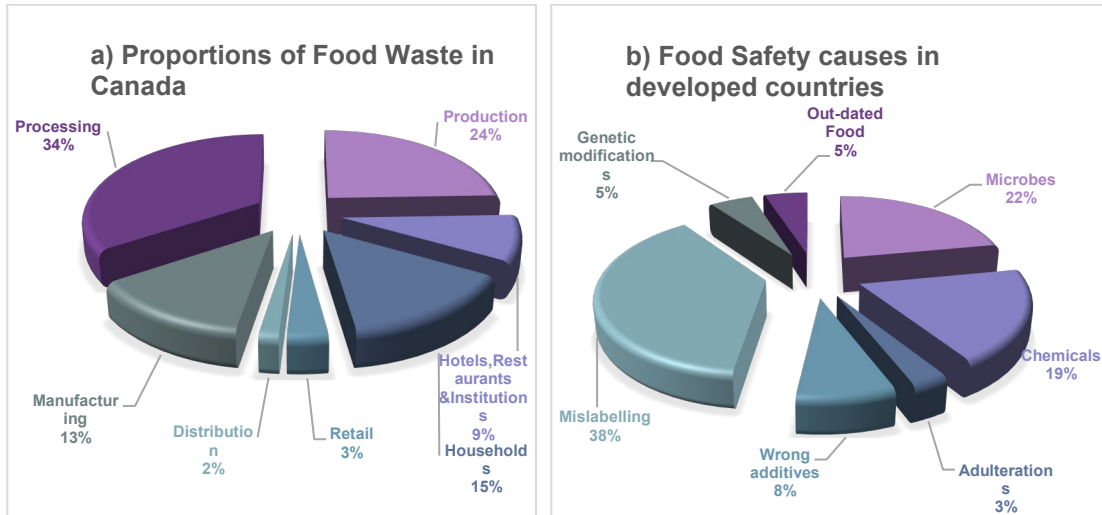
(Source: Gooch et al. 2019)

Figure 2-5 Food Waste in Canada and Food Safety Causes in Developed Countries

2.3 Food Systems, Food Safety, and Food Waste

Food systems are key to providing food to restaurants and catering services. Food systems involve activities and elements that ensure food production and availability for human consumption. The rationale of this section was to explain how food systems experience food safety incidents, high energy consumption, and increased food loss and waste (Guillier et al. 2016). Food safety and food waste in the food systems disrupt the provision of food to the rising global population, which is projected to reach 9 billion by 2050 (Parfitt et al. 2010). Addressing food requirements for the growing population with high safety levels and minimal food waste challenges is essential.

Given the increase in the global population and changing dietary customer needs, pressure is exerted on food systems to scale up food production. In an interview involving 44 participants in the food business, it was observed that increased output led to more food waste(Soma et al. 2021). For instance, studies have demonstrated inefficiency in food systems in Canada, with an estimated 58

percent of edible food valued at $49 Billion going to waste (Nikkel et al. 2019). Grading harvests, food transportation, food packaging processes, and inventory management were responsible for food loss and food waste (MacRae et al. 2016). Conversely, a related study showed annual food waste in Europe and North America (95-115kg/year) compared to Asia (6-11kg/year) (Halloran et al. 2014). They indicated a significant difference, probably because of consumers' social, cultural, and behaviour norms.

The inefficiencies in the food systems demonstrated food waste throughout the supply chain. Schanes et al. (2018) noted that one-third of the global food produced for human consumption, about 1.3 billion tonnes, was wasted. And yet, food production uses many resources, consumes a lot of energy, and generates greenhouse gas (GHG) emissions that impact the environment, society, and the economy. As a result, researchers have argued to strengthen food waste prevention (Mourad 2016; Schanes et al. 2018) in the food systems, including food catering services.

In addition to food systems consuming a lot of energy through food processing, food preservation, cold storage, and packaging, more was reported in shipping, transportation, freezing, cooking, and food disposal (Corrado et al. 2019). Food catering services are involved in similar processes in their routine operations. Therefore, interacting with restaurant and food catering service managers and staff could better understand their actions and decisions in controlling and minimizing food safety and waste, conserving energy, and preserving the environment. Literature alluded to challenges in the food systems, with 30 percent of globally produced food wasted (Gustavsson et al. 2011; Schanes et al. 2018).

Figure 2-6 shows that food produced for human consumption comprises edible and non-edible components; most are unconsumed for various reasons. Because of the COVID-19 pandemic and other adversaries, food systems significantly disrupted farmers from collecting produce, accumulating food, lacking

adequate storage, and closing food catering services. This further led to food getting spoiled or damaged and disposed of as waste.

Researchers have also found that food systems incur food loss and waste because of the product's shape, size, and appearance (Halloran et al. 2014). They explained the substantial amount of food that remained in the fields. Due to limited storage, spoiled, unfit consumption, and discarded food, there was food accumulation, hence food waste. The NZWC (2018) report stressed that the long distances food travelled, given the geographical size of Canada, caused time and temperature challenges that resulted in food spoilage, contamination, and, eventually, food waste.
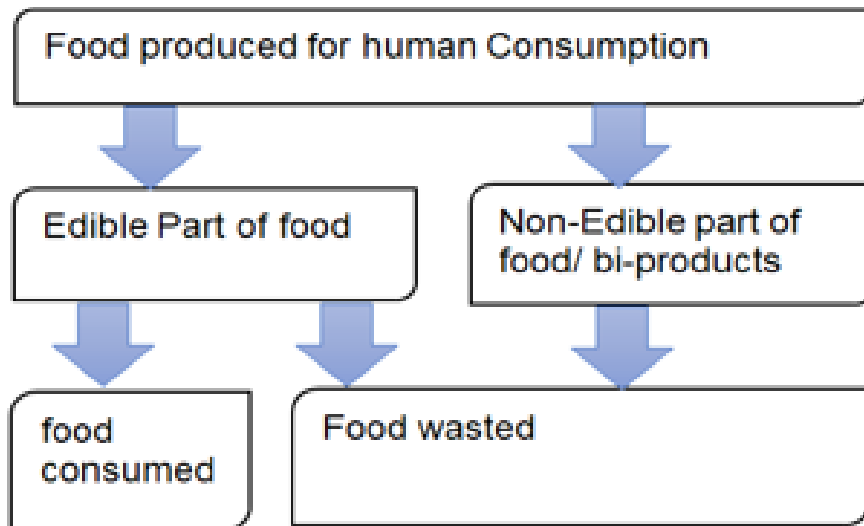
Source: Halloran et al (2014)

Figure 2-6 Food Waste in Food Systems

2.3.1 Causes of Food Safety Incidents

In this section, the causes of food safety assist in understanding whether it was process, activity, system, or personnel. Food safety incidents are associated with food handling, food processes, and the work environment. Murray et al. (2017) found that failure to clean food-cutting surfaces between processes contributed to food contamination. Moreover, an earlier study conducted using telephone

interviews, surveys, and focused groups found that food handlers mishandled food preparation and storage (Nesbitt et al. 2014). The work environment often lacked resources to maintain the required hygiene standards. The studies attributed this to a general lack of knowledge on minimizing food-borne illnesses and the social behaviour of consumers. Arendt et al. (2013) argued that the knowledge and attitudes of food handlers are important to prevent food-borne disease outbreaks, especially for those who exhibit inadequate personal hygiene, use improperly cleaned utensils and equipment, and lack temperature monitoring skills. Other researchers posited improper food cooking practices (Guchait et al. 2016; Gorton and Stasiewicz 2017).

Other than personal and process deficiencies causing food contamination, more causes were identified as chemicals and food adulterations in the food industry. Others used excessive food additives, incorrect food labels, and food sources from genetically modified products (Gizaw 2019). Yet, earlier research stated that date labels were a critical innovation in food labelling (Watson and Meah 2013). The study further argued that food labels increased customer trust and confidence in the product's safety.

Nevertheless, new research showed that non-compliant staff, weak enforcement of regulatory measures, and lack of standardization processes and procedures (Van Bemmel and Parizeau 2019) were responsible for food contamination. Such incidents eventually harmed the business's reputation, with fewer customers and increased food waste. A survey demonstrated that customers had less propensity to return to a restaurant with a prior history of food safety incidents (Harris et al. 2018). Failure to return the eroded trust (Lee et al. 2012) and the associated health safety risk.

Gilbert (2012) posited that the habits of consumers and food servers were to blame for food safety incidents. Inadequate handwashing, minimal cleanliness, and sanitation accounted for the increasingly reported foodborne illnesses in commercial

food services. For instance, food handlers contributed up to 60 percent of food contamination because of poor hygiene and low levels of sanitation. They reported working while sick (e.g., common cold, seasonal flu, and currently COVID-19). In addition to being inadequately trained and unaware of the implications of their practices (Arendt et al. 2013; Racicot et al. 2019). It's argued sick workers reported to work because of the failure of supervisors to appreciate their importance, lack of immediate staff replacement, and workers insisted on working because of minimum wage and the requirement of payments. Workers infected with COVID-19 do not present symptoms in the early phases of their disease or show no signs and symptoms, yet they are carriers of infection.

In addition, food sharing was another source of food contamination that caused food safety incidents. Studies posited that food sharing caused food contamination as a cultural and social norm. A mixed-method study in a university setting noted that the patrons were concerned with food safety, quality, and quantity of their meals without mentioning employees or food handlers (Lazell 2016). The current research focused on managers and their staff to understand their perspectives. Food sharing was a standard social norm implicated in food waste because of safety concerns about unconsumed food (Principato 2018). This research engaged participants to understand the social and cultural norms causing food safety and waste in restaurants and food catering services. The literature showed that the critical causes of food-borne disease among restaurant diners included failure to cook the food long enough at an optimum temperature, poor staff hygiene, and cross-contamination in food preparations and the cooking process.

Table 2-1 below summarises some causes of food safety incidents at the food consumption stage. The conducted studies used different methods and methodologies to arrive at conclusions. Hence, the literature provided different approaches that could better understand the lived experiences of restaurant managers and staff.

2.3.2 Causes of Food Waste

Understanding the causes of food waste is vital in identifying decisions employed in their control. The causes of food waste in Canadian households are preparing excessive food, large food portions, changes in customer habits and behaviours (MacRae et al. 2016), food appearance, confusing date labels, and excessive food supplies (Van Bemmel and Parizeau 2019). These were similar causes in other developing countries such as the UK, France, and the USA (Mourad 2016). Sources (Halloran et al. 2014; Stancu et al. 2016; Schanes et al. 2018) explored the causes of food waste in households.

Table 2-1 Summary of Causes of Food Safety Incidents

Causes of Food Safety Incidents	
1	Improper food handling, food processing, and work environment (Murray et al. 2017)
2	Improper food preparations and inadequate food storage (Nesbitt et al. 2014)
3	Inadequate knowledge, staff attitudes, inadequate personal hygiene, and inadequate training(Arendt et al. 2013; Racicot et al. 2019)
4	Poor cooking practices (Guchait et al. 2016; Gorton and Stasiewicz 2017)
5	Food adulterants, chemicals, food additives, food labels, and food sources (Watson and Meah 2013; Gizaw 2019)
6	Weak regulatory enforcement lack of standard processes and procedures (Van Bemmel and Parizeau 2019)
7	Customer and food server's habits and behaviours, e.g., inadequate handwashing, poor cleanliness, poor sanitation) (Gilbert 2012)
8	Quality and Quantity of meals (Lazell 2016)
9	Social and cultural norms (Principato 2018)

Source: Author (2022)

While Halloran et al. (2014) found food prepared during festivities was not eaten, the leftovers generated a food waste stream. Households discard food for

economic and aesthetic reasons. There were confusing date labels on food packages associated with safety on consumption. In contrast, Stancu et al. (2016) adopted the theory of planned behaviour (TPB); they found that customer behaviours and habits influenced food waste. Schanes et al.'s work was based on a social practice theory (SPT) to understand the causes of household food waste. Visschers et al. (2016) noted that preparing consumer choices contributed to home food waste.

The unpredictable consumption behaviours provided enough food to satisfy everyone in households (Visschers et al. 2016). In contrast, Graham-Rowe et al.(2014) argued that stockpiling of fresh and perishable foods, lack of understanding of the impact of food waste, and availability of disposable income or affordability were the causes of food waste in households. These behaviours may exist in commercial food catering services, justifying the need to understand the perspectives of managers and their staff.

The reasons for consumers in households or commercial food services to hold large food stocks vary—access, time, and cost—causing or generating food waste. According to Gustavsson et al. (2011), globalization and international trade contribute to food waste because food traverses long distances to the markets before consumer purchases. Besides, failure to appreciate stock and inventory management systems such as first-in, first-out (FIFO) principles resulted in food waste. Earlier reports demonstrated poor shopping habits, such as purchasing new food supplies while holding onto initial supplies in the freezer, a practice that generated food waste. Most of it ended up in landfills (Gilbert 2012).

Inexperienced cooks (Schanes et al. 2018) cause disagreeable or unpalatable food taste. Lack of knowledge and skills that affected the use of wrong ingredients and spices affected food taste. The food catering industry with a large menu likely experiences this problem. Food provisions using a buffet generate more food waste than a la carte food service (MacRae et al. 2016; Papargyropoulou et al.

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2016). However, it is not clear that this conclusion applies to food catering services in different social and cultural settings, which is the focus of this research.

Disposable income meant more food supplies, impulsive buying, and excessive purchases. These led to overstocking, quality deterioration, and unconsumed food (Gustavsson et al. 2011; Ahmed et al. 2018). Unconsumed food generated streams of food waste. Principato (2018) posited that family incomes and confusion in interpreting expiration dates on food products, failure to plan meals, improper food storage, and poor culinary skills were the leading causes of food waste at the consumption level. Principato (2018) summarised the causes of food waste in households in Table 2-2,

Table 2-2 summarises some of the causes of food waste at the consumption level. However, these are not exclusive to households alone. These causes of food waste transcend commercial food operations because they operate in similar circumstances. Although these three studies (i.e. Schanes et al. 2018; Ahmed et al. 2018; Principato (2018) provided the causes of food waste in households, these causes may be related to the causes experienced in commercial food catering services. Therefore, this research examines the causes and influences of food waste in restaurants to understand the decision behaviors of the managers and staff.

Table 2-2 Causes of Food Waste at the Food Consumption Level

Causes of Food Waste at the Consumption Level
1 Cooking, preparing, and serving too much food
2 Demand Forecasting and inaccurate purchase planning
3 Inadequate food storage facilities
4 Difficulty understanding dates, e.g., best before; sell by / expired by
5 Absence of Culinary skills that encourage reusing leftovers
6 Socio-economic factors: family composition, income status, and culture
7 Lack of food waste awareness and education

Source: Author 2022

2.3.3 Socio-cultural effects of Food Safety and Food Waste

Consumer expectations and food perspectives are important when understanding food safety and waste and the decisions involved in their control. The expectations and perspectives have led to food safety incidents and food waste at the consumption stage. Some of these expectations and aspects are social and cultural norms. Consumers expect and perceive food products to appear in specific shapes, sizes, and colours. In an observational study conducted between 2013 and 2015, participants had aesthetic expectations of their food (e.g., fruit and vegetables) and the practices of producers and merchants (Mourad 2016). In another study in Canada, customers were interested in perfectly shaped food and good quality, which defined the waste and what was not (Van Bemmel and Parizeau 2019). The expectation was fruit and vegetables of perfect size, shape, colour, and appearance. Despite customers rejecting produce with 'imperfect' aesthetic features, retailers innovatively modify food by chopping it into small sizes, mixing and packaging, changing perceptions, and fetching higher prices. Similarly, producers donate food products rejected to food banks and the community for various reasons to minimise food waste (Thyberg and Tonjes 2016).

Although these studies emphasised food waste, they demonstrated that the social and cultural norms expressed moderate food consumption affecting freshness and, most often, food spoiled and unfit for human consumption. The strengths of these studies included involving experts, using a large sample, comparing countries with different cultures and policies, and triangulation of the findings. The limitations are a lack of descriptions that made understanding the study difficult. Understanding the experiences of managers and staff on aesthetics remains incomplete because the previous studies concentrated on consumers. The incompleteness provides a gap that the current study explores.

Narvanen et al. (2020) argued that social and cultural norms were in the consumer's minds and surroundings and played a minor role in food waste. They

further stated that the theories used, like social practice theory (SPT) and community-based theory (CBT), had little social marketing despite their social and cultural aspects. This argument provided a gap filled in the current study by examining Vancouver's restaurants' social and cultural aspects using a systems thinking perspective.

Furthermore, Papargyropoulou et al. (2016) argued that social and cultural norms and practices resonated with food provisioning and consumption. For instance, regulators argued that households should prevent food safety incidents through improved hygiene and handling. However, ignoring this led to food poisoning and sickness. Also, regulators felt households minimise food waste by controlling portion size and reusing leftovers; however, consumers routinely ignore portion size control and use leftovers in practice. Just like Papargyropoulou et al. (2016), Watson and Meah (2013) posited the existence of social anxieties in food preparation. Families must negotiate whether to cook enough food for their members with the associated cost and leftovers wasted—even though they are safe to eat—or use.

Migration contributed to social and cultural beliefs. These social and cultural norms and practices had dietary needs and preferences, changed farming techniques, and disrupted agricultural models. The socio-cultural changes disrupt ecosystems, and the cycle is repetitive. In their new places of residence, migrants continue with the attitudes and behaviours of cooking excessive food and leaving most of it uneaten. The pretext was to have enough food to satisfy the needs of the family members—arguing that leftovers were not eaten for health and safety reasons and were not fresh (Gilbert 2012). The result was a failure to consume all the prepared food, generating food waste.

In addition, food sharing as a cultural and social norm contributed to food contamination. Families gathered and had festivities, sharing meals. Food contamination was through repeated touching, double-dipping, and circumstances such as sneezing, coughing, and saliva from people who talk while eating. Moreover,

unconsumed food or leftover food forms a stream of food waste. In contrast, Lazell (2016) argued that food sharing was a strategy to prevent food waste, as demonstrated in higher learning institutions. The challenge with food sharing was the need for trust amongst a group. Also, food sharing worked well without fear of food safety. Lazell (2016) found that participants were busy, making sharing difficult, with every participant having differing interests.

In another study, the food storage and thawing methods were below the required temperatures (Murray et al. 2017). The failure was because of a lack of awareness and technical knowledge to use cooking thermometers appropriately. Participants failed to appreciate their use and, in most cases, improperly cooked food, raising the risk of contamination, rendering it inedible, and resulting in food waste. Gilbert (2012) added that inconsistent power supply and electricity outages contributed to food spoilage, contamination, and food waste.

The reviewed sources have demonstrated some of the causes of food waste. However, the essential strengths were using large samples and different methodological approaches and conducting theoretical research to obtain data from participants. The study's limitations were bias and getting responses from participants that the researcher wanted to hear. Discussing food safety and food waste was socially and culturally sensitive. Telephone interviews could lead to responses where the researcher fails to observe cues and is likely to miss important information. The present research could interview managers and staff on the social and cultural aspects of food safety and food waste in food catering services.

2.4 Food Safety and Food Waste Management

Food safety management systems (FSMS) enhanced the knowledge of food handlers, resulting in reduced food safety incidents and subsequent food waste. FSMS involved following key steps, documenting results, and evaluating systems to determine the areas that required improvement. The final part assessed the system's performance in controlling food safety (Panghal et al. 2018). Wang and Van Fleet

(2016) acknowledged that food inspectors interacted with food handlers to ascertain conformity to the regulations and standards during inspection periods.

Figure 2-7 shows the location of FSMS in ensuring food quality and food safety to minimise food waste. The second step is the Hazard Analysis and Critical Control Point (HACCP). In this step, the specific hazards and targets ensure food safety. All stages of the food supply chain have a critical point in preventing the entry of risks. Targeting the food consumption stage implies applying the HACCP to prepare and serve customers in food catering establishments. Chapman and Gunter (2018) observed that using the HACCP protected businesses and customers from possible food safety incidents. Likewise, the latest authors concurred that HACCP has enormous returns as a food safety management system (Guchait et al. 2016; Wallace et al. 2018).

According to Panghal et al. (2018), the initial step of the FSMS is the prerequisite program (PrP). In this step, the emphasis was on food handling with a level of hygiene that did not allow entry of hazards, which caused contamination affecting food safety. The concerned institution had the responsibility of setting the PrPs. These PrPs must be maintained, verified, and documented. The PrPs guarding against contamination are operations Prerequisite programs (OPrPs).

Source Kirezieva (2015)
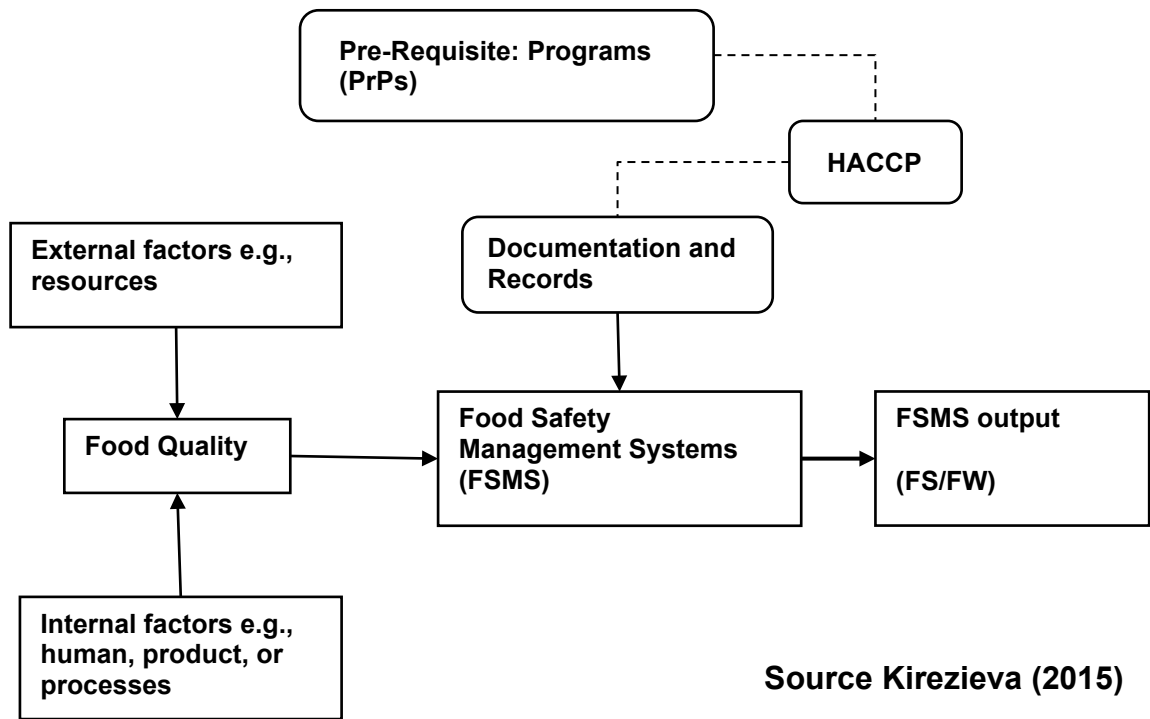
Figure 2-7 Relationship Between Food Quality and FSMS

As a food safety management system, HACCP has existed for a long time. For instance, it has successfully controlled and prevented contamination for decades in aeronautics, space missions, and manufacturing industries. However, it had barriers such as financial resources, technical know-how, organisational problems, and knowledge difficulties (Dzwolak 2019). Besides, the system has challenges such as maintenance and stringent requirements of often unavailable resources. Wallace et al. (2018) noted that the environment, staff training, and management commitment must be robust, starting with the initial stages of PrPs. Consequently, understanding and implementing the system in some food establishments becomes difficult. The challenges and failures were observed once the implementation was faulty and unchecked and lacked management commitment and support.

The studies concluded that successfully using FSMS had ensured food safety and minimised food-borne illnesses, unlike other systems used in the food systems that led to contamination, recalls, and food waste. The introduction of the

International Standard Organisations (ISO), PrPs, and HACCP, routine auditing, documenting monitoring, and recording provided a reliable process for ensuring food safety (Panghal et al. 2018). The current study identified the need to understand the perspective of managers and their staff in food catering services. The HACCP system has been in place for a long time and has succeeded. Why do we see much food wasted due to contamination at consumption? The decisions include HACCP and other tools such as systems thinking seeking to improve food safety control and food waste in the food catering services.

2.4.1 Training, Education, and Communication

Training, education, and communication improved awareness, increased knowledge and reminded food handlers about food safety and strategies to reduce food waste. Gustavsson et al. (2011) noted that training and education improved awareness of standards and regulations necessary to meet the inadequacies and inefficiencies in the food systems. Resources (Roberts and Barrett 2011; Arendt et al. 2013; Guchait et al. 2016) emphasised the deficiencies in food handling practices, suggesting the importance of training and education on different aspects and stages of the food supply chain. For instance, training increases food handlers' awareness of food handling practices and is described as an intervention strategy for varying stages of the food supply chain (Ali et al. 2019).

DiPietro (2016) suggested staff training cut down infractions that led to food safety incidents. Arendt et al. (2013) disagreed and stated that leaders responsible for setting policies and standards must do much more. They set accountability measures, serve as examples, control activities, define and identify training needs, and mobilise resources for staff use to ensure food safety practices. However, this does not seem to be the case, as reported in a recently reported food safety incident in a food catering service where, after an event, managers suggested training was needed (BBC 2018).

Moreover, Schanes et al. (2018) acknowledged that information and education increased knowledge and awareness of preventing food loss and waste in homes. In Britain, a study highlighted the WRAP campaign; in Ireland, "*the stop food waste program*," and in Canada, the city of Vancouver runs the "*love food hate food*" campaign to manage food waste. These campaigns and awareness programs emphasised proper food storage and freezing, inventory management, food purchases, and reusing or repurposing leftovers. However, MacRae et al. (2016) and van Bemmel and Parizeau (2019) complemented related studies and found that information and education improved awareness of date labels that confuse food handlers and customers. Educating consumers changed their food buying skills, systematic meal planning, food modification and increased leftover reuse, a clear understanding of food safety, and the interpretation of date labels on food products (MacRae et al. 2016). For example, educating and increasing youth awareness on food purchases and managing leftovers reduced food waste. Mondéjar-Jiménez et al. (2016) observed that habits, attitudes, and intentions to change follow awareness. Therefore, these awareness campaigns were crucial in restaurants and food catering services. These establishments faced similar challenges, and the limited discussions in the previous studies provided an opportunity to obtain the perspectives of managers and their staff.

The reviewed sources concurred that campaigns increased awareness and caused behavioural changes. As a result, food handlers have better food safety knowledge to prevent food-borne illnesses and make decisions to reduce food loss and waste. However, the limitations of training and education fail to retain the key message and the use of non-targeted messages. Routine and focused practice complemented with other strategies was necessary. Another limitation was the use of a small sample.

This section has focused on some food facilities and argued the importance of training, education and increasing awareness to minimise food waste. This research would focus on managers and staff in Vancouver restaurants and catering

services to understand their decisions towards training and education. For instance, do the decisions on the training and education of restaurant staff increase their awareness to mitigate the causes of food safety and food waste and its control?

2.4.2 Food Sharing, Donation, and Community Support

Food sharing, donation, and community support are essential to minimizing food waste. The most common strategy was sharing surplus food with relatives, friends, or neighbours at the household level. The strategy used in food catering services primarily donated surplus food to food banks for those with insufficient access to food. A mixed qualitative research study with a student community found that food sharing reduced food waste (Lazell 2016). The key decision areas for sharing were food safety, quality, and quantity. The participants lacked food waste awareness and suggested the blame lay within the food supply chain, especially transportation, refrigeration, and storage. They concluded that although food sharing was an important strategy to reduce food waste, it challenged acceptability. The providers and consumers needed trust and thought of safety because of the ease of contamination.

Kinach et al. (2019) observed donating surplus food, rescuing food, preventing unnecessary waste, and addressing hunger. The food banks had restaurants and groceries as the primary source of supplies. However, Galli et al. (2019) noted that food donations faced many barriers: food safety, hygiene of food handlers that could contaminate food, taxation, and litigation following harm caused by the donated food. In addition, there are food providers or donors who are ignorant of the suitability of donations; some recipients of donated food lack enough infrastructure (e.g., storage, refrigeration) and logistics (e.g., transport, workforce) to handle the food donations (MacRae et al. 2016). Kinach et al. (2019) concurred that these issues shift the burden of food waste from food donors to food banks. Similarly, Martin-Rios et al. (2018) noted that food waste in the UK used several complementary strategies, including food donations to communities.

Lazell (2016), in a mixed qualitative study, examined the reasons behind food waste in institutions and demonstrated that donating surplus food was a potential strategy to reduce food waste. The strengths of this study were obtaining the perspective of students and food catering service operators—who blamed each other for their behaviours contributing to food waste; and the use of semi-structured interviews, surveys, and focus groups that triangulated the information obtained from the participants. Besides, the study had valid findings. However, this research attempts to explore the decision behaviors of managers and staff. The decisions on food sharing, donations, and supporting the neighbouring communities of restaurants and food catering services and their control of food safety and food waste are examined to fill the identified gap in this research.

2.4.3 Changes in Food Packaging

Food packaging is crucial in minimising food safety and food waste. Earlier studies found that presentation and pack sizes sold at retail outlets contributed to food waste (Graham-Rowe et al. 2014). For instance, households with few family members or lower food consumption could not consume all the prepared food that got spoilt and discarded. Moreover, subsequent studies suggested that food packaging influenced excessive food purchases. For example, sales and marketing campaigns (e.g., buy two get one free), food packaging with reduced or discounted prices, and the arrangement of food products on shelves (Aschemann-Witzel et al. 2015; MacRae et al. 2016). The consumer had the burden of choosing from different food packaging, which led to food waste.

Therefore, studies suggested modifying and redesigning food packaging to minimise food safety incidents and food waste (Halloran et al. 2014; Parizeau et al. 2015; MacRae et al. 2016). Packaging extends food products' shelf life, reducing perishing and maintaining the freshness of products such as fruit, vegetables, milk, and meat. Besides, packaging changes made food last longer; some were designed in a form that was easier to store and in portion sizes that met customer demands

(Halloran et al. 2014). Similarly, their study (MacRae et al. 2016) supported earlier studies. They noted that some packaging included thin ethylene absorptive strips that extended the shelf life of food packages by at least two days. Parizeau et al. (2015) argued that food packaging changes complement other meal-planning strategies and re-purposing of leftovers. Combining all the strategies reduced food safety incidents by slowing food spoilage and minimizing food waste.

Recent studies have found more exciting innovations like intelligent packaging (IP) (Heising et al. 2017) and Modified Atmosphere Packaging (MAP) (Schanes et al. 2018). Intelligent packaging involves systems that monitor packed food and report its quality and safety features. A quantitative study demonstrating how IP optimally minimised food waste in the food supply chain found that most food that reached its shelf life was low quality, unsafe for consumption, and discarded (Heising et al. 2017). Therefore, using IP determined the remaining shelf life of food products. The food processes are adjusted based on provided reports encouraging customers to use intelligent packing. As a result, minimal food safety issues occurred, few expiries and minimal food waste.

The strategy's limitations are food handlers' failure to understand and apply the technology in their operations; the associated cost of the technology was astronomical for small food establishments to afford. A few food service operations would have the resources to deploy the system. Another challenge was obtaining staff and customers' acceptability and trust in the design, complicating its implementation.

2.4.4 Meal Planning and Shopping Modifications

Planning of meals and the amount of food procured determine the amount of spoiled food, hence unsafe for consumption and discarded food. Therefore, it is a vital area to consider in decision-making. Increased food consumption has led to excessive and unnecessary food purchases, deterioration, and food waste. Also, wasteful retail sales and marketing campaigns encouraged excessive purchases

and compulsive food buying (Aschemann-Witzel et al. 2015). Therefore, meal planning and shopping lists assisted in food purchase decisions. The procedure involved the consumer sticking to food purchases needed and reducing food purchases (Schanes et al. 2018).

Similarly, Papargyropoulou et al. (2016) supported the suggestion that forecasting and planning meals for expected clients or consumers minimised food waste. For instance, food service establishments pre-booked procedures for customers: knowing customer food choices and avoiding excessive purchases that were not consumed and discarded as food waste. In contrast, the same study observed that food operators provided excess food to meet customer expectations and its value for money (Papargyropoulou et al. 2016). Food operators do this to avoid losing clients even though food waste would be generated.

Further, several researchers have explored the planning of meals to minimise food waste (Mondéjar-Jiménez et al. 2016; Stancu et al. 2016; Visschers et al. 2016) in different settings. Mondéjar-Jiménez et al. (2016) conducted a quantitative study based on the theory of planned behaviour (TPB). They found that youth were susceptible to wasting food because of their unplanned purchases. The study emphasised increasing awareness of shopping behaviours to change the purchase habits of youth. Their argument supported a later comprehensive review of reducing household food waste using shopping lists to plan meals (Principato 2018).

However, Mondéjar-Jiménez et al. (2016) concluded that the actions of food retailers negatively led to the wasteful behaviour of customers and should play a role in cutting down the food waste generated. In another quantitative study, unplanned meals and incomplete shopping lists caused food waste at the consumption level. The participants indicated that, as a result, the purchases made lacked purpose and did not have their desired taste (Visschers et al. 2016). Likewise, Stancu et al. (2016) emphasised that a lack of shopping lists led to unplanned purchases and purchases of large pack sizes, which ultimately would get spoiled and discarded as food waste.

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Interestingly, this study noted that unplanned purchases were related to a lack of cooking skills. They also observed that a lack of cooking skills led to the preparation of food that did not meet people's choices—ending up unconsumed and wasted.

The reviewed sources found meal planning and compiling food shopping lists critical in controlling and monitoring food purchases. Households or food service establishments could use this strategy to plan meals for their consumers, cutting down on food waste—consequently saving costs, resources, and time and protecting the environment. However, the limitations of these resources were limited responses obtained from a small sample of participants generalised to the consumption level. It is also challenging to determine the accuracy of the insufficient answers from the participants due to bias or providing responses the researchers wanted to know or hear. Therefore, a qualitative study would give an in-depth perspective of participants in a related area like food catering service and food catering services to understand how meal planning and shopping lists assist in controlling food safety and minimizing food waste.

2.4.5 Re-purposing and Re-using Leftovers

Households repurposed or reused leftovers to minimise food waste. Most of the re-purposable food parts were discarded, though. Most homes prepared food for single consumption and lacked interest in eating leftovers because they had deteriorated quality and were not fresh. In other homes, preparing excess food saves time, minimises energy, availability of storage facilities, and saves money (Schanes et al. 2018). Further, culture and feelings of low esteem discouraged eating leftovers.

Interestingly, the circular economy concept in the sustainable development goals (SDGs) emphasises reusing and recycling food to minimise food waste (Mylona et al. 2018). Similarly, the National Zero Waste Council NZWC (2018) strategy report argued that reducing food waste prevents, recovers, and recycles food to minimise food production resources. Cutting down food production saves resources, the environment, and the climate. Chalak et al. (2018) concluded that

recycling and composting reduced food waste. On the other hand, MacRae et al.(2016) noted leftovers fed farm animals other than being discarded. The waste was composted, providing garden manure and supporting food production. In support, a study argued that the methane gas produced from compost operations is an energy supply. Corrado et al. (2019) also noted that generating this energy reduces overall energy in the food systems and conserves the environment. However, based on the scope of this study, this form of reuse and repurposing of leftovers is geared toward food waste management. Conversely, studies exploring food waste argued that reuse, recycling, and repurposing leftovers prevented food waste from ending up in landfills. They were reducing methane gas that is harmful to the environment and affects the climate (Van Bemmel and Parizeau 2019).

The limitations identified in the reviewed studies were recycling or reusing food waste was expensive to set up and manage. Also, food waste was challenging to separate accurately into recyclable parts, compared to items such as cars, televisions, or radios, making food waste challenging to integrate into a circular economy (Van Bemmel and Parizeau 2019). Another challenge was some leftovers were contaminated and unfit for animal feeding. For example, infected animal meat products with mad cow disease and poultry products with bird flu for safety reasons were not safe for other animals. (MacRae et al. 2016). The controversy encouraged food waste accumulation since farm animals could not eat the feed, making reducing food waste ineffective.

The repurposing, reusing, and recycling of food waste demonstrated the connection between food safety, food waste, and energy conservation (Guillier et al. 2016). The studies reviewed did not directly examine the perspectives of managers and their staff in food catering establishments such as restaurants. This study capitalised on the perspectives of managers and their staff to fill the gap in the previous studies to understand food safety and food waste control measures and decisions.

2.4.6 Taxation, Policies, and Regulations

Developed countries have introduced measures to minimise food safety incidents and food waste. These include tax exemption policies and regulations on food safety and food waste. In a study on food service establishments conducted between 2013 and 2015 in the United States of America and France, each country had different regulations and policies governing food waste (Mourad 2016). Some countries taxed food waste, and others introduced tax incentives to encourage donations of leftovers. These measures probably influenced decision behaviours to control food safety incidents and manage food waste.

Recent studies also argued that policies and regulations on food waste, providing tax incentives on food donations, and providing tax credits on food donations complemented food waste prevention programs in institutions (Chalak et al. 2018). However, although introducing policies, regulations and taxation were effective, others believed it was not. For example, some countries introduced a value-added tax on food donations, and others eliminated the charge to encourage donations and minimise waste. Interestingly, researchers referred to these as positive or negative incentives. The positive incentives enabled food waste reduction, and the negative incentives discouraged food waste behaviours without eliminating them. Some of the taxes introduced included an environmental tax, incineration tax, and donated food tax (Chalak et al. 2018).

Other researchers emphasised that setting fees, taxes, and fines deterred food wastage. To attract customers, they suggested providing incentives to food service establishments such as restaurants, canteens, and catering services. They encouraged having meals outside homes (Schanes et al. 2018), persuading customers to patronise food service establishments, and assisting in centralising food safety incident management and food waste control. Also, conducting inspections and monitoring established food centers such as restaurants and canteens was easier than homes.

The Introduction of tax credits on food donations motivated food catering establishments to donate to food banks and the community (Kinach et al. 2019). The benefit was preventing food waste and providing access to those with minimal access to food and nutritional requirements. Kinach et al. (2019) further added that tax incentives did not only benefit food banks but also unsold food sold to the community at affordable prices. Consumers got what they wanted and were afforded fresh food and quantities they could handle, store, and distribute. However, Chalak et al. (2018) disagreed that these strategies alone were ineffective—a combination of strategies would be more effective. For instance, eliminating value-added tax (VAT) on food donations did not reduce food waste. The limitations of the above-reviewed studies on policies, regulations, and taxation had limited exploration. This study explores how policies, regulations, and taxation impacted managers and staff and their decisions in controlling food safety and food waste in food catering services.

2.4.7 Partnerships and Collaboration

Partnerships and collaborations are important in controlling food safety and food waste. The complex nature of food safety and food waste necessitates systems to address the problem within the food catering services. Studies have shown that partnerships and collaborations are essential in this regard. For instance, WRAP encouraged institutions to collaborate to minimise food waste using several activities (Gustavsson et al. 2011). These activities included learning from best practices, partnership engagements, training programs, detailed action plans, and tailored programs. Aschemann-Witzel et al. (2015) and Schanes et al. (2018) concurred that partnerships, collaborations, and integrations brought perspectives together and improved effectiveness. Aschemann-Witzel et al. (2015) observed that working together contributed to sharing otherwise uncommon knowledge to reduce consumer food waste. Different consumers probably learned the strategies employed by their peers and emulated them to achieve food waste reduction. Moreover, Schanes et al. (2018) suggested that systems thinking provided a deeper

understanding of food waste's root causes or generators and helped design strategies to address the problem.

Schaveling and Bryan (2018) defined systems thinking as systematically analyzing situations to determine solutions. Further, systems thinking is a method or approach. In the approach, we try to understand why organisations or variables in a complex situation interact, relate, or are connected through causes and effects using visual methods to explain the situation's dynamics. Senge (2006) added that entities must develop capabilities to find lasting solutions to their problems. For instance, food catering services faced policy challenges that needed the understanding to manage future issues. In this context, analysing the big picture within food systems provided an understanding of the causal relationships. These relationships formed the basis of decision-making and increased chances of selecting long-term prevention strategies for food safety incidents and food waste. However, partnership and collaboration are important to achieve effective solution.

2.5 Consequences of Food Safety and Food Waste

This section covers the consequences of food safety and food waste. The impact of the consequences calls for decisions to save lives and the environment. Research showed that food safety and waste impacted the environment, society, and economy. Further, Chaudhary et al. (2018) noted that the lack of complete sustainability assessment of food systems was the cause, and van Bemmel and Parizeau (2019) emphasised that economic and environmental impact led to policy attention in Canada. Much was expected with this level of attention, but to our surprise, more than 42 percent of food produced in Canada went to waste in homes (Mondéjar-Jiménez et al. 2016).

Interestingly, the food wasted in households included avoidable and unavoidable food components. As a result, denying people access to nutritious food continued the food deprivation cycle. Likewise, Stancu et al. (2016) observed that food waste costs homes high costs and time because food and drinks are

unconsumed and end up in landfills. Hence, there is an urgent need to reduce food waste, as discussed in the previous sections.

The following subsections discuss five areas of food safety and food waste impact. These include the socio-economical, environmental and climate; ethics, inequality, and injustice; business; food security and health impacts.

2.5.1 Social, Economic, Environmental and Climate Impacts

Food safety and food waste have impacted society, the economy, and the climate. With increased global population, migration, and growth in food consumption, there has been strained food production and supplies (Stancu et al. 2016). As a result, the lack of enough food to feed society, characterised by diverse consumption patterns, remained challenging. A recent study conducted in Canada demonstrated that 4 million Canadians, including 1.4 million children, lacked healthy and nutritious food. And yet, 3 million tons of food was wasted annually in restaurants and catering services alone (Gooch et al. 2019). Therefore, continued food waste impacts society through increased food prices and competition in accessing adequate and nutritious food. These accounted for malnourishment (Graham-Rowe et al. 2014) and the observed health defects (e.g., Vitamin D deficiency, mental retardation, and reduced immunity).

Other than the social and environmental effects, purchasing spoiled food to discard wasted money. Participants in a quantitative study argued that unnecessary food purchases meant losing money and food losing freshness; the quality deteriorates, making it unsafe for consumption and hence discarded. Consequently, Schanes et al. (2018) noted that using minimal resources cuts purchases to manageable levels and minimises food waste. They further observed that reducing food waste saved money and time in preparing and providing food.

Globally, food catering services employ many people, providing economic benefits to people and taxes for national economies. For instance, in 2018, statistics

showed that the USA had 14 million employees and Europe had 8 million employees in the food catering sector (Martin-Rios et al. 2018). Therefore, disrupting the food industry with food safety, food losses, and waste at any stage of the food supply chain affected employees, their communities, and the national economy. For these reasons, Martin-Rios et al. (2018) suggested prioritizing, reducing, and recycling food waste in the food supply chain. Similarly, Gilbert (2012) earlier alluded to planning as a time-saving mechanism and saving resources, including money. The report emphasised that minimizing running around to purchase available food saved time and money and controlled food waste, saving the climatic changing factors used in food production.

Additionally, improper food handling and contamination led to food safety incidents and food waste generation, which affected consumers economically. The consumers invested time, resources, and energy to purchase unconsumed food. The process experiences losing food and other resources (e.g., money)—an additional cost incurred in food waste management, disposal, and composting. Moreover, most of the food waste ends up in landfills. Food waste disposed in landfills was oxidised and decomposed to produce methane gas, a more potent greenhouse gas (GHG) with the potential to cause 34-fold global warming (Van Bemmel and Parizeau 2019). In contrast, Visschers et al. (2016) noted that food production processes require energy, water, land, and labour and produce GHG emissions; therefore, failure to consume the produced food impacts the climate.

The discarded food waste in landfills also deprives part of cultivation land, affects soil fertility, and puts pressure on the climate by encroaching on forests. A quantitative study conducted in a Canadian city pointed out that 20 percent of landfills were composed of food waste; consequently, climate change disrupted seasons and rainfall, necessitating the wasting of billions of cubic meters of water in irrigation to produce food that again ended up wasted (Graham-Rowe et al. 2014). Stancu et al. (2016) concluded that food waste affected the environment, society, and the economy—with emissions generated from food waste in landfills contributing

significantly to climatic change. The continuation of this cycle wastes other resources used in food production. Because of these concerns, food must be produced and consumed with the environment and the impact on society in mind; reducing food waste improves the efficiency of competitive resources in the economy. As a result, in Europe, there are calls to halve food waste by 2025 (Mondéjar-Jiménez et al. 2016).

The strength of these studies was that they provided the same argument on the impact of generated food waste on our environment, society, and economy. However, there was little discussion on the awareness of different stakeholders in the food catering services. This research attempts to fill the gap by obtaining the perspectives of the managers and their staff to understand the measures and decisions taken in addressing food safety and reducing food waste to save the environment, society, and the economy.

2.5.2 Ethics, Inequality, and Injustice

Irani and Sharif (2016) stated that as the global population increases, consumer needs and wants change—the dietary requirements are confused with high demand and consumption. The increasing number of consumers increases competition, accounting for the increased pressure to satisfy the rising demand. The study further noted that people needed food but could not find it, yet people waste lots of food for various reasons. Hence, the need to ensure that food was readily available and easily accessible to those who needed it. In most cases, people fail to find enough food to eat due to inequities and injustices within our food systems. Ethically, food waste happens at the expense of lack of access, hence poor nutrition. The need to meet the rising demand increases competition for scarce resources such as land, water, energy, and labour (Chalak et al. 2018).

Interestingly, earlier research observed that consumers found food waste inequitable and a form of injustice; others had access to plenty of food compared to many who failed to eat enough (Aschemann-Witzel et al. 2015). Like Irani and Sharif

(2016), the researchers noted that programs and resources that provided equal and stable food access helped maintain sustainable food security. While providing food for those in need, these programs must ensure that the food produced is safe and healthy for human consumption. However, Galli et al. (2019) speculated that food waste is unethical and immoral; it wastes scarce natural and economic resources. Wasted food could feed people deprived of minimal access—experiencing inequality and food insecurity (Galli et al. 2019).

Further, the more food waste, the more the realised food shortages (Stancu et al. 2016), the demand to feed the growing population increases, and competition increases resulting in price changes. As Graham-Rowe et al. (2014) earlier argued, nutrition deficiencies resulted when accessing food became a problem. Animal experts argued that it was cruel and unjust to slaughter animals for meat consumption and then fail to consume the meat and waste it (Personal communication). Parizeau et al. (2015) agreed with other researchers and concluded that food waste increases social inequality; many people lack enough food to eat and miss the necessary nutrients. Many people get their food supplies from food banks and community food support programs, as the current COVID-19 pandemic has demonstrated. The COVID-19 pandemic has affected the food systems and complicated food supply chain processes. Birds and animals (e.g., pigs and cattle) were curled and discarded because of the cost of feeding, and the absorption was low due to restaurants and hotel closures.

The limitations of the reviewed studies were failure to provide managers' perspectives and positions and staff in food catering services. The arguments are generalised, with small samples; therefore, this current research focused on managers and their staff to understand the impact of food safety and food waste on society using systems thinking perspective.

2.5.3 Business Impact

Sources show a decline in customer numbers and sales for restaurants with reported food safety infractions. Well-known restaurants struggle to clear their reputation and businesses after experiencing and reporting a food safety incident. Harris et al. (2018) contradicted the observation, stating that these communications do not affect customers' propensity to return to restaurants. There are so many that probable customers fail to read them. Further, industries like water transport with a high turnover of clients and restaurants observed rapid changes and a high turnout of clients; the food business on ferries and cruise ships continued unabated.

Harris et al. (2018) established that contamination of equipment and facilities in food service establishments and sourcing supplies from unreliable and unsafe sources were common. Consequently, these factors influenced prospective customers from dining out for fear of consuming contaminated food and getting sick. The customer's action led to unconsumed food, leftovers, and food waste. Similarly, food businesses realised low customer numbers, declined sales, damaged reputation, negative publicity, and social media coverage. Others are falling stocks, interrupted operations, associated costs (e.g. legal, medical, insurance), and even complete business closure (Roberts and Barrett 2011; Harris et al. 2018). For instance, during the COVID-19 pandemic, customers and restaurant staff contracted the new coronavirus from close contact, resulting in many sick people and the closure of food businesses (Personal communication).

In a ten-year systematic review, the service provisions of food service centers and restaurants were the driving factors. The customers go to a food establishment, such as a food catering service, based on the service level, food quality, ambiance, and food prices (DiPietro 2016). On the other hand, customers' decisions on dining depended on location, menu composition, and tidiness. These customers considered food safety and health key in making their decisions; the failure of restaurants to meet the criteria affected the business. In contrast, the problem

originated in food systems, improper food handling, slow food transportation, and poor cold chain storage. These attributes led to food quality and freshness deterioration, affecting customer confidence, resulting in direct business loss and increased food waste generation (Parfitt et al. 2010).

Gooch et al. (2019) and the WRAP study report argued that reducing food waste saved business costs and increased profitability. Given that food service establishments prepare food on demand, reducing food waste resulted in—saving energy and resources such as labour and water used in preparing food. Therefore, minimizing food waste implies businesses realise sales from all purchases, saving time and other associated costs such as managing food waste (MacRae et al. 2016).

The reviewed studies applied varying theoretical approaches in discussing the impact of food safety and food waste on businesses. Examples of theories used included the protection motivation theory (PMT), the theory of planned behaviour (TPB), and the organisational theory (OT) (Kirezieva et al. 2015; Manning 2017; Schanes et al. 2018; Özbük and Coskun 2020). However, the limitations were considering food service establishments with big chains and restaurants with differing mechanisms for addressing business operations. Therefore, the results and findings can not be generalised and are biased. As a result, this created a void to be filled, considering many small and independent food establishments to provide their perspectives and understanding. The current research explores the lived experiences of managers and staff of food catering services to better understand how they decided to control food safety and food waste. The result was effective solutions, lower food safety issues, minimal food waste, and less impact on businesses.

2.5.4 Food Security

One of the global challenges is feeding millions of people facing undernourishment and hunger. And yet, a lot of food produced is wasted in large amounts. In a highly referenced study, about a third of the global food produced for

human consumption was wasted—1.3 million tons annually (FAO 2011; Gustavsson et al. 2011). Similarly, food contamination has resulted in discarding of large amounts of food, including edible and recalled food. The discarded edible food would otherwise be provided to those without access but thrown away. Tracking food loss and waste since 1970 showed that as more food waste occurs, the number of people facing food insecurity increases (Gustavsson et al. 2011; MacRae et al. 2016). People do not have enough food to eat; they face hunger and experience nutritional deficiencies.

According to Mylona et al. (2018), Sewald et al. (2018), and Kinach et al. (2019), their investigation showed that food waste accounted for the food insecurity experienced and lack of access. Mylona et al. (2018) noted the increased attention to food security, arguing that global climate change and scarcity of resources caused food insecurity. They further observed that attention focused on food security and less on food safety, food waste, nutritional requirements, and needs. Sewald et al. (2018), in a qualitative study using interviews and document evaluations, found that 40 percent of food produced for consumption goes to waste in the US, yet many people face food insecurity. They also argued that food insecurity led to health and dietary consequences, suggesting minimizing food waste by collecting unconsumed safe and healthy food for those without access. In contrast, Kinach et al. (2019) found that income inequality and disparities left many people without a disposable income; experiencing food insecurity and depending on food donations from food banks.

Further, providing food to those without access through food banks was not the permanent solution to addressing hunger and food security. The food banks face several challenges: supplies that overwhelmed the logistics systems, space, and cold chain system; stigma to food supplies viewed as food surplus or leftovers; and indiscriminate food supplies, some of which were to landfills (Kinach et al. 2019). These challenges made food banks and food stamps a non-sustainable solution to food security. Likewise, Galli et al. (2019) agreed and added that food donations

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contributed to food poverty. Since food loss and waste occurred throughout the food supply chain and food systems, stakeholders strived to prevent and reduce donating. Many believed donating and distributing unconsumed food could manage food waste and poverty. However, surplus food or donated food to food banks and communities had not satisfactorily solved the cycle of food poverty or food insecurity. Instead, these actions prevented responsible institutions and bodies from providing enough food for their citizens (Galli et al. 2019).

In general, wasting surplus food in food poverty or food insecurity was unethical and affected the roles of the food systems. Hence, human behavioural change is important to ensure food use. It minimised food production resources, achieved equal access to safe and nutritious food, and sustained the environment and climate (Stancu et al. 2016; Galli et al. 2019). Moreover, the increasing global population impacted the environment and socioeconomic aspects, though migration created room for agricultural land, especially in rural areas (Irani and Sharif 2016). Providing land was an opportunity to increase food production and solve food insecurity.

The strengths of the reviewed studies were using different methodologies and techniques, resulting in the triangulation of data and elimination of bias, making the research findings on food security valid and reliable. For instance, studies found that much-wasted food would otherwise find use in communities with less access to food. Providing surplus food reduced food waste and improved food security. However, the limitations are the failure to measure the outcomes and the key role players, given the number of food handlers in the establishments. Therefore, eliminating food waste seems to be difficult or impossible.

The opportunity was to obtain the stakeholders' perspectives in a specific sector of the food service establishments. The current research achieves this through interaction with managers and staff in the food catering services. The study sites comprised various social, cultural, and income backgrounds with a foodbank

network. The novelty was ascertaining that systems thinking was an approach to solving food waste and food security problems.

2.5.5 Health Impact

The living standards in developed countries have improved, resulting in paid employment and steady income, creating a wealthy population that can afford to purchase the food they need. This development subsequently increased the consumption of food, resulting in health concerns. Consumers preferred meat and fat products to vegetables. From a public health perspective, meat and fat products are implicated in obesity, diabetes, and cardiovascular diseases. The changes in diet and lifestyle are responsible for the rising cardiovascular disorders (Irani and Sharif 2016; MacRae et al. 2016). Excessive food purchases led to food damage or spoilage, causing illness, and implicated in health-related risks such as hypertension and elevated blood sugar

However, research and the media reported sickness, hospitalization, and deaths associated with food contamination that affected human health, the economy, and society (Guchait et al. 2016). For instance, many people have become sick in the US and the UK after consuming contaminated food. About 60% of these incidents were traced to food operation systems (Arendt et al. 2013; Grover et al. 2016; Angelo et al. 2017; Thaivalappil et al. 2018) and occur in households and commercial food service settings.

2.6 Taxonomy for Management of Food Safety and Food Waste

The purpose of the taxonomy for the management of food safety and food waste is based on Bloom's taxonomy to improve the discussion. The review used Granello (2001) and Krathwohl (2002) ideas to provide a framework that assisted in organising, classifying and understanding the learned groups and categories. At the same time, Cooper (1988) argued that taxonomy was vital in literature reviews and provided the reasons for organising the literature and its contribution. Granello (2001) further stated that Bloom's Taxonomy provided a model for categorizing,

organising, and classifying reviewed studies demonstrating the extent of understanding. Besides, Granello (2001) provided a summary table indicating six attributes: knowledge, comprehension, application, analysis, synthesis, evaluation, and creation from each source. Against these attributes, the researcher used critical reading skills, noted the assumptions, identified the key content, and organised the content in themes before moving to a higher level such as critiquing and finding the strengths and limitations of the studies. Therefore, the taxonomy provided quality assessment; differentiated between superior and inferior articles; assisted the researcher in communicating with readers in an organised fashion; and provided a framework for the reviewed related literature.

Figure 2-8 shows that organising the reviewed literature began with the basics, such as understanding the terminologies and the specifics of generalisations and theories. These were followed by interpretations and obtaining the connections and linkages of ideas. Further, the researcher applied the acquired knowledge, and the analysis made relationships, and organised the content. Next was synthesizing and connecting the stories into a single account with related arguments. Finally, the evidence was measured and selected to support the arguments, resulting in the discussed sections of the literature review on food safety and food waste.

	Knowledge in article	Comprehension	Application	Article Analysis	Synthesis	Evaluation & Creation
Required Skills						
Assumptions Author Makes	Basic Knowledge			Complex Knowledge		
Organisation & content of articles						
Advancing to next level						
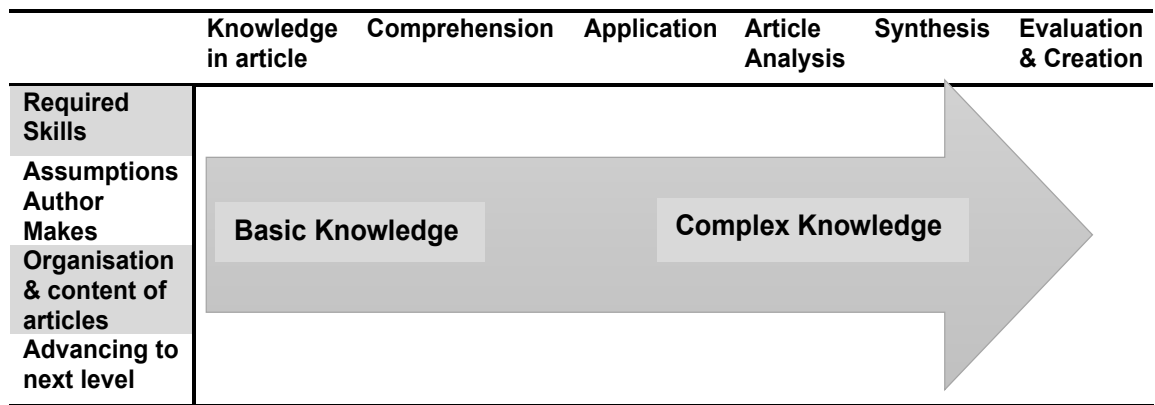
Source: Author (2022)

Figure 2-8 The Taxonomy Steps in Synthesizing of Related Information

After reviewing the related literature and sources, the author organised the arguments of previous researchers into categories. These categories are summarised and presented in the diagram below (Figure 2.9); each indicates selected and pivotal authors (Bruce 2001).

In the diagram shown in Figure 2-9, the researcher organised the review into eight themes to appreciate and contextualise food safety and food waste management in food catering services. The diagram's purpose is to demonstrate the important themes supporting this research. Each theme has the authors discussing food safety or food waste along the food supply chain, focusing on retail and households. The themes are food supply chain and food systems, food safety and food waste, the relationship between food safety and food waste, and the socio-cultural effects of food safety and food waste. Other themes are consumer habits, attitudes and behaviour, food safety and food waste management, causes of food safety and food waste, and decisions in reducing food safety and food waste.

The taxonomy illustrates how the researcher conducted the reviewed literature. The stated themes described the ontological and epistemological positions that facilitated understanding the phenomenon—of food safety and food waste. The author critiqued the ideas and identified the limitations of each study. The researcher observed the theoretical concepts used in each study and adopted the organisational

theory (OT) that assisted the researcher in advancing the research process, explained the study aims, and managed the controllable factors likely to affect the research outcome. This research contributes to researchers, policymakers, and practitioners addressing the related literature's contradictions, inconsistencies, and gaps.

2.7 The Research Questions

To explore the lived experiences of managers and staff to better understand the decision behaviors in the control of food safety and food waste in a food catering service setting, the researcher used the review and identified a research gap to formulate research questions. These assisted in achieving the research aim and addressing the research problem. The research followed an iterative process to develop research questions. Well-developed research question/s facilitated the research decisions, such as selecting a suitable research design, methods for data collection, and data analysis. The research questions, with the theory and framework, set the research boundary and focused the research (Rennison and Hart 2019)
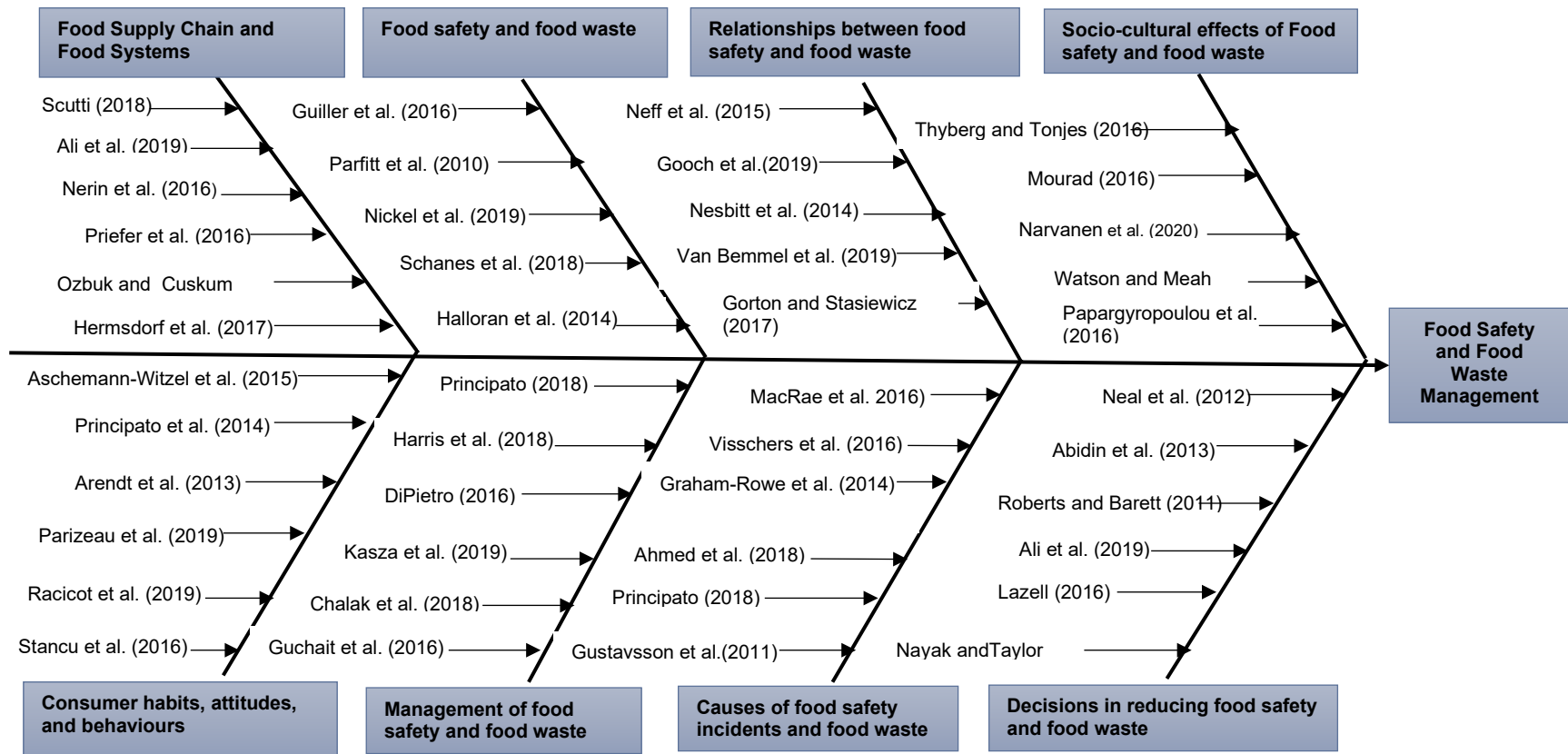
Figure 2-9 Summary of articles with themes on Food Safety and Food Waste Management

Source: Author (2022)

Borrowing Maxwell (2013) ideas, the researcher considered the research topic, the research problem, and the theoretical framework to develop the research questions, with the goal of research questions consistent with the research design, methodology, philosophical paradigm, and mode of data collection and analysis (Aurini et al. 2016). In addition, the researcher focused on stating research questions related to the problem statement and reflected in the theoretical framework used in the research (Merriam and Tisdell 2016). The result was a main, broad, and open research question. Three sub-questions were focused, specific and targeted vital issues in the main research question and were feasible, contributed knowledge and provided research interest. The criteria used are summarised and the formulated research questions that the research attempts to answer;

MRQ-1. In what ways do food catering services managers and staff's lived experiences use the systems thinking approach to control food safety and minimise food waste?

SRQ-1. How do food catering managers and their staff make sense of their food safety and food waste experience in food catering services?

SRQ-2. What are the lived experiences of the causes and influences of food safety and food waste in food catering services?

SRQ-3. What decision behaviours are experienced in controlling food safety and minimizing food waste in food catering services?

2.8 Chapter Summary

This chapter reviewed related studies to the current research. The chapter identified theories and methodologies used in the previous studies. The review also discussed and presented the strengths and limitations of the research studies. The researcher positioned the current study and identified the gap reflected in the research questions the researcher attempts to address in the present research.

The literature revealed that food safety and waste were challenging in households and food establishments. The studies discussed the causes of food safety and food waste and provided strategic options, but the challenges have continued. However, there was little discussion that involved managers and staff of food catering services, hence the need to obtain the perspective of managers and staff in the food catering services and look at the decision behaviors using systems thinking perspective. The chapter also presented the taxonomy for food safety and food waste management to demonstrate how the researcher gained and linked the argument in the literature to the current research.

The next chapter presents the theory and theoretical framework that framed and informed this research on food safety and food waste in food catering services, focusing on the lived experiences of managers and staff. The theory and framework formed the boundary and structure of the research process—from the problem identification to data collection, data analysis and interpretation.

CHAPTER 3 : FOOD SAFETY AND FOOD WASTE: THE THEORETICAL FRAMEWORK

3.1 Introduction

Chapter two dealt with a review of related studies. The chapter identified theories and concepts in previous studies on food safety and food waste in the food supply chain. In addition, the chapter identified the gap this research attempts to fill.

The purpose of this chapter is to present a theoretical framework that informs the research. A theoretical framework is an underlying structure that frames or scaffolds the research (Merriam and Tisdell 2016; Larsen and Adu 2022). Further, authors Terosky et al (2023) stated that theoretical frameworks provide perspectives with which research questions are answered. It is a lens for original or new knowledge that assists in planning data collection and analysis. However, Merriam and Tisdell (2016) emphasised that the theoretical framework is used instead of a conceptual framework because there are broader and contains the identified theory and other elements such as concepts and models. Maxwell (2013) and Merriam and Grenier (2019) added that the structures comprised the concepts or theories that informed the research and understanding of the phenomenon under investigation. In comparison, Anfara and Mertz (2015) argued that theoretical frameworks linked the research problem, the formulated research questions, the interview questions, data analysis, and data interpretation. Therefore, in this research, the presented theoretical framework links the research components, providing the structure, and demarcating the boundaries.

The following sections explain the rationale of the theoretical framework and identify the theory used in developing the presented theoretical framework. It also presents the constructed theoretical framework that framed and informed this research. The last section concludes with the theoretical framework's roles in this research.

3.2 The Rationale of the Theoretical Framework

The rationale of the theoretical framework in this research was to assist the researchers in better understanding the manager's and staff's experiences of food safety and food waste in food catering services. The researcher interviewed managers and staff to obtain their experiences. The interpretation of experiences was to derive meaning based on the researcher's understanding. The researcher bracketed or 'epoched' to minimise bias and ensured all the important aspects of the gathered data were analysed using the theory or theoretical framework that guided the research process (Maxwell 2013; Larsen and Adu 2022).

The researcher used the theoretical framework to connect the current research to the broader knowledge of food safety and food waste. Research is not isolated but anchored on previous and related studies (Larsen and Adu 2022). Accordingly, this research is built on documents and studies on food safety and food waste(PHAC 2016; Murray et al. 2017) that were vital in the presented theoretical framework.

The primary goal was to fill the gap in the reviewed and related studies. Next was identifying the research problem and developing the questions. Well-thought-out questions led the researcher to gather data that resulted in the discussed contribution to knowledge and practice. The theoretical framework supported the process by considering the concepts and theories in studies (Harris et al. 2018; Principato 2018). For instance, the theory assisted in focusing the interview questions and enabled the researcher to understand the language within the phenomenon under inquiry. Larsen and Adu (2022) further argued that a theoretical framework assisted in generating themes that were instrumental in data analysis. The use of appropriate language facilitated the researcher to communicate the research findings and the research contribution.

The theoretical framework assisted the researcher in setting the boundaries that made the research process feasible and transferable. More importantly, the theoretical framework narrowed the research focus, ensuring the research was within the time and resources available. To fill the research gap, the researcher explored food safety and food waste in food catering services. The theoretical framework informed the structuring of the interview guide and observation tool and obtained the required data from the participants during interviews and observations.

The researcher explains and focuses the current research on organisational theory. Focusing the research enabled exploring participants' perspectives on the food catering services. The exploration involved using the formulated research questions, choosing a suitable research design, and developing interview questions to gather data. Moreover, the resulting theoretical framework was instrumental in observing and learning the appropriate language and terminology used in the research field—providing a strategy for communicating the research findings.

The framework was also important in defining the themes at the data analysis stage, comparing the findings with previous studies or theories, and stating the theoretical contribution of the study. However, there was a justification for the study and communication of the research's importance. More so, meeting the goal of exploring aspects of the phenomenon to better understand how the managers and their staff dealt with food safety and food waste and the decision behaviours in controlling and minimizing food safety and food waste, respectively.

3.3 Identification of a Suitable Theory

Theories are concepts, ideas, constructs, and relationships that enable structuring models to understand the world around us. It was important to identify a suitable theory to support this research because it assisted in constructing the model and explaining what was going on and why it was happening within the research (Maxwell 2013). Therefore, the researcher searched potential theories and themes on food safety and waste in the literature related to the current research problem.

The related sources demonstrated several theories that, included the theory of planned behaviour (TPB), the protection motivation theory (PMT), the social practice theory (SPT), and the organisational theory (OT). Harris et al.(2018) noted that the theory of planned behaviour considered "*attitudes, subjective norms and perceived control.*" The attitudes focus on evaluating one's behaviour. The subjective norms looked at how others approve of specific behaviour. The perceived control involved knowing those behaviours that would stop someone from a behaviour. Earlier studies that applied the same and the protection motivation theory (PMT) observed that customers analyzed the situation following their information and decided on a food catering service to dine at, despite a previous food contamination outbreak (Kirezieva et al. 2015). Likewise, another study that focused on household behaviour suggested that the behaviours of family members explained the continued food waste in homes (Visschers et al. 2016). In contrast, Principato (2018) argued that a combination of behavioural and marketing theories influenced food-management decisions, actions, and processes in food management, leading to food waste. The researchers further stated that staff activities, customers, and behaviours determined how to minimise food waste, reuse and repurpose leftovers or distribute surplus food to food banks and the community.

On the other hand, the social practice theory (SPT) explains the perception of participants in the food industry and consumers. A study that suggested using mixed methods found that the social practice theory explained the modes of food waste in homes and the reason behind the action. The consumers perceived their actions were wrong and immoral and felt guilty (Schanes et al. 2018). The guilt feeling led to some households reviewing the amount of food wasted. In an earlier study, Neff et al. (2015) emphasised consumer' guilt-motivated food waste reduction. Therefore, using the social practice theory, the routines and processes of food handlers, such as planning meals, shopping for food products, quantities cooked, portions served and eaten, and management of leftovers, were the basis of decision-making (Schanes et al. 2018). These actions were responsible for food safety and

food waste occurring in households. The discussion of the above theories was important to focus on and justify the choice of organisational theory.

The researcher justifies why the theory of planned behaviour (TPB), the protection motivation theory (PMT), and the social practice theory (SPT) were not the most suitable for this study but the organisational theory (OT).

First, the theories did not align with the research objectives and research questions that are addressed in this research for a better understanding of the control of food safety and food waste. Whereas organisational theory (OT) focuses on how organisations or institutions function and how the functions impact the operational environment.

Second, TPB focuses on attitudes, subjective norms, and perceived control, the PMT focuses on analyzing situations before decision-making, and SPT entails participant perceptions. In contrast, OT highlights constructs such as actors, roles, activities, and decisions. The three constructs are relevant and focus the research.

Third, based on the focus of TPB, PMT and SPT, there were limitations in the reviewed studies. The gathered data under the theories (TPB, PMT, SPT) did not align with the current research. It was an organisational theory that supported the theoretical framework that guided the research process and helped gather data to address the research objectives and questions.

Based on the above arguments, the researcher used OT because it was practical and feasible to guide and frame the research as the most suitable to underpin the study (Maxwell 2013; Anfara and Mertz 2015).

This study, therefore, adopted and built upon the organisational theory (OT) as the formal theory. The rationale for applying organisational theory was to expound on the linkage between organisations and the surrounding environments (Singh and Ramdeo 2020: 248). OT had limited coverage in the theories used in previous studies. Therefore, these theories helped build ideas on the nature of reality (ontology) and how we reached reality or conducted the study to obtain knowledge

(epistemology) (Van de Ven 2007; Ravitch and Carl 2016; Ravitch and Riggan 2017). In short, the reasons for the choice of organisational theory (OT) for this study were two-fold:

1. Restaurants and food catering services are institutions operating in a commercial environment; the organisational theory was important because entities develop and implement strategies to minimise food safety and food waste; and,
2. Organisational theories helped to explain food safety and food waste in research studies.

For instance, a proponent of organisational theory (OT) was a study conducted to identify the factors that led to food waste in the food supply chain and found that behaviours, the environment, and the systems are essential (Özbük and Coskun 2020). This study further stated that organisational theory had traditional human relations, decision-making, and systems approaches. Therefore, using organisational theory, restaurants and catering services as organisations or institutions functioned, executed and operated in a similar environment (Jones 2013: p.30). However, these institutions strived to provide safe food to customers, and once customers consumed food, they minimised the amount of food waste. The internal environment enables the performance of different actions and decision-making, further subdivided into the micro-environment and the macro-environment (Özbük and Coskun 2020).

Figure 3-1 shows that the researcher adopted organisational theory (OT) theory related to the organisation's structure, culture, design, and change. The researcher selected structure, roles/activities, and decisions to construct the theoretical framework that guided this research (Figure 3-2). First, managers and staff understood and analyzed the structure and culture of their setting to better understand the challenges faced. The result was to determine the changes to find a solution. Consequently, understanding the structure assisted in achieving

effectiveness and meeting set targets. The structure had managers and staff who had resources that determined their actions. Therefore, given that the research looked at controlling food safety and food waste, the possibility of existing interrelations led to considering a systems thinking approach.
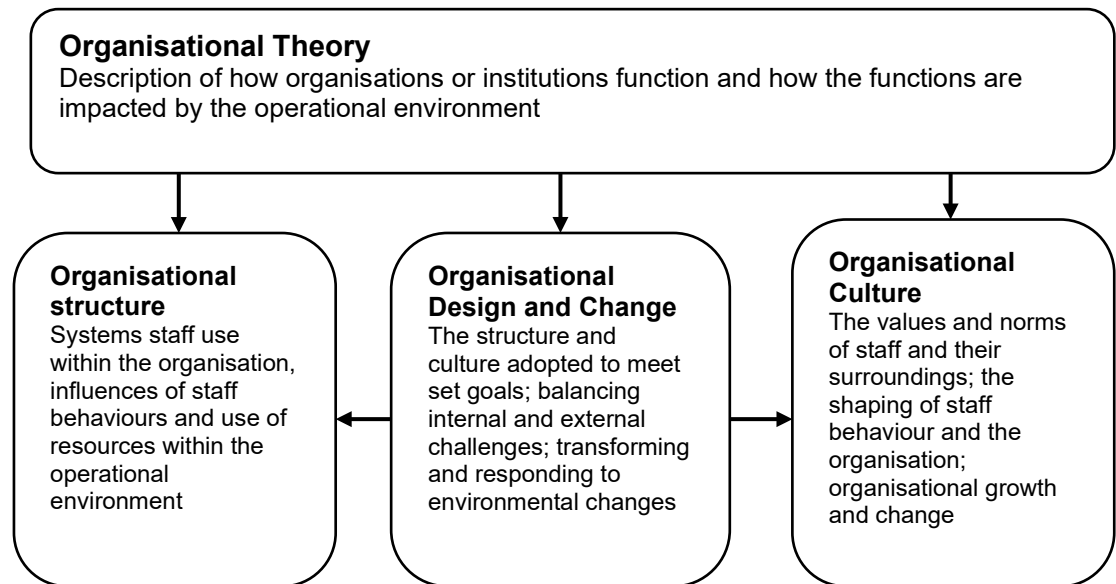
Figure 3-1 Organisational Theory, Structure, Culture and Design, and Change

Second, the organisational culture comprising shared values, norms, and relationships among stakeholders was key in organisational theory: the ethics, the structure, and employee rights (Jones 2013) all influenced culture. For instance, there were many cultural restaurants and food catering service operators. Still, inspection reports did not find the same problems. Many had extreme food safety violations compared to others, potentially associated with the business culture.

Finally, design and change necessitated managers to oversee the culture and structure and balance the internal and external challenges that affected staff and their actions to realise the set goals and objectives. In addition, managers and staff could envisage moving from one state to the desired state by identifying sustainable strategies to control food safety and food waste.

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The micro-environment is the surroundings that impact the conduct of activities and decisions. The environment consists of consumers, suppliers, competition, and unions. The macro-environment involves general and uncontrollable actions and decisions such as economic, technological, socio-cultural, and political factors (Özbük and Coskun 2020). In this regard, the researcher reflected on his personal experience and the formal theories on food safety and food waste to construct a theoretical framework for this research. It was significant to have an in-depth understanding of controlling food safety and minimizing food waste. Despite interventions, food safety and food waste have persisted and have numerous consequences for society, economies, and the climate. These led the researcher to ask questions to achieve the research aim and address the problem. The provided answers were within the research boundaries, hence the presented findings. The following section presents and describes the theoretical framework based on the above discussion and the identified theory.

3.4 Presentation of the Theoretical Framework

Little is known about how food catering services managers and staff deal with food safety and food waste (Parfitt et al. 2010; Priefer et al. 2016; Principato et al. 2018; Snyder et al. 2018; Nikkel et al. 2019; Blum 2020; Coskun and Ozbuk 2020), In these studies, concepts and themes that discussed food safety and food waste causes and control and fit into organisational theory were listed. The ideas and themes were mapped into organisational theory using an iterative approach. It resulted in retaining those that showed relevance to the research. The retained concepts and themes were arranged under structure, activities, and decisions. The researcher then used lines/arrows to demonstrate how the different concepts or themes were related and connected. As suggested, theories come from studies, personal experience, and the participants (Maxwell 2013). The researcher checked back and forth for the terms, language and issues discussed in the literature and by the participants to ensure they were related to the components of the developed theoretical framework shown in Figure 3.2.

Figure 3-2 presents the theoretical framework used as a lens to plan data collection and its analysis. Based on related studies (Arendt et al. 2013; MacRae et al. 2016; Principato et al. 2018), food catering services such as restaurants experienced food safety and food waste. The organisation theory frame includes managers and staff, who are part of the food catering services structure; they directly experience food safety and food waste, their roles and the decisions made. The arrows indicate both managers and staff are responsible or concerned with food safety and food waste in their settings. The roles and activities the managers and staff performed in the restaurants led to the causes of food safety incidents and food waste (Principato 2018). Some actions managers and staff performed included food handling, cutting, personal hygiene and monitoring of food dates. It was during this time that potential food safety incidents happened. Examples included cross-contamination, improper storage, improper food cooking, and inadequate food training practices. In addition, managers and staff procured and prepared excessive food and served big portions. The activities led to several causes of food waste, such as excessive leftovers and improper storage. Further, the activities explained the lack of culinary skills, food waste awareness, and education.

The theoretical framework further shows the potential decision-making of the managers and staff that depended on the activities and the causes of food safety and food waste. Some of these decisions involved training and education to increase awareness (Arendt et al. 2013; Racicot et al. 2019), emphasising food safety culture (Principato 2018) and emphasis on the standard processes and procedures (Van Bemmel and Parizeau 2019). Other decision areas to control food waste included repurposing and recycling leftovers, educating staff on food waste, managing customer leftovers, and planning and forecasting food purchases and the amount of food prepared (Principato 2018).

With the managers' and staff's decisions, the researcher explored whether the systems thinking approach was applied—explained after obtaining answers to the research questions. According to Sherwood (2002), Senge (2006), Mella (2012)

and Sherwood (2023), the systems thinking approach facilitates a holistic understanding of systems as related components other than individual parts. It addresses problems such as food safety and food waste.
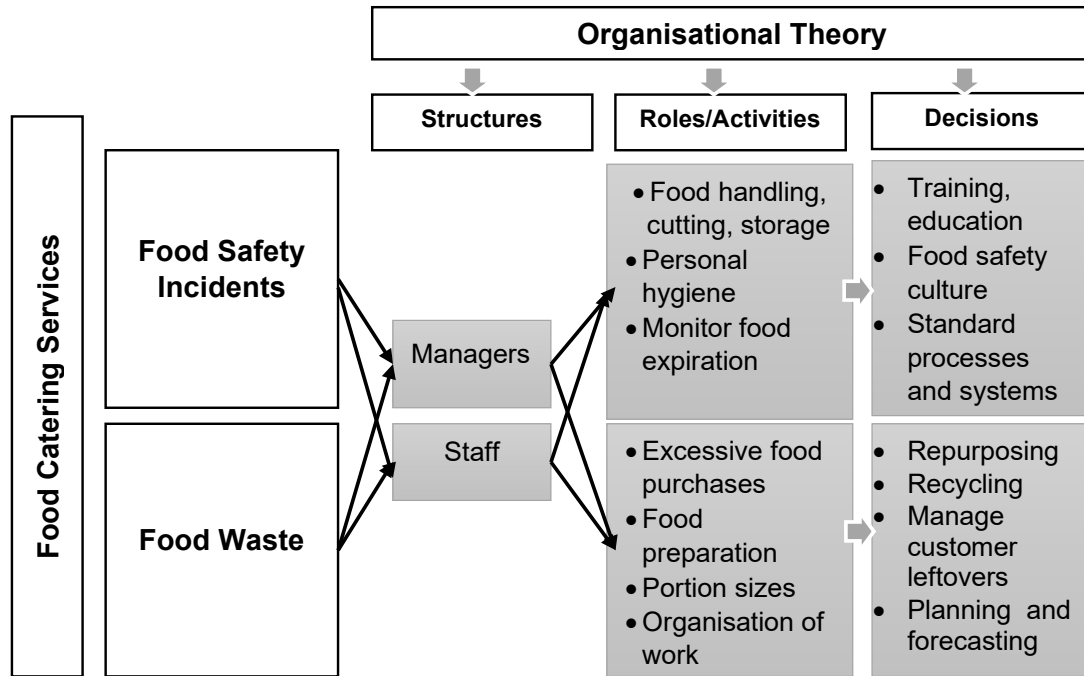
Source: Author 2023

Figure 3-2 The Theoretical Framework for FS and FW in Food Catering Services

Further, Grant and Osanloo (2014) argued that choosing a theoretical framework was important because it formed the base or frame of the research study. In constructing this framework, the goal was to guide the research process and focus on the aspects to explore and better understand the multiple aspects of food safety and food waste. Implementing the framework assisted the researcher in obtaining answers to the research questions and achieving the research aim.

3.5 Role of the Theoretical Framework in this Research

The theoretical framework shaped and focused the research with refined research questions. This assisted the planning of data collection and structuring of

the data analysis process— hence, congruent research (Anfara and Mertz 2015). All these aspects strengthened this research, as discussed in the following subsections.

3.5.1 Focusing the research

Fowler (2015) posited the use of a theoretical framework in qualitative research and argued that the framework assisted in gathering sufficient data to address the research questions. Other than collecting too much overwhelming and unnecessary data, the researcher narrowed the research and focused on areas in the inquiry that were relevant to the selected theory. Hence, collecting data situated within the scholarly conversation and kept the focus of the research.

Qualitative research generates much data from transcripts, field notes and memos. The theoretical framework assisted in selecting data to answer the research questions, making the research process manageable and coherent (Anfara and Mertz 2015). Specifically, the researcher used the concepts, constructs, and propositions to shape the research process. For instance, the refined research question and interview questions gathered only required data (Bell et al. 2019). The participant selection strategy involved obtaining adequate participant size or number with rich information to address the research questions (Merriam and Tisdell 2016) and collecting data using interviews and observations. In addition, the researcher used the theoretical framework to focus the review of related studies (Hart 2018) and restate the significance of conducting the research.

3.5.2 Structure of the Research Questions

The theoretical framework assisted the researcher in structuring and refining the main research question and sub-questions. The questions sought the lived experiences of managers and staff to understand how they dealt with food safety and food waste and the decisions they made to effect their control. The research used the framework to obtain specific answers and achieve the research aim. Structuring the research questions from the theoretical framework determined the suitable research design and methodology employed in this research. The

participants responded to the interview questions by explaining their lived experiences and understanding of food safety and food waste in the settings.

3.5.3 Planning Data Collection

The theoretical framework facilitated the data collection by exploring three organisational theory areas. These included the structures, the design, and the decision behaviors. Under the structures, the researcher targeted managers and staff to provide their lived experiences. Under design, the researcher focused on gathering data on the roles and activities of restaurant managers and staff. Whereas for decision behaviors, the researcher looked at the decision behaviors to control food safety and food waste.

The researcher selected restaurants for interviews and observations because this was the focus of data to answer research questions—meanwhile, a snowballing technique assisted in reaching more participants who would thoroughly explain their lived experiences. The participant interviews continued until there was no new data or saturation, and the observed sites yielded the field notes.

3.5.4 Structuring Data Analysis

Borrowing Miles and Huberman (1994) suggestion that the theoretical framework guided and informed the data analysis process, the researcher focused on structure, activities and decisions to compare and contrast the data from transcripts. Using thematic analysis, comparing, and contrasting transcripts led to themes discussed in the findings chapter related to the reviewed literature.

Further, the researcher used the framework during the data analysis to code and generate themes reported in the findings chapter. The codes and themes were helpful in the thick descriptions. The thick description enhanced the understanding of the research for the audience and readers. In the discussion chapter, the researcher explained the relationships and associations and compared the findings with the previous studies that supported existing theories and advanced knowledge.

Similarly, the researcher ensured the research was consistent with the adopted theory, thus showing accountability in the research process.

Lastly, the theoretical framework showed the strengths and weaknesses of the research study. The strengths included the researcher pursuing exciting and focused research and fitting data into the theoretical framework. In contrast, the weakness of the theoretical framework was concealing crucial information and failing to support the research, making it difficult for readers to understand.

3.6 Chapter Summary

This chapter has provided the rationale of the theoretical framework and identified the theory—Organisational Theory (OT). The theory used in constructing the framework that supported and informed this research's structure. Next was the presentation of the theoretical framework. The chapter explained the connection between the concepts and themes within the framework. The final section of the chapter elaborated on the roles of using the constructed theoretical framework in this research.

The next chapter focuses on the research design and methodology used in this research, the data collection procedures, and the data analysis process that provides the empirical data to address the research problem. In each section, the researcher provides a rationale and detailed description of the research process.

CHAPTER 4 : RESEARCH DESIGN AND METHODOLOGY

4.1 Introduction

Chapter three explained the organisational theory used in this research and presented the theoretical framework that guided and informed this research. This chapter focuses on the research design and methodology used in the research. The research problem was the limited studies investigating how managers and staff in food catering services dealt with food safety and food waste and the subsequent decisions made in their settings. This research explored the lived experiences of managers and staff in food catering services to better understand the approaches in their decision to control food safety and food waste. The main research question was: In what ways do food catering services managers and staff's lived experiences use the systems thinking approach to control food safety and food waste?

In this chapter, the researcher selected a qualitative research design and the phenomenology approach to conduct the research. The basis was the research questions pursued within the theoretical framework based on organisational theory to obtain relevant data to address the research problem (Merriam and Tisdell 2016; Creswell and Poth 2018; Peoples 2021). First, the researcher reminds us of the research questions and objectives and then explains the philosophical stance or paradigm brought to the research. Second, the researcher provides a rationale for the research design, discussing the researcher's role, how the pilot study was conducted and its role, and how the sites and participants were selected for the research. Third is a discussion of the data collection strategies and how the collected data was managed. Fourth is a discussion of the data analysis and the research decisions. Finally, the chapter concludes with a discussion on validity, reliability, the research limitations, and ethical considerations inherent in this research. The following section restates the research questions and explains the alignment of research objectives to research questions.

4.2 Research Questions

The research questions that guided the development of the interview questions assisted in gathering data and were vital in addressing the research problem were;

MRQ-1. In what ways do food catering services managers and staff's lived experiences use the systems thinking approach to control food safety and minimise food waste?

SRQ-1. How do food catering managers and their staff make sense of their food safety and food waste experience in food catering services?

SRQ-2. What are the lived experiences of the causes and influences of food safety and food waste in food catering services?

SRQ-3. What decision behaviours are experienced in controlling food safety and minimizing food waste in food catering services?

4.3 Research Objectives

The following objectives assisted with achieving the research aim.

1. To obtain the experiences of food catering service managers and staff to understand how they make sense of food safety and food waste.
2. To explore the causes and influences of food safety and food waste experienced in restaurants and catering services
3. To review and evaluate the strategies restaurants and catering services experienced and used in controlling food safety and reducing food waste
4. To examine the experiences and approaches such as systems thinking in controlling food safety and reducing food waste.

To answer the above-stated research questions and address the research objectives, the researcher, as stated above, adopted a qualitative research strategy. The rationale for using qualitative research was to obtain a deeper insight, meaning and understanding the participants had of food safety and food waste in the food

catering services. Qualitative research is versatile and reliable, providing research options for gathering reliable and valid data. In qualitative research, the researcher cross-checks the data sources to ensure validity. Similarly, the researcher used triangulation, where more than one data collection technique increases reliability, as described in Section 4.8: Validity and Reliability (Glesne 2016). Qualitative researchers argued that in management research, research brings a philosophical stance, paradigm, or worldview (Johnson and Duberley 2000). The purpose is to inform the research based on ontology (reality) and epistemology (Knowledge) brought into the research. Therefore, the social constructivist paradigm or worldview informed this research, and its discussed in the research philosophy section below;

4.4 Research Philosophy

Research philosophy is a position a researcher takes or brings to a study or research to shape how research is undertaken or conducted and how the findings are interpreted. A research activity may consider several philosophical positions, beliefs, or worldviews. These include positivism, social constructivism, pragmatism, and transformative philosophies. The researcher's philosophical stance explains the choice of the research approach to what the nature of reality is (ontology) and the acceptable knowledge of a discipline (epistemology) for their research (Sekaran and Bougie 2016: 28). In this case, the researcher's philosophical paradigm was social constructivism.

The social constructivist philosophy framed and shaped the research. The underpinning of social constructivism involves reality being *socially, culturally, and historically* co-constructed through interactions between the researcher and the participants (Merriam and Tisdell 2016: 9). The attempt was to understand how participants made sense of food safety and food waste and the decisions to reduce the same in the food catering service.

In the social constructivist philosophy, research beliefs and assumptions are defined with multiple realities constructed through understanding lived experiences

and interacting with participants. The knowledge or reality was co-constructed between the researcher and the participants, and the participant's experiences shaped the nature of knowledge. Merriam and Tisdell (2016) stated that knowledge has to be sought and does not simply exist. The values of participants were honoured and negotiated among participants (axiology). And, the approach to inquiry was inductive and obtained through interviews, observations, and policy document reviews (methodology) (Creswell 2013: 35-36; Patton 2015). Further, reality does not simply exist but is discovered through participant interactions (Blackstone 2012; Creswell 2013). Similarly, Patton (2015) stated no truth or meaning was in isolation but constructed.

Further, researchers and authors argued that the multiple interpretations and interactions between the researcher and participants influenced the interpretation of the experiences and perceptions, and knowledge was context-bound (Adu 2019). According to Sekaran and Bourgie (2016), beliefs and assumptions influenced daily decisions and impacted the exploration of the phenomenon. Therefore, the researcher decided on a suitable methodology and methods to investigate the phenomenon (Saunders et al. 2019: 129)—food safety and food waste in the food catering industry. Figure 4-1 below shows the relationship between a philosophical position, the research design and the research methods used in the study.
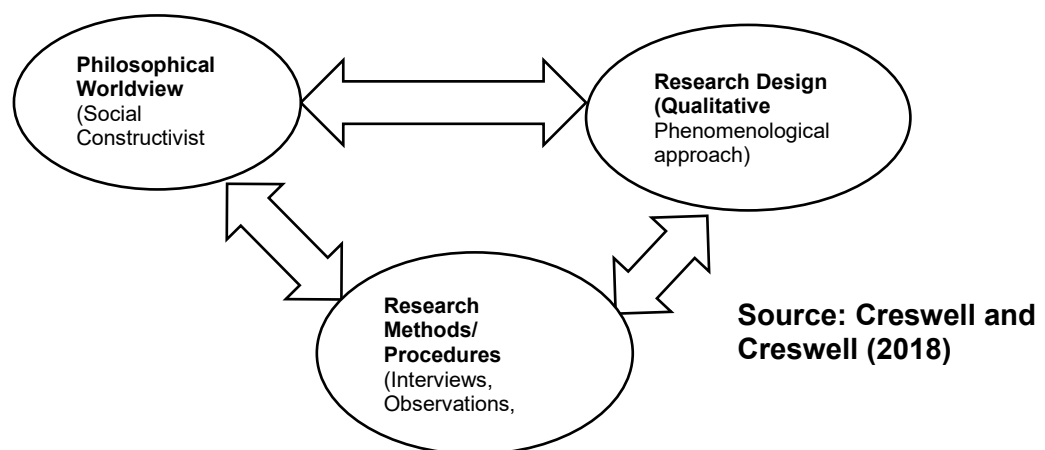
Figure 4-1 Relating Research Philosophy, Design and Research Methods

In searching and developing knowledge on food safety and food waste in the food catering industry, the assumptions about the realities and participants' knowledge arose from their experiences and personal values to influence the research process. Crotty (1998) stated that assumptions shaped how research questions are interpreted and understood, defined the suitable methods used in research, and guided data interpretation. This study sought to interact with the managers and their staff to understand their experiences, perceptions, and perspectives on food safety and food waste in food catering services. In this regard, Saunders et al. (2019) noted that coming out with assumptions resulted in a credible research philosophy that provided the lens to support the choice of the methods, the research strategy, the data collection tools, and the data analysis procedure.

Creswell (2013) further suggested that constructivists focus on the participant's settings for a social, cultural, and historical understanding of a phenomenon. After this, researchers use their background to shape interpretation and acknowledge their experiences. Saunders et al. (2020) concurred and stated that an appropriate method was inductive, with a small sample from which rich-information textual data was gathered using in-depth investigations. The resulting data were qualitatively analyzed, and a range of data was interpreted.

The next section focuses on the research design adopted for the study based on the social constructivist philosophical paradigm. The section also provides a detailed methodology used in the study. The methods or techniques in the research included interviews and observations.

4.5 Research Design

Research design is a strategy or plan to conduct empirical research (Salkind 2010). Several research designs could be employed in conducting research. These are qualitative, quantitative, or mixed methods. Under each research design are strategies of inquiry or approaches to conducting an inquiry. The choice depends on the nature of the inquiry and what to find out or what the researcher is looking for.

The approaches guide the research procedures. Some approaches are narrative, phenomenology, grounded theory, ethnography, and case study (Creswell and Creswell 2018; p. 11). This research sought to better understand the lived experiences of managers and staff of food catering services and their decision behaviors to control food safety and food waste. The researcher selected a phenomenological approach to conduct this research.

A phenomenological approach was most suitable for conducting this research because it facilitated the researcher to obtain participants' lived experiences (Creswell 2013: p.331). It also allowed an in-depth understanding and interpretation of the descriptions and analysis (Merriam and Tisdell 2016: p.3) of food safety and food waste in food catering services. Moreover, qualitative authors argued that a qualitative phenomenological approach was most suitable for exploring and understanding participants' lived experiences and perspectives (Moustakas 1994; Wolcott 2002; Creswell 2013; Creswell and Creswell 2018). The three types of phenomenology include Heidegger's Hermeneutical phenomenology, Husserl's transcendental phenomenology and Merleau-Ponty's phenomenology of perception. However, this research focused on Heidegger's hermeneutical phenomenology, which involved researching the meaning of a being (Peoples 2021). Therefore, the researcher interpreted the meaning from the lived experiences and described the same to answer the research questions and address the research problem.

Based on the research designs used in previous studies, the nature of the research questions suited a qualitative approach to gather empirical data and address the research problem (Wentzel 2018). The qualitative hermeneutic phenomenological approach facilitated the researcher to gather data, investigate, analyze, and interpret the participant's valued experiences and decision-making implications. A quantitative research design was unsuitable because it focuses on numeracy rather than exploring and interpreting descriptions to understand food safety and food waste (Rennison and Hart 2019).

The research process focused on obtaining meaning from selected participants. The participants' meaning of food safety and food waste superseded the researcher's meaning. The researcher bracketed or 'epoched' to minimise bias and interpret the meaning ascribed to the participants' lived experiences. In contrast, Heidegger advised against bracketing or epoching because the researcher is immersed and has ideas about the phenomenon (Norlyk and Harder 2010; Peoples 2021).

Therefore, the researcher interacted with participants to collect and analyze data to find the meaning and understand the phenomenon. Drawing from Moustakas (1994), Merriam and Tisdell (2016) and Peoples (2021), the researcher sought participants who experienced food safety and food waste in their workplace to describe their lived experiences. The researcher conducted in-depth interviews (Moustakas 1994; Creswell and Creswell 2018). The nonparticipant observations complemented interviews in the food catering service settings. Using the two data collection methods provided a holistic and detailed insight and a better understanding of the multiple aspects of food safety and food waste and decisions in controlling their occurrence (Yin 2016). In addition, the two data collection methods minimised bias and facilitated the corroboration of information obtained from different sources. As discussed later, Creswell and Creswell (2018) posited that data from multiple sources enlightened and determined common themes.

4.5.1 The Researcher's Role

The researcher was the key instrument in gathering data. The researcher was responsible for identifying, recruiting, interviewing, and observing participants; the researcher also reviewed the provincial food sites to identify restaurants to include in the research. Observations included directly observing actions and behaviours in food catering service units. There were no interactions with participants in the process, which could arguably introduce ethical and unprofessional issues. The

researcher, therefore, reflected on any bias, values or prior background that could affect the research process (Locke et al. 2010; Yin 2016; Creswell and Poth 2018).

The researcher has been a public health professional for more than ten years and has attended to both reported and unreported food safety incidents while, at the same time, being a resident in a community with frequent food waste. Food safety incidents and food waste were coming from the food catering businesses. The consequences of food safety and food waste were troubling despite the regulations and policies in place. This motivated the researcher to conduct a study based on lived experiences to examine the decisions in reducing food safety and food waste in food catering using the lens of a systems thinking perspective.

The researcher is a customer of some food catering services and personally knows the management and staff of those food catering service centres. The researcher conducted interviews and observations during operational hours. Non-participant observations avoided interrupting business operations and ensured participants operated in an ordinary situation.

The expectation of the research was for the stakeholders to benefit from the findings and recommendations. Understanding decision-making using a systems thinking approach could assist in the reduction of food safety and food waste in food catering and facilitate the development of better food policies and regulations.

4.5.2 Pilot Study

A pilot study tested aspects of the planned research. The aspects included learning whether the researcher's interests in the research topic matched the interests of the potential participants. It also assisted in clarifying the stated research statement and research questions. The pilot study verified and challenged the assumptions made on the research topic; it tried out the research methods used in the main research (Glesne 2016). More importantly, the pilot study tested the organisational theory and the framework.

The pilot study's purpose was to refine the data collection tools (i.e., the interview guide and the observation tool) to ensure the information obtained from the participants answered the research questions and was recordable for analysis. In addition, the pilot study was also used to practice the interview techniques and assess the comprehensibility of the formulated interview questions (Hammond 2023). Therefore, the pilot study assisted in removing elements that would hinder smooth data collection in the main research. The researcher had the opportunity to check the format and wording of questions (Bell and Waters 2018).

The researcher minimised data collection and recording problems and assessed the validity and reliability of the questions/tool gathered data. Saunders et al (2019: p.540) emphasised that conducting a preliminary data analysis using the pilot test data guided the researcher in investigating the research questions and addressing the research problem. Moreover, Bell, Bryman and Harley (2019) concurred that the pilot test ensured questions and the research instruments performed as required in the main research.

The pilot study was a small-scale study that involved six participants. The participants were purposively selected based on the research aim, objectives, and task time. The researcher ensured participants had close characteristics to potential participants of the main research. For instance, participants included colleagues, family, and sites with prior experience handling food in food service centres. As a result, the interview guide was tested to determine what responses they elicited, the difficulty in understanding and answering the questions and whether the recording device recorded retrievable information. Whereas with the observation tool, the researchers targeted finding a suitable location in a facility to observe the participants' actions and behaviours to corroborate the information in the interviews.

Meanwhile, the researcher was keen to test the interviewing skills, filed notes taking skills and techniques for obtaining detailed answers. Bell et al. (2019) argued that testing these skills provided the researcher with experience conducting

interviews and built better confidence in the task. For instance, interview questions that yielded the same response from participants necessitated modification. Peoples (2021) argued that phenomenological research targets multiple experiences. The same applied to questions not clearly understood, questions the participants found uncomfortable to answer or confusing.

The pilot study also focused on finding whether the order of the interview questioning made sense to the participants. As a result, the researcher considered the question flow and the need to change the questions to attain the best answers. Saunders et al. (2019) further posited that pilot testing assisted in testing the instructions or wording of questions to elicit a response. The researchers could determine the suitability of wording the questions. The researcher was also interested in testing the duration of completing an interview.

The researcher used the opportunity to clarify and modify the interview questions, test the audio recorder, and practice the interview skills and observations used in data collection. Further, the responses were tried out in the data analysis tool (Nvivo 12) to test the expected outcome of the main research.

4.5.3 Site and Participant Selection

A criterion-based, purposive selection[§] technique enabled the selection of the research participants and identification of research observation sites. The selection strategy is a non-probability technique that deliberately identifies and selects

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[§] The researcher deliberately used participant selection rather than participant sampling because the goal was not on representation in this qualitative research.

research participants and research sites used in the research. Therefore, criterion-based purposive selection assisted in obtaining relevant participants with deep and rich information sources and relevant information on food safety and food waste to address the research questions. It further enables the researcher to obtain participants with characteristics meeting the purpose of the research (Merriam and Tisdell 2016: p.57; Kornuta and Germaine 2019; Tracy 2020).

The criterion-based purposive selection and snowballing techniques assisted in selecting informative participants. Snowballing involved asking the interviewed participants to refer others who met the selection criteria. For instance, the researcher requested interviewed participants for contacts with diverse knowledge and could discuss multiple aspects of food safety and food waste in the food catering services. The technique facilitated obtaining participants with a broad perspective and rich textual information on food safety and food waste.

The process involved contacting potential participants in the food catering industry using email, telephone calls and personal visits (See Appendix B Communication to Potential Participants). The communication highlighted the purpose of the research. It sought the request of participant participation. Many were delighted to participate in the study, and others refused for reasons ranging from COVID-19, confidentiality, and personal reasons. The researcher capitalised on the participants who agreed to participate, met the criteria, and was complimented with snowballing techniques (Creswell 2016). The criteria for selecting participants emphasised experience, period of stay in a restaurant, and the level of education in seeking to articulate the information. In doing so, the selection criteria included the following;

1. Participants with at least six or more months of experience in restaurant or food catering services,
2. Participants who could independently express themselves and communicated freely on food safety and food waste,

3. Participants with an education of at least a high school level and,

4. Observation sites included restaurants and food catering sites that were routinely monitored and appeared on the inspection website of the province of British Columbia and had interviewed participants.

Therefore, the selected participants had experience, were knowledgeable and were willing to provide credible information (Creswell and Poth 2018) on multiple aspects of food safety and food waste in restaurants and food catering services. Similarly, observation sites focused on food safety and food waste were discussed during interviews.

The rationale for selecting participants with these qualities was drawn from the qualitative researchers, e.g.,(Creswell and Poth 2018) and the pilot study (see pilot study section above) before the main research. The literature argued that reflective participants explained their lived experiences (See, e.g., Martin-Rios et al. 2018); Pitney et al. (2020: p.31) stated that obtaining quality information depended on the suitability of participants and systematically observing participants. The study sought four forms of data: demographic, contextual, perceptual, and theoretical information (Bloomberg and Volpe 2019).

Phenomenological qualitative research participants are fewer compared to other research approaches. The goal was to obtain participants' diverse experiences on food safety and food waste and provide a better understanding (Gentles et al. 2015; Vasileiou et al. 2018). The guiding principle was attaining data saturation, redundancy, or no new information (Pitney et al. 2020). Additionally, the small number of participants relates to the researcher's emphasis on ensuring depth rather than breadth (Leedy et al. 2021) and the availability of resources. The researcher conducted interviews that lasted at least forty-five to ninety minutes and realised saturation or redundancy when participants did not reveal any new information or emphasised the same point. The study also focused on obtaining enough data to

address the research question and the study purpose, contributing to knowledge bearing in mind the available resources and time constraints (Liamputtong 2019).

According to Marshall (1996), adequate participants in qualitative research are subjective. The number of research participants was when there was evidence of saturation and a sign of diminished gain in any new information from participants. As a result, twenty-five participants were interviewed for this research. Further, the number of participants interviewed for this study was supported by the argument that a phenomenological qualitative study typically has between six and twenty-five participants (Creswell 2013; Creswell and Poth 2018; Leedy et al. 2021). For this research, the responses were similar at the twenty-first interview, and there was nothing new the participants were revealing. The process supported the decision to complete the interviews after the twenty-fifth participant. Because of a purposive selection process, generalizations to all the managers and staff in the food catering services did not exist.

The summary in Figure 4-2 (a, b and c) below shows the distribution of the participants interviewed in the research. Figure 4-2 (a) shows that the gender distribution of the participants was close to a ratio of 1:1 (Males-52% and Females 48%). Gender is important and introduced here to pay close attention to the workplace's balance of females and males. Figure 4-2 (b) indicates that more than 50% of the participants had a high school qualification, with an almost equal distribution of diploma and degree qualifications for other participants. Figure 4-2 (c) shows that most participants had more than ten years of experience in the food industry, with more participants with experience of one year to six years.
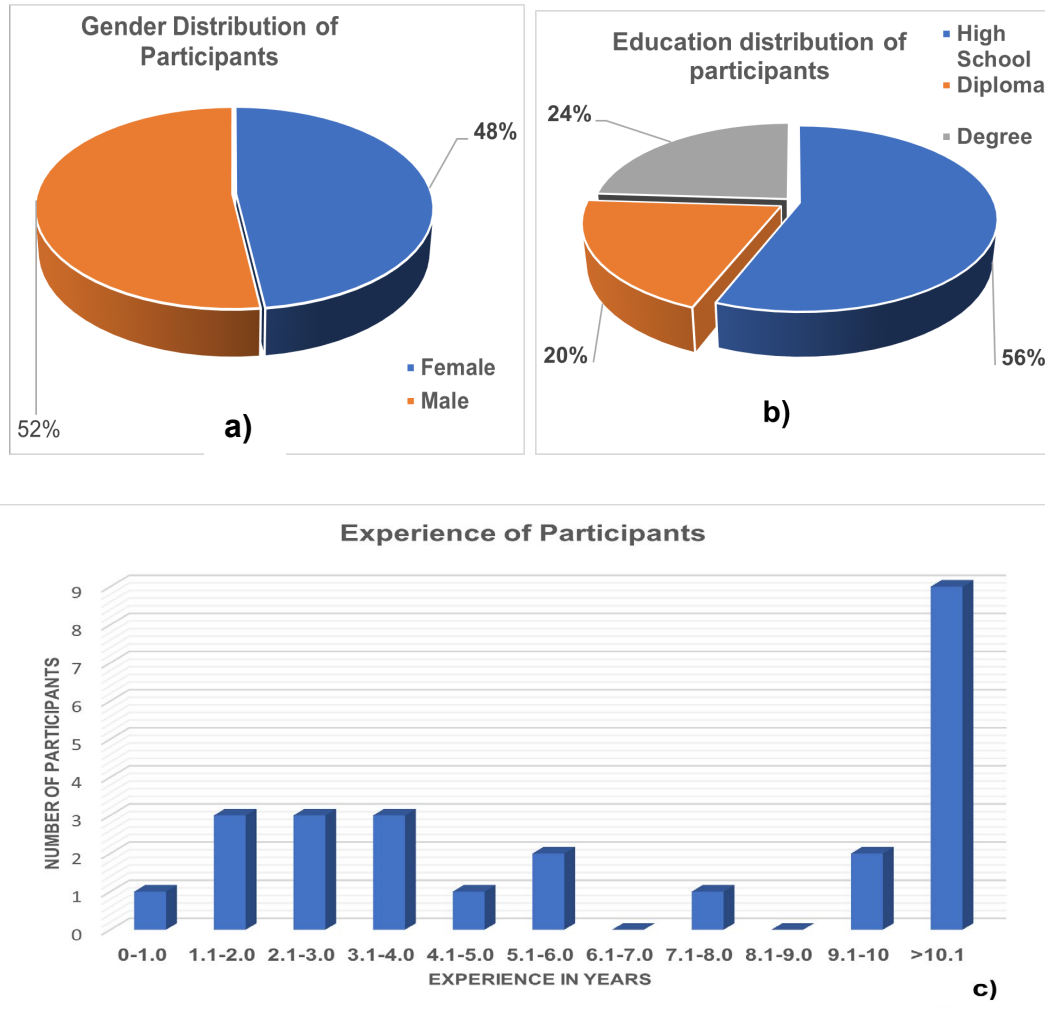
Figure 4-2 Distribution of Participants Interviewed for the Study

Table 4-1 below summarises the distribution of the research participants' experience, education, gender, age, and positions. The information facilitated explaining participants' experiences and compare the participant's responses. The data was gathered at the end of the interviews and illustrated in the table below:

Table 4-1 Participant Demographics

#	Participant code	Pseudonym	Experience/ Years	Current Position	Education	Gender	Age
1	FH01	Alex	2.5	Food server	High School	F	28
2	FH02	Patrick	3	Food server	Degree	M	26
3	FH03	Harriet	8	Supervisor	Diploma	F	25
4	FH04	Jane	3	Food server	Degree	F	27
5	FH05	Tom	28	Supervisor	Degree	M	58
6	FH06	Tim	12	Food server	High school	M	35
7	FH07	Conrad	5	Chef	High school	M	29
8	FH08	Cedric	15	Chef	High School	M	52
9	FH09	Andrew	10	Chef	Diploma	M	32
10	FH10	Monica	23	Supervisor	Degree	F	39
11	FH11	Cheryl	4	Food server	High school	F	23
12	FH12	Jeff	16	Manager	Diploma	M	36
13	FH13	Irene	35	Manager	High school	F	59
14	FH14	Sean	1.5	Food server	High School	M	25
15	FH15	Renny	2	Food server	Diploma	F	34
16	FH16	Tonny	30	Head chef	Diploma	M	52
17	FH17	Jon	6	Chef	High School	M	26
18	FH18	Alice	6	Chef	High School	F	37
19	FH19	Ruth	10	Manager	Degree	F	36
20	FH20	Devin	4	Food server	High school	M	28
21	FH21	Rita	0.5	Food server	High school	F	26
22	FH22	Samantha	4	Chef	High school	F	30
23	FH23	Charles	1.3	Supervisor	High school	M	38
24	FH24	Carol	11	manager	High school	F	56
25	FH25	Jason	14	Senior Manager	Degree	M	52

Source: Author (2022)

4.6 Data Collection

The rationale of the qualitative approach was to obtain a better understanding of food safety and food waste in the participant's settings. The setting included restaurants and food catering services where the research problem occurred. Further, qualitative research assisted the researcher in presenting the multiple participant's experiences in their own words. Therefore, of the several qualitative data collection methods, interviews and observations were used in this research (See, e.g., Merriam and Tisdell (2016); Saunders et al. (2019)). The two data collection methods provided enough information to address the research problem and the research questions. The methods also minimised bias by checking the gathered information enhancing data quality (Bloomberg and Volpe 2019). The

methods complemented each other, expanded on aspects that were not well captured using a single technique (Maxwell 2013; Rudestam and Newton 2015), and provided additional information and accuracy (Maxwell 2013). Also, interviews and observations demonstrate the novelty of this study because previous and related studies either used a single technique or other data collection techniques such as surveys. The sections that follow discuss data collection techniques used in the research.

4.6.1 Interviews

Interviews involved interacting with participants, where the researcher posed questions and obtained responses. In-depth research interviews used in qualitative inquiry include unstructured, semi-structured, and structured interviews. In this research, the researcher used a semi-structured interview and developed an interview schedule based on the research questions guided by the theoretical framework. Appendix D shows the interview schedule employed in conducting the interviews. The interviews were limited to forty-five to ninety minutes and focused on obtaining a detailed exploration of food safety and food waste from the managers and staff of food catering services (Gournelos et al. 2019: p.53). After the interviews, the researcher followed up with the participants to validate the collected information described in section 4.7.

This research employed semi-structured interviews. The technique used developed questions or an interview schedule to guide the interviewing process. Kvale (2006) argued that the format encouraged openness, and the question order could be changed to follow up on the participant's responses. In other words, the researcher asked the questions, and the participants responded in their own words (Braun and Clarke 2013). The rationale for using semi-structured interviews was to allow for comparisons between participant's responses, obtain rich and broad information from participants (Rennison and Hart 2019), and a better understanding of the participants' lived experiences (Kvale 2007; Braun and Clarke 2013;

Brinkmann 2013; Silverman 2017). The open-ended questions enabled the participants to provide detailed responses, and information they felt was important to them on food safety and food waste in their settings. In addition, the questioning enabled the researcher to probe, obtain clarifications and build on the discussion (Seidman 2006; King et al. 2019).

The researcher employed both face-to-face interviews and telephone interviews. According to Merriam and Greiner (2019), conducting in-depth interviews with participants makes the researcher the key data collection and analysis instrument. As a result, the researcher determined the interview process, refined the procedures, clarified, checked for accuracy of description, summarised the material, and interpreted the responses. The rationale for using face-to-face interviews was to elicit in-depth information about the experiences and views of managers and their staff on food safety and food waste in food catering services. The face-to-face interviews encouraged participants with a stake in food safety and food waste to be open and thoughtful as they answered the interview questions (Braun and Clarke 2013). The phone interviews suited the COVID-19 pandemic, which restricted contact and interaction.

The interview questions sought demographic information such as age, education level and gender before asking about experiences with food safety and food waste in their work settings. An interview guide guided semi-structured interviews and open-ended questions with twenty broad questions (See Appendix C: Interview Guide/Protocol). The interview guide was developed and piloted (see Section on Pilot Study). Developing and piloting the interview guide was to build trust or rapport with the study participants—a key component in building relationships, smoothly interacting with participants, and eliciting important and required information (Maxwell 2013).

As a result, twenty-five participants in total were interviewed. The interviews lasted between forty-five to ninety minutes. Twenty face-to-face interviews took

place on office premises at the participant's convenience between December 2019 and April 2020. At the same time, five telephone interviews involved using a telephone at a convenient time for the chosen participants. The study incorporated telephone interviews because the COVID-19 pandemic required social distancing. Hence, participants felt safe and comfortable using the medium. However, the disadvantage was a failure to observe participants' cues during face-to-face interactions.

The interactions between the researcher and the participants were audio-recorded using a Sony ICD recorder. After obtaining consent from each participant and obtaining a signed consent form, the researcher audio recorded (See Appendix B Consent form). The researcher listened attentively to the participants and took notes. Before transcribing, the notes and the audio recordings were read and listened to, respectively. Saunders et al. (2019) argued collecting data, transcribing, and analyzing simultaneously. The purpose of simultaneous data collection and analysis was to inform subsequent data collection and follow-up on initial insights. It facilitated new revelations and recognition, arriving at data saturation. Yin (2016) and Creswell and Poth (2018) further emphasised that *"data collection, data analysis and report writing"* are related and done concurrently in a qualitative study.

4.6.2 Observations

The second data collection method was observations. Observation involves witnessing events, actions or aspects in the catering industry based on the time, place, and situation and then drawing a conclusion. The researcher obtained firsthand accounts by observing the participants, hence the multiple aspects of food safety and food waste during the interview process. As a result, the researcher depended on the participants' experiences and interpretations in the interviews (Bloomberg and Volpe 2019).

The observations facilitated the researcher to discover meaning, improve understanding, and bring insight into food safety and food waste (Bowen 2009;

Merriam and Tisdell 2016). Further, observations complemented interviews, assisted in verification, and ascertained information obtained. As a result, observations facilitated the researcher to get information not revealed in interviews through participant concealment or lack of expression (Creswell 2016).

The observation process involved holding observation sessions at sampled food catering services (restaurants and cafeterias). The researcher watched, listened to, and recorded the sites' actions, behaviours, and interactions (Angrosino 2007). The field notes were treated like interview transcripts (Merriam and Tisdell 2016) and guided the information obtained in the interviews, the research questions, and the research purpose.

The observation steps and procedures included Selecting restaurants and food catering service locations to conduct observations, seeking permission to gain entry and observe, and identifying the key issues to observe, the duration and when to observe. The researcher designed an observation protocol to record descriptive and reflective notes—on experiences, actions and what was learned (Creswell 2013). Please see Appendix D Observational protocol. The observational instrument had the date, time, location, and notes on what was observed (Angrosino 2007; Merriam and Tisdell 2016).

The researcher recorded the observations, including the participant activities, processes, behaviours, routines, settings, and anything new or unique. Shorthand captured as much information as possible. Given that many things coincided, the researcher's role was more of a complete observer. There were no interactions with the staff; the emphasis was on observing and taking field notes. The field notes were in chronological order as the event occurred. As the researcher, I kept reflecting on asking myself questions about the answers in interviews and what to observe to maintain focus.

After observing for the set duration, the researcher thanked the gatekeeper for the opportunity. The researcher immediately compiled the full field notes to

ensure memorisation of the observed events. The notes included a description of the participants, their actions, behaviours and noted events. Appendix E shows a diagrammatic example of one of the settings (See Appendix E: Diagrammatic Representation of an Observed Setting).

4.6.3 Data Management Plan

A data management plan ethically manages the collected data to ensure anonymity and confidentiality. Data collection captured participants' names, business settings, positions, and professions. Therefore, identifiers are anonymised and replaced with pseudonyms (e.g., AB1, AD2 etc.). The researcher ensured that this final research report did not identify the participants or settings (Saunders et al. 2019). Also, the researcher transcribed the data verbatim without altering the participants' words to maintain the meaning of the participant's accounts.

The data management plan also included the storage of collected data, signed forms and field notes. The raw data contained identifiers; therefore, the researcher ensured the different versions of the data had identifiers. As a result, all the identifier-labelled data was secured in passworded folders and backed up, securing the data. Given that the collected data addressed the posed research questions and met the purpose of the dissertation research, there was little chance to share the file. The sharing and storage of data in the cloud would not arise.

After satisfying the research committee of the University of Bradford, gathered the permanent deletion of the saved files and folders will destroy data. Implementing all the data management processes goes a long way in satisfying the maintenance of confidentiality, participant anonymity, and privacy, causing no harm to participants or businesses (Saunders et al. 2019) and abiding with the University of Bradford ethics requirements.

4.7 Data Analysis

Data analysis involves systematically searching, organising, and arranging gathered data. This research gathered data from interviews, transcripts and field notes to interpret the meaning and arrive at the research findings with the concepts in organisational theory and the theoretical framework in mind. (Bogdan and Biklen 2007). The gathered data were orthographically entered or verbatim into Nvivo version 12 software that facilitated the analysis. Entering the data, verbatim ensured the researcher captured what the participants said and how they expressed their responses (Braun and Clarke 2013: p.163). The analysis software assisted the researcher in organising, sorting, and searching for textual data. The researcher then sought: *"emerging themes, patterns, concepts, insights and understanding"* from collected data (Suter 2012; Patton 2015). Doing so made sense of the collected data on multiple aspects of food safety and food waste.

There are several methods of qualitative data analysis. Depending on the approach of inquiry, some of the common methods of analysis are narrative research analysis, interpretive phenomenological analysis, ground theory analysis (Maxwell and Miller 2008), ethnographic analysis, case study analysis (Creswell 2013; Creswell and Poth 2018), thematic analysis (TA) (Braun and Clarke 2006; Braun and Clarke 2013), discourse analysis (Clarke and Braun 2015; Lyons and Coyle 2016) and content analysis (Schreier 2012).

The researcher adopted thematic analysis (TA) because the analysis technique was flexible. TA works with different theoretical frameworks, research questions or methods used in gathering qualitative data and the number of participants (Braun and Clarke 2013). Therefore, in this research, TA suited the theoretical framework and the epistemological assumptions or philosophical paradigm brought into the research. And, within the thematic analysis, there are styles. These include template analysis, framework analysis and matrix analysis (Crabtree and Miller 1992; King et al. 2019; Saunders et al. 2019)

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Figure 4-3 illustrates how the researcher used TA to generate the themes presented in this research. The six stages of Braun and Clarke (2013) explained the process in detail and posited the thematic analysis technique. However, Figure 4-3 demonstrates that the process commenced with transcribing and reading the interview transcripts and filed notes. Next was observing the patterns in the data and marking them out. The researcher sought the meaning of the segments or codes and labelled them accordingly. The codes were re-read to determine codes or segments that were related or with close ideas; these were merged. The next step involved reviewing the codes for relevance and closeness to answering the research questions. The researcher reduced the themes to manageable levels and eight themes. Figure 4-3 also shows the spiral form of data analysis Peoples (2021) described, where small chunks of data to the bigger ones and vice versa are analysed to obtain a meaningful theme.
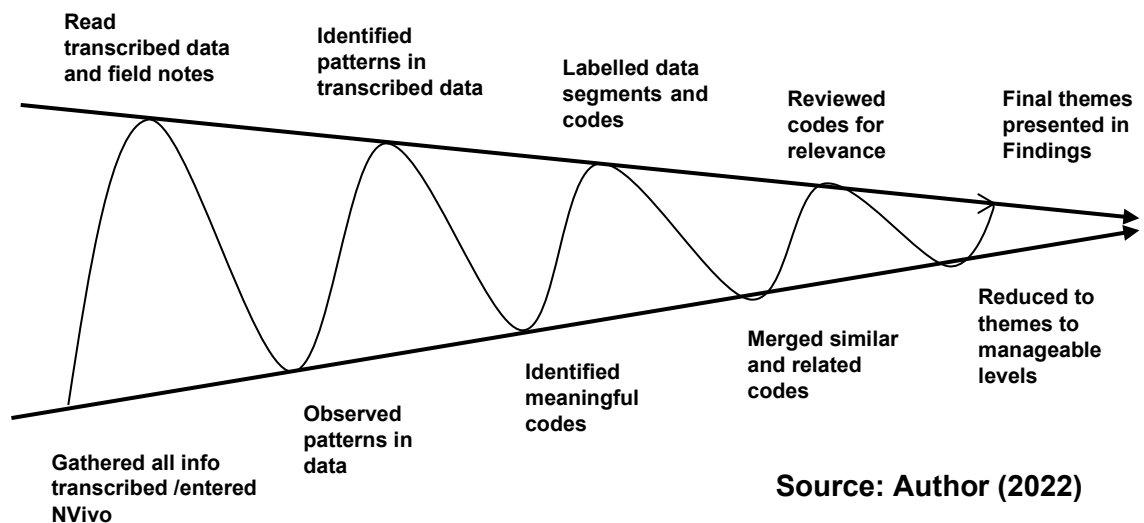
Figure 4-3 Generating Themes from Codes Using Thematic Analysis

This research employed Braun and Clarke's thematic analysis (TA) style. Thematic analysis is a qualitative data analysis technique that identifies, interprets, and captures categories, partners, or regularities in textual data (Clarke and Braun 2015). Categories or patterns are codes or nodes with similar or related data groups:

the identified categories and relationships or patterns assisted in data reduction. As a result, manageable transcripts could be synthesised and sorted for more patterns (Bogdan and Biklen 2007; Maxwell 2013).

4.7.1 The Rationale for Thematic Analysis (TA)

The rationale for using thematic analysis over other forms of analysis is included. First, it was a widely used analysis technique for different forms of qualitative data and provided a rigorous and robust mode of data interpretation. Second, thematic analysis was flexible with different theoretical frameworks and epistemological assumptions (i.e., the researcher used organisational theory (OT) and the social constructivist philosophy or paradigm). Lastly, the type of questions the researcher formulated for the research was suitably answered using thematic analysis (Clarke and Braun 2015).

4.7.2 Thematic Analysis Process

Braun and Clarke (2015) posited thematic analysis as a non-linear process with back-and-forth processes that involved identifying themes and patterns of meaning within a dataset related to the formulated research questions. The process involved coding, labelling, or indexing (Miles and Huberman 1994; Maxwell 2013; Miles et al. 2014). Coding involves identifying exciting or essential features in the data, either a word, a short text or a paragraph. The purpose of coding was to generate broader units (themes) that clearly defined the features of textual data— was distinctive and recurred, showing the experiences or noted behaviours—that were important and relevant in answering research questions (King and Brooks 2018). The researcher used the resulting themes to write the narrative, as shown in the findings section of this report (Creswell 2016).

The six stages used to analyze the collected data and derive the themes (Braun and Clarke 2006; Braun and Clarke 2013) are presented in detail below:

Stage One: Familiarization with Data

After transcribing the interviews and field notes, the researcher immersed and engaged with all the transcribed data, reading and re-reading to get a feel of the collected information, identifying ideas and expectations and understanding the participant accounts on food safety and food waste in food catering services. At this stage, using a research journal, the researcher made reflective notes, wrote memos, and explored the data, seeking answers to the research questions. The transcripts raised further questions on what the transcripts or textual data meant and why they existed. The implicit ideas within the participant's accounts and the other textual data started to emerge.

Stage Two: Generation and Aligning Codes/Nodes

After data familiarization, the initial codes forming the qualitative data analysis building blocks emerged. Coding involves a process of identifying segments or statements in the data that are related to the research questions. A code is a phrase or word that captures part or section of the data that helped answer research questions—the meaning at the intersection of gathered data and its interpretation facilitated systematically assigning codes with a meaning.

However, the first thing was defining anchor codes based on the research questions. The purpose of the anchor codes was to organise the codes/nodes that fall into the respective research questions (Adu 2019). The anchor codes were FS and FW meaning and understanding (SRQ1), FS and FW cause (SRQ2), FS and FW management and strategies (SRQ3), FS and FW management solutions (MRQ1), and FS and FW barriers and motivations. Figure 4-4 below shows the anchor codes assigned and where the different codes fall.

The data extracts at semantic and latent levels represented codes. The researcher coded the extracts at the semantic level based on the participant's responses to the interview questions. In contrast, the latent level was coded based on implicit ideas underlying the participants' meaning. Therefore, coding assisted the

researcher in generating meaning from the collected data and not searching for pre-determined meaning.
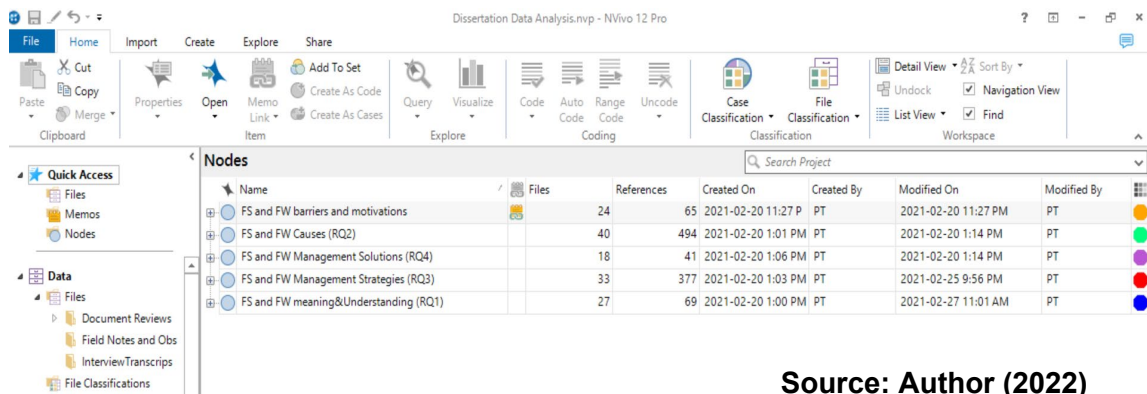
Source: Author (2022)

Figure 4-4 A NVivo Extract Showing Anchor Codes

Using inductive coding, the initial codes emerged in the data. Each code identified essential and relevant information in data segments and assigned it with labels, words, or phrases. Each anchor code shows grouped or clustered codes. The process was repetitive, systematic, and continuous. Coding involved all data sets or cases emphasising clusters and segments with the sought-for information to address the research questions. Multiple rounds of coding ensured all the data was completely coded (Lyons and Coyle 2016). Coding also reduced the voluminous data into manageable and refined data (Rudestam and Newton 2015).

Coding marked the beginning of data interpretations and identifying related codes for potential themes, quotes, or excerpts included in this report. The quotes were composed of surprising and revealing information about the research questions and evidence from the data. It is important to note that qualitative researchers argue that coding data guides refining research questions (Lyons and Coyle 2016).

Figure 4-5 shows the coded significant statements and how a code falls under an assigned anchor code. The arrows indicate the codes, coded statements, and anchor codes.
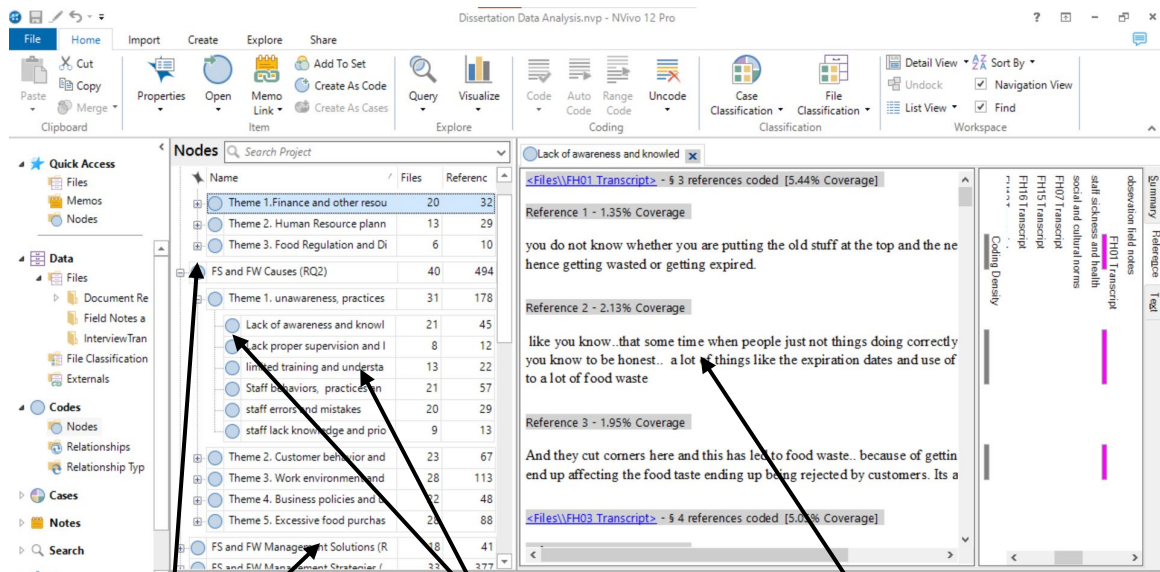
Figure 4-5 An Anchor Code, a Code, and the Significant Statement

Stage Three: Constructing and Developing Themes

The first two codes with the highest references formed the initial codes in the first cluster columns. The codes were then dropped into different clusters/columns based on their closeness or relation. The codes created building blocks of themes; the codes under each anchor code amalgamated into a candidate or potential themes. These were possible themes because they kept changing in the analysis process.

The characteristics that formed the basis for developing the themes were that the theme could address the posed research questions individually or as a combination. Although some themes were relevant to answer the research questions without systematic appearance within the data set, they were coherent and had a central concept or meaning. Figure 4-6 demonstrates how the subthemes and themes emerged using the sorting strategy. The process involved selecting themes the researcher found suitable for addressing the research questions. Otherwise, selecting themes continued to the next stage (stage 4)
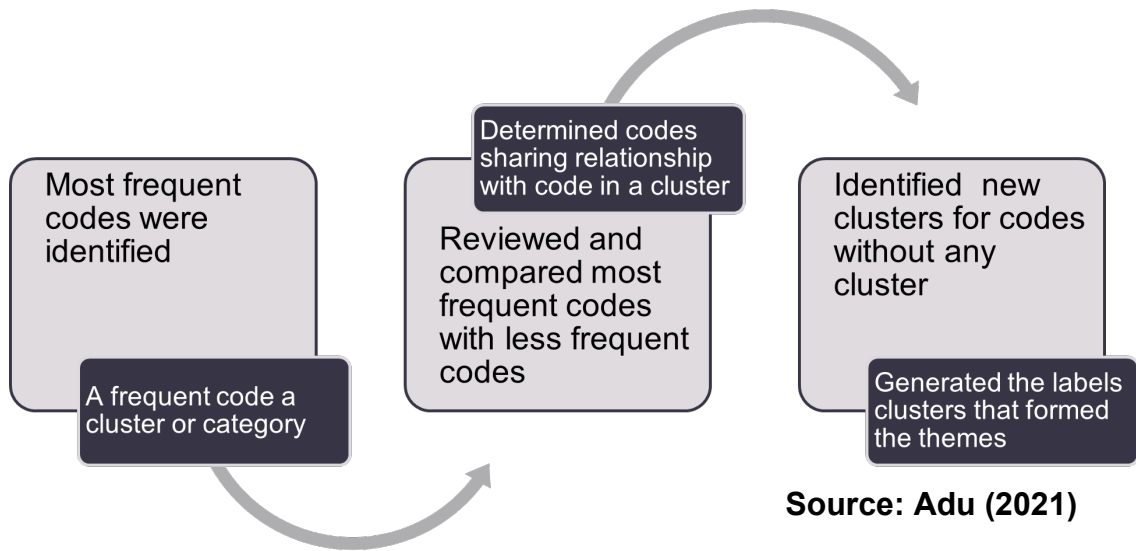
Figure 4-6 Developing Themes and Sub-themes Using a Sorting Strategy

Stage Four: Reviewing Themes

After developing the potential themes (in green, Figures 4-7 and 4.8) representing the possible themes in the gathered data, the researcher checked these against their relevance and importance in answering the research questions. The codes and extract statements were reviewed for the collected data and compared to their fit into the final themes. The rationale for reviewing was to check the coding process's comprehensiveness and ensure the focus was on gathered data. The developed theme was further checked for meaning and provision of a participant account and followed across the data set (Braun and Clarke 2013), recommending at least six themes for a research question.

Related themes were collapsed into a single theme with a story in mind to make sense of the theme. For instance, "*staff food practices*" and "*training needs*" were collapsed into one theme, "*staff practices and training needs.*"
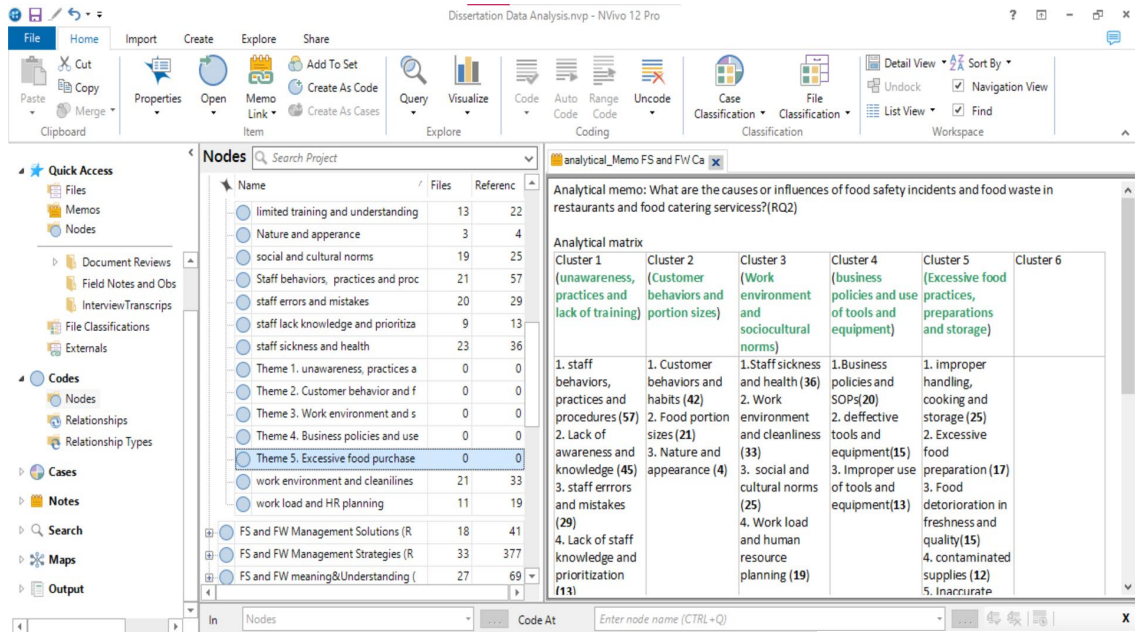
Figure 4-7 Grouping Related Codes, Assigning and Reviewing Themes

Stage Five: Defining, Revising, and Naming Themes

This stage refined the focus and the breadth of the analysis. The researcher sought the story told under each theme, capturing the meaning of the posed research questions. The narrative provides the readers and the audience with what emerged in the data and describes the importance of the research questions. Most importantly, this stage demonstrated the reasons to care about the presented research findings.

Figure 4-8 Defined, Revised, and Named Themes

Stage Six: Writing Up the Analysis and Report Findings

The final report presents the defined themes at this stage, although writing remained ongoing during the analysis. The stage involved collecting analytic notes, extracting statements supporting the themes, and answering the research questions. Therefore, this section presents the exciting and important findings obtained from the participant accounts. (Braun and Clarke 2012; Braun and Clarke 2013). This stage summarises the analytical notes or extracts that illustrate the themes as answers to the research questions, demonstrating the relationship between the themes and the research questions.

Table 4–2 below summarises the six steps in the thematic analysis process. Each stage provides a brief task the researcher performed to arrive at the presented themes in Chapter 5: Presentation of Findings)

Table 4-2 Summary of Stages of the Data Analysis Process and Tasks

Stage	Analytical tasks
Stage One	Immersing and engaging with transcribed data by reading and re-reading for familiarization
Stage Two	Coding/labelling of data segments or sections that were relevant to the research questions
Stage Three	Identifying patterns within data and searching for themes
Stage Four	Revising and reviewing identified themes to map out themes and subthemes and their relations.
Stage Five	Defining and naming themes
Stage Six	Finalizing data analysis and commencing the writing of findings based on identified themes

Source: Author (2022)

4.8 Validity and Reliability

In qualitative research, validity means checking the accuracy of research findings by following the research steps and procedures. Reliability ensures that the research approach adopted remains consistent and provides the same results as other researchers or related studies (Creswell and Miller 2000; Creswell and Creswell 2018). The importance of validity and reliability assures readers and enhances the acceptability of the research findings to be credible, authentic, and trustworthy. This research has drawn on the recommendations of qualitative researchers to ensure the findings are accurate and consistent.

Several approaches or strategies enable obtaining accurate findings and add validity to the study. First, the researcher triangulated the data sources using interviews and participant observations. Doing so resulted in the reported themes that arose from different sources. Moreover, using more than one method in investigating a phenomenon such as food safety and food waste provided evidence

from more than one source. It facilitated convergence and corroboration of evidence (Bowen 2009). As a result, the outcome lacked potential bias and was credible.

Second, the researcher returned to the participants for follow-up interviews and presented the findings to the managers and staff to check accuracy. The final report included the comments of the participants.

Third, the study findings reported thick descriptions to bring the readers closer to the study settings and the participants' lived experiences in the interviews or the analyzed documents.

Fourth, the researcher elaborated on the role and background held. These were important in shaping the interpretation of the information (The reflexivity section provides more information).

Fifth, the researcher considered all gathered information for analysis. Both realistic and contradictory information came out in the study findings with evidence.

Sixth, the researcher shared the findings with peers and colleagues to obtain their views of the research. The final research report considered the views for improvement.

Finally, Creswell and Creswell (2018) stated that the researcher should spend substantial time. Staying longer in the field facilitated the researcher's deeper insight and understanding of food safety and food waste experiences and decisions. Further, the researcher interacted with the participants, obtaining accurate and valid information. The qualitative authors also noted that an external audit would provide an extensive review of the research study. In this case, the external audit would assist in finding the relationships between sections of the study and aligning them, hence improving the validity of the final report.

On the other hand, the researcher ensured the findings were reliable or consistent by doing several things. First, the researcher consistently documented the steps and procedures of the research process. Models and figures assist the readers and other researchers understand the procedures followed. Second, the researcher checked transcripts immediately after fieldwork to avoid errors or missed information. Third, the codes were defined, routinely revised, and compared with data coding. Further, the researcher wrote memos regarding the codes immediately and consistently. Finally, codes were cross-checked, although Creswell and Creswell (2018) argued that this was best when a project or study had multiple researchers.

As stated earlier in this chapter, qualitative researchers are interested in descriptions and themes generated from the participant's experiences. Therefore, it was the particularity and not the most important generalizability in this qualitative research (Creswell and Creswell 2018). The researcher ensured to document steps and procedures that other researchers or readers could use to replicate the study.

4.9 Research Limitations

Limitations are external factors or conditions hindering the research scope or affecting the findings. The research encountered several challenges. Among these, they have included narrowing the research scope. Food safety and food waste have had broad and substantial research conducted; however, some participants were reluctant to discuss food safety and waste. Hence, failure to examine experiences affected obtaining all the information from food catering services.

Accessing participants was affected by gatekeepers, who prevented the researcher from reaching key participants. Limited access arose from the COVID-19 pandemic-associated risks, the busy schedule of managers and supervisors and the fear that the researcher would discover weaknesses and harm their business. However, the researcher managed the limitation through online tele-conversations.

Time was a factor that affected the study—the time involved both the participants and the researcher. Most of the time, the participants were busy, leading to postponing scheduled interview appointments. On the other hand, the researcher did not have the time to exhaustively interview participants, directly observe sites for as long as necessary or review and analyze all the documents on food safety and food waste. The researcher was a part-time student in full-time employment. As a result, there was limited time to balance work and studies, hence the delayed completion of the research or final report.

4.10 Ethical Considerations

Ethics are important in research and making decisions that apply to the research design. Before gathering data through interviews and non-participant observations, the researcher obtained approval from the research ethics review committee (RERC) to conduct the research (See Appendix A. Research Ethics Approval). Ethics approval guaranteed that research participants and institutions (study settings and the University) were protected and not harmed. The researcher also obtained written and signed consent forms from all the study participants and the respective institutions (See Appendix B: the informed consent forms). The signed documents guaranteed confidentiality and transparency to the participants and their workplaces and affirmed that the research intended to provide knowledge to stakeholders on food safety and food waste.

Protecting the research participants, settings, or institutions in conducting ethical research was necessary. The researcher used several measures to protect participants and the institutions. First, pseudonyms represented each participant and institution/setting. The transcription process followed the same procedure. Second, the researcher modified the participants' background information to protect their identities. For example, in the interview, participants mentioned the names of their workplaces and their line supervisors. However, the researcher presenting this information in the report would lead to a possible identification of the participants.

Finally, the researcher ensured no access to gathered information or data. As mentioned in the consent form, the researcher locked the interview recordings and the transcripts in a secure and locked facility. The researcher personally conducted the interviews and transcribed the materials for familiarization, interpretation, and denying access to others.

4.11 Chapter Summary

This chapter has described the research design and methodology used in this research. The social constructivist philosophy was adopted to frame the study. The researcher explained the research design with organisational theory and the presented theoretical framework informing the process. The information sought assisted in addressing the posed research questions. The chapter also described data collection methods, data analysis, ethics, and data management processes.

A criteria-based purposive selection technique guided the selection of participants from a population of food catering service managers and staff. This resulted in twenty-five participants. The interviews lasted forty-five to ninety minutes between December 2019 and April 2020. The researcher entered the transcribed data into NVivo 12 for analysis. The researcher used an inductive thematic analysis.

The next chapter presents the research findings as themes and subthemes identified from the analysis process.

CHAPTER 5 : PRESENTATION OF FINDINGS

5.1 Introduction

Chapter four presented the research design and methodology used in this research. The chapter reminded us of the research questions and provided a detailed discussion of the data collection strategies. It also explains the data analysis procedure and the generation of the research findings discussed and presented in this chapter.

The research aim was to explore the lived experiences of managers and staff in food catering services to better understand their decision behaviour approaches in controlling food safety and food waste. Therefore, this chapter presents the research findings from analysing twenty-five semi-structured interviews and textual material from observational field notes. The presented findings demonstrate the lived experience and accounts that assisted in addressing the research questions and study objectives. The excerpts support the findings under each theme in section 5.3. First, the chapter explains the research background and setting, the research participants, and the data sources and presents the findings.

5.2 Background and Setting

In this phenomenological qualitative research, the participants were managers and staff in restaurants and catering services in Vancouver. The managers and staff were selected as participants because the services provided in food catering depend on their services. Ozbuk and Coskum (2020) argued future research such as this one to investigate their role in food waste. This research extended it to include food safety. The data collected from the participants was complemented with non-participant observations and a review of related policy documents. The COVID-19 pandemic travel restrictions denied the researcher the opportunity to interact with some key participants.

5.3 Selecting Participants and Observation Sites

The study participants were selected using a criterion purposive selection technique with a snowballing technique. These included managers and staff—supervisors, chefs, and food servers. The criteria were at least six months of experience in a food catering service, the ability to hold a discussion comprehensively in English, and having the time to discuss between forty-five to ninety minutes. The rationale was to obtain rich and informative data to answer the research questions. As a result, more than forty participants took part in the interviews. Still, many cancelled the appointments because of the COVID-19 pandemic, which restricted movement and interactions and caused some restaurant closures.

The observation sessions followed up on the responses and hunches the participants provided. The purpose of the observations was to complement the semi-structured interviews and participants' responses and improve the trustworthiness of the study findings. The gathered data were analyzed and integrated to strengthen the reliability and validity of the research findings (Van de Ven 2007; Kornuta and Germaine 2019)

5.4 Findings

An inductive analysis of twenty-five transcripts and textual data yielded 1,052 relevant and important statements. The related groups indicated clusters of findings with a closer meaning. The clusters resulted in twenty themes. These were the lived experiences of the food catering service managers and staff on food safety and food waste. The four subsections present themes representing the research questions and an additional subsection on unique and interesting responses and observations.

The subsections include the meaning and understanding of food safety and food waste; causes and influences of food safety and food waste; behaviour decisions in controlling food safety and minimizing food waste; and the barriers and motivations managers and their staff faced in controlling food safety and food waste

in restaurants and catering services. Using the strategy of telling—showing—telling (Golden-Biddle and Locke 2007: p.53), the smaller closed quoted fonts and accompanied pseudonyms and participant codes represent interview/textual extracts. (Pseudonym, Participant code) to assist readers and the audience in following. For instance, the excerpts from the textual data are represented in the finding as follows: the pseudonym or source is stated in bold, followed by the participant's responses or statement (e.g., John: Doc 1:). The number of interviews accompanied the responses (e.g., FH01, FH02, etc.).

5.4.1 Findings on the Meaning and Understanding of Food Safety and Waste

The three themes stated the participant's account of the meaning and understanding of food safety and food waste in their settings. Participants mentioned that food safety meant the procedures followed in food preparations. In contrast, some participants indicated that food safety and food waste were about restaurants' systems, human processes, and food catering. The participants attributed food safety and food waste to serving customers and maintaining their businesses. The meaning and understanding of food safety and food waste were not different from those described in the reviewed policy documents and observed in the participant activities and behaviours.

Theme 1: Safe Food Preparation Procedures

Participants described food safety as ensuring customer provision of safe food prepared following a standardised procedure. Failure to follow procedures meant food wasted in restaurants and catering services. In preparing food, the standard expectation was personal hygiene (e.g., washing hands) and ensuring that food was cooked adequately (e.g., correct temperatures). For instance, Patrick highlighted the point:

"I understand food safety as following the right procedures…aah
working with food and in a hygienic manner, so that safe food is

served to the people, you have to check the temperatures of different foods and everything to make sure everything was just standard to help people not to become sick. I apply it on my job to ensure food is safe" (Patrick, FH02)

Similarly, Tim emphasised the same sentiment and stated:

"Food safety is around handling food to ensure that people consume it do not get sick. The food handlers must follow proper protocols and have processes in place as well as having standard operating procedures". (Tim, FH06)

These statements provided evidence that food handlers understood food safety and ensured safe food provision to customers. The reviewed policy documents supported the evidence that complimented face-to-face interviews and defined food safety as improperly handling food that resulted in food-borne illness outbreaks (FOODSAFE Level 1 2019). However, participants were quick to add that there were no reported food safety incidents in their settings and possibly in other restaurants, and the only problem was food waste:

"there is a lot of excessive food waste. However, with food safety or contamination, we are very cautious to have any" (Tom, FH05)

On the other hand, participants related food safety to food waste and argued that improper food handling led to food contamination, making it unsuitable for consumption. However, not all food waste arose from food safety incidents or food contamination. For instance, interaction with Harriet revealed:

"contaminated food supplies spread to all the food when washed, once it has spread to other supplies, all the food has to be discarded because of contamination, it is unsuitable for customer consumption, would not be eaten and wasted".(Harriet, FH03)

One of the documents the food catering staff used in training stated,

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"never rinse raw poultry before using it because bacteria can spread everywhere the water splashes, creating even more of a food safety hazard. The raw poultry has already been washed and rinsed at the slaughterhouse" (FoodSafe level 1)

Participants agreed with the statement, and Tom argued:

"The truth is that whole batches of food are contaminated and thrown away. The reason for throwing away this food is because it can not be sold or even eaten since it can make people sick —the safer you are with food, the less will be the waste."(Tom, FH05)

Both Harriet and Tom's explanations demonstrated that participants understood food safety and food waste in restaurants and showed that in their experiences, food safety was related to food waste in restaurants and catering services and was unavoidable.

Theme 2: Systems and Human Processes

Food safety and food waste were about systems and processes under staff control in food catering services. Food supplies go through several steps before serving customers. As a result, many things are likely to happen, leading to food spoilage, damage, or contamination. The researcher observed in direct observation during the food orders and food preparations, and a similar argument appeared in the reviewed policy documents, thus

"our food supply has resulted in large volumes of raw and processed products moving across domestic and international boundaries every day" (FIORP, 2017)

Participants further raised this point during the interactions, such as:

"I would say in general; food preparation goes through several steps before reaching the final consumer. I feel that that's watched pretty

carefully. It is through a system and through the process of it being prepared to make sure the food is not contaminated or wasted because something wrong was done." (Renny, FH15)

Subsequently, other participants had similar views of food safety and food waste and added:

"Systems and processes are crucial, and it is important in making sure that you do not have to get food-borne illness situations or get food-borne illness outbreaks because you need to make sure that the same level of food safety is held every day. If you do have systems in place and you are relying on people to know what to do or trusting people to know what to do, everything that is not written down and measured is open to interpretation" (Jason, FH25)

Renny and Jason's arguments illustrated that participants understood food safety and food waste associated with the systems and processes in food catering services, which the food handlers had control. Therefore, the staff needs awareness of and appreciation of the importance of these systems and processes. There were inconsistencies within the systems and with the humans, causing safety incidents and waste-related situations due to a lack of standardization.

Theme 3: Effects on Sales

Restaurants and catering services are business entities. Participants described food safety and food waste based on a monetary perspective. Participants understood food safety and food waste as a lost opportunity to make sales to customers. For instance, Jon explained:

Yeah… once food is contaminated, it can not be sold or consumed by customers. Instead, it is thrown away as food waste. Food waste is a big issue in restaurants because food is contaminated, which means a lot of food will be wasted and means a loss of money. (Jon, FH17)

To this, Jason added;

Food safety and food waste result in sales going to be over a period of time being affected if you want to keep the food safety controls. (Jason, FH 25)

The participants understand food safety and food waste and relate them to the costs involved. Therefore, addressing food safety would save food-borne illnesses, minimise food waste, and save related costs.

5.4.2 Findings on the Causes and Influences of FS and FW

Participants expressed several factors in the cluster on the causes and influences of food safety and food waste. The same factors were highlighted in the reviewed and analysed policy documents and the field notes on direct observation sessions. The discussion has the factors in five themes: staff practices and lack of training, customer behaviours and food portion sizes, work sociocultural norms, business policies on tools, and excessive food preparations.

Theme 1: Staff Practices and Lack of Training

Participants explained that staff lacked adequate food handling and preparation training, accounting for their practices such as uncleanliness, uncovered hair, beard, or failure to use gloves when handling and preparing food. Food safety was compromised in the process, rendering food unsuitable for consumption and discarded. For instance, Tim and Patrick shared this:

"Sure, staff need to understand food safety, people may be working under the table, therefore they are not accountable. Lack of well written out how and why do certain things, e.g., responsibilities of individuals responsible for training, but the restaurant should have a clear protocol like cleanliness, temperature control, what to do when one goes to the bathrooms" (Tim, FH06)

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Patrick further supported Tim and stated:

"The contaminations start from improper practices such as not using gloves, having uncovered hair, some sort of and touch the food and improper use of…. leading to food safety issues. It includes handwashing, untied hair that falls everywhere, people failing to wear gloves where they must wear gloves and touch the food, just like any sort of food safety practices- making sure that you are following them" (Patrick, FH02)

Tim and Patrick implied that staff need proper hygiene and cleanliness training, education or reminders. Lack of this caused food contamination that impacted food safety and led to food waste. Additionally, lack of training on these aspects meant staff would adopt practices they thought were right. Perhaps having written guidelines and reminders within the work setting would be important. As a result, Patrick concluded:

"It is important to not only follow the guidelines and you are expected to do at work but there are lot of things that end up in food for instance hair, it's important to follow the perceptions of the customers such that you reflect a high level of cleanliness" (Patrick, FH02).

Other participants further highlighted that staff practices are related to improper staff supervision and leadership in restaurants. For instance, participant Alex, exclaimed:

" there is a general lack of managers, for instance, people are not well supervised while conducting their jobs [...] lack of supervision […] something like that. Supervisors are not following through to make sure that everything is up to standard, that sort of thing." (Alex, FH01)

Participants implied unsupervised and poorly led teams resorted to doing things that did not meet the food standards and were responsible for food contaminations and food waste in restaurants.

On the other hand, inadequate training highlighted a lack of knowledge, understanding, and general awareness of food safety and waste. In this regard, participant Andrew said:

" restaurants employ different people, and all these handle food differently. Many people do not think food storage or handling is important, lack of refrigeration skills, and have all sorts of behaviours that place consumers at health risks. People talk with uncovered mouths while preparing food. Essentially this is attributed to a general lack of knowledge and awareness about food. No one wants to make the other sick, but they are ignorant of whatever they are doing. This explains the food safety incidences and food waste we have in restaurants" (Andrew, FH09)

Similarly, direct observations and participant interactions show that staff knowledge was important in food catering service operations. Most cases define the level of food safety in a restaurant. Tom stated:

"the lack of knowledge on the part of staff breeds food contamination. Most people do not understand what they are doing or are simply ignorant about food safety. This is the largest cause of contaminations in restaurants and the biggest threat on compromising food." (Tom, FH05)

Also, unawareness and lack of knowledge were the main reasons for the routine errors, mistakes, and failure to prioritise restaurants and food catering services. Alice remarked:

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"people who do not care at all to take any steps in preventing accidents, errors or mistakes during the handling and preparation of food." (Alice, FH18).

To which another Ruth added:

".. a mistake in food preparation in restaurants makes customers fail to eat their meals, and all that food is discarded." (Ruth, FH19)

As a result, more than half of the participants had a similar account. Still, a participant, Conrad, summed the evidence on staff practices and inadequate training as a cause or influence for food safety and food waste because they thought it was not a priority and concluded:

"People do not think food safety is a priority and therefore once the food is contaminated, it is unconsumed or not sold to customers and goes to the waste bins—a big problem we have in North America, especially Canada." (Conrad, FH07)

Food safety must be a priority because of its consequences in the food catering service business. Several implications include causing food-borne illness, hospitalization, litigation, and loss of customers and business. Their straining on the weak aspects would address the challenges the participants highlighted or lived experiences.

Theme 2: Customer Behaviours and Food Portion Sizes

Participants attributed food safety, and food waste to customer habits and behaviours and the food portions served. Participants mentioned customers come to the restaurants with different expectations, such as taste, portion size and cost of food. This was evident in one of the participant's responses:

"the other thing is about the portions the customers serve themselves from the buffet. Customers end up serving themselves with a lot of

food, thinking they would finish it and later fail. This kind of food can not be recycled or given away to other people; it is thrown away." (Monica, FH10)

Occasionally, unconsumed food is not taken home or reused in restaurants. Food sharing among the customers, customer habits and behaviours, talking while eating, coming to restaurants with a cold or flu, and failure to carry the leftovers readily cause food contamination and render it unfit for further use. Monica explained further and said:

"all the food the customers do not consume and never carried with them is thrown out. This also contributes to a lot of food waste in restaurants." (Monica, FH10)

Conversely, some customers ask for more significant food portions and fail to complete their meals for psychological reasons. They lose interest in their meals, lack awareness of the effects, and food fails to meet their tastes. For instance, Rita stated:

"..customers order more than they can eat. The customers psychologically order food with more than the stomach can take in over their minds. They think that they would finish it but end up failing and all this is thrown away […] they come in when they are already full, lack the appetite to complete meals and sometimes it may be attributed to the taste of the food provided to them. It does not meet what they expected or paid for.." (Rita, FH21)

Other than that, some customers consider the nature and appearance of the food served. This could affect their choice and decision to complete their meals. As a result, increasing the amount of food wasted. Participant Irene emphasised this evidence stating:

"..most of the time, people do not finish what they have been served to eat. This is more because they did not like it or did not want to eat it. Every time, we put fresh food and nice-looking food, warmed up, maybe it tastes good…. " (Irene FH13)

However, other reasons such as time factors, urgency, allergy to some ingredients, and even gluten intolerance may not have been told to the food handlers that could affect the customer's food consumption.

Theme 3: Work Sociocultural Norms

Participants described how the food catering service environment influenced food safety incidents and food waste in this theme. They further explained how social and cultural norms are related. The working environment was important in restaurants because cleanliness and hygiene determined the level of food contamination. Health hazards such as rodents and insects are attracted to restaurants and contribute to food contamination. For instance, participant Jane said:

"rodents, cockroaches, and insects invade the restaurants because of the food droppings that are left unattended. The danger is contaminating food, causing people to become sick. Instead of saving it, for hygiene reasons, all this food is discarded…" (Jane, FH04)

Other than that, participants hinted that different people in the work environment come in with differing attitudes and behaviours and, to an extent, influence food safety and food waste in restaurants and catering services. These two excerpts illustrate the influence of social and cultural norms:

" people come from different areas, with different behaviours and attitudes. This affects or leads to food contamination and food waste we experience in restaurants. I believe that just like different cultures, everyone has just different work ethics because that's how they do

things or how they have been raised or have been taught. […] this is how standards are not met, or people pass corners and not taking basic things seriously…." (Alice, FH18).

And,

"absolutely, the culture around the world differs. The experiences and regulations influence how different people handle food. Some places specialise in seafood and handle it differently from another group. While another cultural group will handle it differently. The different experiences […] yeah accounts for the differences in food handling hence the rising food contamination and food waste this is the reason we see a lot of food waste in Canadian restaurants" (Devin, FH20)

These excerpts showed how different cultures and social groupings caused and influenced food safety incidents and food waste. However, other participants' accounts differed. These participants stated that a heavy workload and a lack of planning characterized the work environment. As a result, staff worked while sick, causing food contamination, customer risk, and food waste. For instance, participants noted:

"staff that are sick influence food safety in two ways. The first one is pressure because low cadre staff are the least paid people. And yet they do most of the food preparations in restaurants, may get so tired and even yelled at. A restaurant manager, because of budgets, pressure staff to stay because it means they must turn away paying customers or must bring in other people at a higher pay.." (Tim, FH06)

Conrad added and stated:

" often managers would prefer you would come into work sick because they do not want to deal with finding another worker or staff. If a small team member falls sick and is supposed not to be there, there is no

replacement of a sick staff…. Aah that comes up now and then, and they would rather have you come into work when sick. It is more important to them than getting substitute staff." (Conrad, FH07)

And,

"there is also a staff shortage, so if someone gets sick, they have to look around getting a replacement. Most of the time, it is so busy in the restaurant, and there are few staff, so they grab somebody as a replacement—I think it is associated with poor planning and cutting costs. […] not having sufficient staff on call and staff unwilling to step in to cover shifts" (Jane, FH04)

However, this contrasted with descriptions from other participants. Despite the heavy workload environment, sometimes the staff were forced to work because they earn little and needed an income to pay for their needs. Specifically, two participants stated.

"Many people rely on going to work every day to make money to survive. So, when they get sick, especially if they are like part-timers or something of the sorts, they can not miss going to work because they miss the paycheck" (Sean, FH14)

And Tony added:

"it just happens some people do not have to stop coming to work because they need to be paid. Others are called in to fill their shifts even if there are sick and there are no alternative staff to replace them. Work in the food catering service can be crazy" (Tony, FH16)

Although the work environment and sociocultural norms influenced food safety and food waste because of the actions of staff and their managers, the COVID-19 pandemic changed this. No staff member reported working with any

sickness symptoms to prevent food contamination and passing the virus to other people, including customers.

Theme 4: Business Policies on Tools

Participants mentioned that business policies and the tools and equipment used in their restaurants contributed to food safety incidents and food waste. Andrew shared his view and stated:

" there are too many policies and procedures that we must follow. These policies and procedures have corresponding logs that have to be completed. They are so annoying. We have staff that know all these things and do not bother to look at them at all… simply people do not have sufficient time for policies, cleaning tools and equipment that the bacteria contaminate surfaces and equipment and eventually goes to food" (Andrew, FH09).

Other participants added that restaurant tools and equipment were improperly used or defective and contributed to food contamination and food waste in restaurants. Some of these tools and equipment in restaurants included; thermometers, knives, cutting boards, hand towels and cooler/freezers. On improper use of tools and equipment, Tim stated:

" the challenge is how many people know-how to use the thermometer. It is just a matter of training to understand how to use a thermometer properly. Otherwise, more advanced restaurants use the laser temperature monitors " (Tim, FH06)

And Charles added by saying;

"cutting boards are a major source of food contamination in restaurants because most food has to be cut or mixed on the boards. In case someone is not careful or does not know-how to use the boards, there

can be physical, biological, or chemical contaminations hence affecting
food served to customers or discarded" (Charles, FH23)

Whereas defective tools and equipment in restaurants led to food contamination and food waste. Harriet, a supervisor of eight years, summarised her experience:

" there are many unreliable things. A refrigerator once froze in winter
and failed to work in summer. There are coolers that are unreliable,
with broken seals hence unable to close properly leading to food
spoilage and waste" (Harriet, FH03)

In contrast, an observation session noted food handlers had not decontaminated surfaces before food preparations and serving customers. The uncleaned grills, cutting tools and surfaces caused food allergy contaminations.

Theme 5: Excessive Food Preparations

In this theme, participants described how excessive food purchases and food preparation caused food safety issues and food waste in restaurants. The inaccurate forecasting, planning, and improper food handling and preparations caused excess food. Participants Jason and Jon noted:

"there are a couple of different ways but the majority I think primarily
focus on inaccurate forecasting or events that cannot be expected that
will result us having excess product that we can not use or can not be
consumed—with poor forecasting, you are not accurate in that the level
of sales that you are expecting or the volume of guests that you are
expecting and once you have over order, you have a lot more to waste"
(Jason, FH25)

And another participant complimented that;

"the bacteria, viruses and protozoa are responsible for contaminating food. When these get to the food that causes the problem and makes food unsafe to be eaten. We have people mishandling food, unable to wash their hands properly. All these spread these organisms from people to the food they are handling and serving to the customers." (Jon, FH17)

Participants further described how inaccurate forecasting and planning, other than influencing excessive food purchases, were responsible for contaminated supplies and subsequent food deterioration in food freshness and quality. Participant Tony stated:

"… food from suppliers look fine, but it gets into the kitchen; it does not look like it is good. Most often, the food does not last long enough. Take an example of cantaloupes that might look good when you get them and should be good for at least a week or two in a fridge. But only last two days, turn mouldy, and so you must cut a lot of the mould away hence food waste." (Tony, FH16)

And Sean complimented:

" the issue is food getting older, and this would not be served to customers because it is old and of poor quality. Despite this occurring every day and looking at past records, there was no change in the amount of purchased or prepared food. This suddenly led to a lot of food going bad, uneaten and throw away.." (Sean, FH14)

The statement implied excessive food purchases and food preparations in the food catering service most likely caused food storage challenges. Driving the evidence back to food deterioration in freshness and quality, improper food handling and cross contaminations. One participant summarised this evidence noting:

"… if whoever is responsible for ordering food supplies is sloppy, we experience either over-ordering or underordering food. When you have too much food in the house, storage becomes a problem, and it can go bad. Even though there are mitigation measures, the problem is ordering wrong quantities…" (Jeff, FH12)

5.4.3 Findings on Decision Behaviours in FS and FW control

In this group of themes, food catering service managers and their staff they provided evidence of the decisions to control food safety and minimise food waste in their settings. The emphasis was on staff training and education, enhanced organisational skills, standardizing food catering service systems, using tools and equipment, proper human resource strategy, and leftovers. The following discussion provides evidence with relevant excerpts.

Theme 1: Training and Educating Staff

In this theme, participants described that the decision to train enhanced staff knowledge and enabled them to learn the food-safe culture. Participants further stated that educating staff increased their understanding of food safety and food waste and how it could be controlled and minimised. The excerpts noted the evidence thus:

"well-trained staff/employees do not cause food contaminations and food safety issues. Most times they know and understand what to do. Staff take food safety courses, which goes down from employers to employees on the proper food handling." (Tom, FH05)

And Conrad emphasised the reasons for training by saying;

"..there are training to make sure staff are updated and eliminate actions that lead to food contamination. The further you get out from it, the more you internalise it as it stops being specific—you remember

and build habits and such. Ideally, you will develop good habits, but then it is easy to get complacent. So even if you have good habits, you have to catch up" (Conrad, FH07)

On building the food safety culture, following doing something on a routine basis, Jason said:

" we build continuously all the time and try to make sure that everyone knows and understands that food safety is number one.[..] building that culture is something that we spend a lot of time working on and with a lot of resources. So, our strategy is really for you to know and assess where we are identifying opportunities, then look to implement and reinforce…. […] we are trying to build this food safety culture that is not always there.." (Jason, FH25)

With this evidence and more from other participants, staff training followed formal and practical staff training as a strategy to control food safety and minimise food waste in restaurants. The formal training involved attending accredited food safety courses regularly. And practical training involved peer-to-peer training during food preparations.

In addition, the strategy of staff training and education on controlling food safety and minimizing food safety extended to promoting cleanliness and hygiene in restaurants. Restaurants used posters to promote the strategy. The stated evidence included:

" the posters about washing your hands properly with soap dispensers and towel dispensers. These are located near every sink that encourages staff to use them appropriately" (Irene, FH13)

The non-participant observations in the restaurants supported the evidence in the reviewed documents. Restaurants had posters near sinks with both hot and cold running water. The posters demonstrated handwashing, cleaning and hand

drying. This improved sanitation and reduced cross-contamination. For instance, the researcher noted:

> "staff were observed using gloves between different activities within the restaurants, and some even changed their gloves, others went ahead to wash their hands and dry their hands between processes" (Observation notes)

Theme 2: Enhanced Organisational Skills

The participants shared that organising and monitoring activities and roles were important for controlling food safety and minimizing food waste in restaurants. The emphasis was on organising food stocks, noting expiration dates and monitoring records important in decision-making. For instance, Alex stated:

> " a new stock or shipment are placed at the bottom and the old stock at the top. If it's in the refrigerators or coolers, new items are placed at the back and old ones at the front.." (Alex, FH01).

Monica complimented Alex's point with a specific statement thus:

> " the idea behind organising food in refrigerators is that foods like fruit and vegetables are placed at the top shelves, and all meat products are at the bottom shelves… " (Monica, FH10)

Alex's evidence was analogous to the first-in, first-out (FIFO) strategy used in supply chains to ensure that the old stocks get used up before the new stock. In restaurants, this would minimise food spoilage and waste. Monica's point implied that separating the different foods controlled cross-contamination and transferring organisms responsible for food-borne illness. The policy document reviewed stressed the same point, and the researcher observed it in restaurants.

Further, the strategy of organisational skills assisted food handlers in controlling restaurant preparations and portions. The food handlers would use

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records and data to plan for future business. Alice alluded to the evidence and highlighted the following:

" we monitor the quantity of food we prepare, and the portions served to customers. Since all the food served to customers can not be recycled or reused but thrown out.[…] we plan meals or menu properly such that only that food customers are interested in is prepared and does not remain to be wasted. This is done by monitoring the consumption after a given period and the waste we accumulate at the end of the day.." (Alice, FH18)

Most participants discussed organising and monitoring every aspect of the food catering service to achieve acceptable food safety and food waste levels. In summary, Cheryl summarised the evidence and stated:

"arranging food products in refrigerators, recording and monitoring food temperatures are some of the important roles in restaurants that have registered fewer food safety incidents and realised minimal food waste." (Cheryl, FH11)

Theme 3: Standardizing Restaurant Systems

Standardizing systems and following regulations was another strategy participants shared and highlighted to be crucial in decisions on controlling food safety and minimizing food waste in restaurants and catering services. Participants stated that standard systems and processes enabled them to limit food safety and food waste in their settings. The systems and process were collaborated with an excerpt from Devin, thus:

" standard systems and processes such as standard temperatures, cleaning surfaces, and avoiding cross-contamination prevent food deterioration and subsequently limit food waste. Having a successful food regulation in place supports all this…" (Devin, FH20)

Participants described how regular food inspections enforced restaurants' standardised systems and regulations, reinforcing food safety and food waste in restaurants and catering services. For instance, the excerpt from Carol:

" inspectors from regulatory authorities have specific practices they look for. These practices must be adhered to; else the restaurant is closed. We, therefore, must document the processes and monitor how we implement food safety practices" (Carol, FH 23).

The implication was visiting from food inspectors enhanced accountability since the set expectation was meeting the set standards or listed in the public domain as failing to meet the standards. Under the theme, participants described how standardizing systems and regulations go hand in hand with restaurant pest management. Based on the backdrop that pests contribute to food safety incidents and food waste in restaurants, participants shared that having a pest management program supports the strategy of controlling food safety and minimizing food waste. Andrew said:

" restaurants must have a rodent or pest management plan to manage situations […], e.g., mouse traps. Other than contaminating food, these rodents rip food bags and destroy food that is thrown away. We had a famous restaurant that reported having rodents, and it was reported that 19 people got sick. The restaurant has since been closed." Andrew, FH09)

Theme 4: Use of Tools and Equipment

A discussion with participants revealed that a strategy of improved procurement and proper use of tools contributed to controlling food safety incidents and minimizing food waste in restaurants. Participants shared that the strategy involved deciding what quantity of food to order based on the observed consumer consumption patterns. For instance, Irene shared:

" we had ideas on what takes place in restaurants every day. We use this to estimate what to buy for our clients accurately. This saved on how much food would get spoiled, how much was wasted and the attributed costs." (Irene, FH13)

This implied that proper procurement planning and forecasting would save restaurants on storage requirements, meaning instances of food spoilage were limited and discarded as food waste. Other participants further discussed that procurement involves food orders, tools, and restaurant equipment. More than one participant explained that simple tools such as cutting boards, knives, thermometers, and food catering service equipment required routine replacement hence an investment. For example, Jason said:

" .making sure you are paying for all your equipment to function properly or paying for an extra equipment [..] having adequate room for products in coolers or freezers for example [..] it is costly, but in the long run it turns out the cost is worth spending" (Jason, FH25)

Jason's experience indicated that investment in and using tools and equipment was important in cutting costs because of addressing food safety. There would be minimal food waste; hence the food catering service business realizing sales.

Further discussions with participants yielded other exciting experiences that differed from earlier participants. They suggested, with the current technology age, investing in software. This would assist in minimizing cross-contamination, provide accurate measurements or readings, and be a general help to all food handlers. Samantha noted:

" we have invested in software to allow do things in the restaurants, hence improving food safety and minimizing food waste. We also

benchmark the performance from other restaurants to understand what competitors are doing best" (Samantha, FH22)

Direct observation in some restaurants demonstrated that some restaurants were coping with advanced technology to make food orders and serve customers. For instance, one observation note was:

"*some restaurants we have advanced technology like using handless microphones, laser thermometers that reduced the contact of food handlers and food" (observation notes*)

Theme 5: Human Resource Strategy

In this theme, participants forthrightly highlighted the human resource strategy's role in controlling food safety and minimizing food waste in restaurants. The experience ranged from treating staff well, setting up protocols and providing better compensation. These things motivated the team and resulted in a better work attitude and sales growth. An excerpt from Andrew supported the evidence:

"the menu was simplified, and staff were made to work 8-hour days and get proper compensation. Staff were provided breaks that really motivated staff hence more careful with minimal errors and mistakes." (Andrew, FH09)

Day-long direct observation in the food catering service observed that staff had broken shifts and changed from time to time. However, the researcher did not see this partner in the food catering service where direct observation was due to the restaurants' resources and the researcher's time.

In addition, participants shared a need for collaboration and teamwork for the human resource strategy to be effective. They argued that restaurants have so many activities, hence the need to work together. To ensure that there were no food safety incidents in the restaurant, Conrad shared:

"there is nothing specific, with all our staff, we are divided into groups, so we all work together very well in terms of staying on top of all activities in the kitchen as a team.." (Conrad, FH07).

Similarly, participants had other experiences and argued that teamwork and collaboration enhanced communication within the teams and improved their performance within the restaurants, controlling food safety and food waste. For instance, Jane hinted:

"teamwork ensures the communication between customers and staff, or staff and staff was accurate to cut down on communication error, for instance, providing accurate customer orders, selecting ingredients etc….(Jane, FH04)

Therefore, the significance of human resource strategy highlights the fact that food catering service employs many people, some of whom it's their first job. Other elements, such as supervision and leadership, were instrumental in guiding the staff to do the right thing. For instance, a participant provided evidence and noted:

"I feel the involvement of managers and supervisors is important. They work directly and closely with us because they have a closer connection or interest [..] I think proper training is really important and I also think supervision is really important" (Patrick FH02)

Theme 6: Repurposing Leftovers

The last theme on the strategies to control food safety and minimise food waste in restaurants and food catering services that participants discussed and shared exhaustively was repurposing leftover food. Participants discussed repurposing leftover food from donating to food banks to feeding animals on farms to cut wasted food. Excerpts that provided the evidence included:

"…. Businesses seek food banks, soup kitchens to see whether they could donate the leftovers other than wasting. We partnered with organisations such that food was not thrown in the garbage but donated" (Jane, FH04)

And,

"we donate leftovers to food banks and homeless people. Otherwise, the leftovers contribute food waste in restaurants owing to the large food portions they fail to complete" (Jon, FH17)

An excerpt on redirecting leftovers to farms said:

" …we try hard not to waste food. .. we have pig bins.. so, all our leftovers are fed to pigs, so it does not go to the garbage, so it is not completely wasted. We are so keen on food waste and food contamination…" (Patrick, FH02)

Another excerpt hinted at the magnitude of the problem and how it was unethical and suggested how to minimise food waste. Alex said:

"it is just not realistic when a food like [..] can go bad when it can be eaten by someone who has little or access to food" (Alex, FH01)

The excerpts demonstrated the restaurants' efforts and decisions on minimizing food waste. These actions and activities were observed in the direct observations and highlighted in the policy documents.

However, other participants had exciting experiences, including modifying leftovers to realise a sale and minimise food waste. One participant suggested what was done in their food catering service thus:

" I mean, there are ways of doing things, one of them is modifying leftovers so that you get a product to sell to the customers. There are

a lot of ways on how to improve the leftovers and sell them to the customers. The best way of minimizing it is cooking it, and then you get more days out of it.." (Andrew, FH09)

Although this seems to make sense that food waste was minimised, there was a risk of contamination and feeding customers of food that was not fresh. This could affect the business's reputation, make customers sick, or cause hospitalization.

5.4.4 Findings on Solutions to FS and Food FW

In this cluster, the participants shared several strategies to control food safety and food waste to prevent recurrence in restaurants. The researcher learned that managers and their staff concentrated on one strategy while others came up. The participants described how their restaurants sought food safety and food waste solutions in the themes below.

Theme 1: Promoting Food Safety Culture

One of the participants' solutions was promoting a strong food safety culture among staff. The food safety culture was critical in understanding processes, maintaining standards, and achieving zero restaurant violations. Participants Tom and Tim noted how food safety culture was a solution to food safety and food waste:

" we do not compromise, so we talk about food safety culture, and that's first and foremost the most important thing in our organisation. There is no compromise on that. It's a priority afterwards comes quality and afterwards come guest experience.." (Tom, FH06)

And,

"the priority of organisations and our expectations are clear, so we start by talking about that as zero incidences of anybody getting sick and zero health inspection violations.." (Tim, FH06)

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Tim and Tom described that food safety culture enabled food handlers to spot the critical control points to find food safety and food waste solutions. Some restaurants consistently set up checklists to address food safety and food waste issues at different food preparation stages.

Theme 2: Partnerships and Monitoring Activities

Another suggested solution to address food safety and food waste was having partnerships and monitoring all restaurants' activities. Doing this assisted the food handlers in identifying and recognizing what would lead to food safety incidents and subsequently lead to food waste. Partnership, in particular, enabled teams to ensure follow-up and address all aspects. Participant Renny noted:

" I mean, we are all kind of working together, so in general do not purposely try to, but I feel that everybody is pretty good. Even if somebody does not fit in well, say or forget to change the gloves or we are reminded and continue doing our part.." (Renny, FH15)

Participants described monitoring activities as another important solution. They recognised that monitoring the temperature is one solution for food safety in food handling and preparation. One participant emphasised the importance of temperature in the food catering service:

"making sure the food temperature is adhered to all the time. Food that has to be served cold should be cold, and that which must be hot should be hot enough. The standard temperatures in the kitchen are stated I believe the minimum is 140 deg F and 160 deg F " (Devin, FH20)

5.4.5 Themes on Barriers and Motivations

In addition to describing their experiences on food safety and food waste, participants shared unique and exciting responses to provide a deeper insight to the

researcher. Participants discussed these responses under barriers and motivations experienced in the settings. These barriers and answers are presented below in three themes.

Theme 1: Finance Resources

The researcher's interaction with participants highlighted that management and staff focused on money instead of prioritizing food safety. They argued that money was the motivator for doing what they were doing, implying that less emphasis was probably on food safety and food waste. However, they quickly mentioned that food safety was not a big problem, but food waste was abundant in restaurants. For instance, excerpts supporting this evidence are:

> *" the main reason of coming to work is money. The money influences me to come to work because I need it more than caring about their health or infecting others or contaminating food…[..] most managers are interested in getting work done though…." (Devin, F20)*

And,

> *"staff are interested in money. Some people come to work exhausted or tired, and this distracts them from doing their jobs properly. Hence failing to multi-tasking and missing food safety incidents.." (Rita, FH21)*

Interestingly, some participants stated that some food catering service operators do not mind food wasted in restaurants despite many people having less food access and others not having enough to eat. This proved that money was a motivator instead of prioritizing food safety and preventing subsequent food waste. Alice explained her experience and related failure to avoid food waste and access to food, she said:

> *"there is nobody that can restrain us from wasting food. You believe it is your money, so you are free to waste as much as you can. Yet, our*

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society has people that are homeless, people who can not afford a meal a day, you think about it, and there is nothing you can do…" (Alice, FH18)

Cheryl complimented Alice's argument and noted:

"..people are so unscrupulous because they think short term instead of a long time…they are just worried of making the bucks etc.." (Cheryl, FH11)

On the contrary, other participants mentioned that financial resources were barriers to implementing strategies to control food safety and minimise food waste in restaurants.

Theme 2: Human Resource Planning Issues

One of the aspects the participants highlighted in the discussions was human resource planning. Food handlers narrated situations when few staff members were on shifts, yet they received low wages. Overworking staff with little pay was considered a barrier to controlling food safety and food waste in restaurants. For example, participants noted:

" because we are always understaffed and underpaid and yet there is too much work… some time this defines the choices we make.." (Patrick, FH02)

Patrick's discussion was reinforced by other participants, arguing that possibly the operators have different priorities and not the human resource function and providing safe food to their customers. Monica stated this differently, though:

"forcing you to work when you are sick, I think it's all to do with the bottom line. The reason is another staff, ignoring the fact that we are supposed to do what we should be doing. ".(Monica, FH10)

As a result, participants mentioned demotivating teams caused attrition in restaurants and the loss of the best staff, hence conducting staff recruitment and routine staff training. Jeff was quick to add:

"staff need motivation to produce the best out of their work. This includes their pay, benefits, and cover for sick leave. Lack of encouragement, and demotivation lead team members to leave their positions. The result is bringing on board inexperienced and untrained staff who leave as well. This contributes to a high staff turnover, reported errors and mistakes and other problems associated with food safety." (Jeff, FH12)

In contrast, many participants mentioned they had a personal connection with what they were doing. However, their superiors were often let down and did not mind the staff and their activities. One participant said:

"at my workplace, our superiors tend to care but not always; they take it more personal…"(Conrad, FH07)

These and many other barriers and motivators distracted food handlers from prioritizing food safety and food waste in restaurants. And a cause for the growing resistance to change among staff for whatever effort management implemented. A senior manager concluded:

"no matter how much you try, not everybody is going to embrace the same principles within the organisation. It is harder to get through the people, limiting how many times you train people. Some people do not care and do see things differently.".(Jason, FH25).

Theme 3: Food Regulations and Disposal

Participants focused on regulations and requirements for food disposal as a barrier in this theme. The barriers are evident, with participants expressing the

challenge they experienced with donating leftovers. This accounted for the accumulated food waste in food catering services. Samantha described it as follows:

"even if food is not contaminated, we can not donate it to people because of the existing food legislation" (Samantha, FH22)

Another participant related this to business concerns as well. The businesses fear litigation and closure from the authorities. In this regard, hinted:

"..but I understand that if customers get food poisoning from a restaurant, the health authority would crack down hard on us for the food catering service to continue in business and even closing the business." (Jon, FH17)

Despite the efforts of food handlers, minimizing food waste in restaurants was faced with barriers to generating food waste from food safety incidents and the cost involved in the disposal. A manager articulated his experience:

"the concern for health is a major barrier for food waste because I think it comes at the expense sometimes of food safety. Another, barrier for properly disposing of food at the cost of composting and organics.."(Jason, FH25)

In contrast, a 10-year experienced manager shifted the barrier to minimizing food waste to a regulatory officer and noted:

"the food is recycled or given to other people [..] we are not allowed because of the standards that are required to give anything to food banks or any excess purchases about to expire. Even if it is fine, we are not allowed through the advice of the safety standards so that's probably something that an occupational health and safety officer has to take. Whatever remains is just thrown away. We may reheat food at least once but not always" (Ruth, FH19)

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The barriers and motivators provided exciting and unique responses from the participants. Analysing these responses provided the researcher with possible solutions to address food safety and food waste, such as using a systems thinking approach.

Based on the above research findings, the researcher refers backs to the developed theoretical framework presented in Chapter 3 that guided and framed the research process to include the interactions and relationships between the interventions. In doing so, using the systems thinking perspective, the lived experiences of managers and staff provided a better understanding of the control of food safety and food waste in the food catering services. Therefore, Figure 5-1 below, demonstrates the key concepts as actors, roles/activities and the decisions taken, extending the framework to include the Causal Loop Diagram (CLD) Systems Thinking for Food Safety and Food Waste (Chapter 6 section 6.6.2).

The actors are the managers and staff confronted with food safety and food waste in the food catering services. The findings suggest that food safety incidents and food waste are associated with the systems and processes during the conduction of roles and activities. As such, the managers and staff are compelled to make decisions to control food safety and food waste. Among the roles or activities, the managers maintained personal hygiene, monitored food expirations, supervised staff, and conducted the desired organisational duties. In addition, the staff purchased, prepared, handled food, and served the customers. In the process, decisions to control food safety and food waste involved interventions and strategies such as staff training, motivation, management operations, and planning.

Therefore, the researcher used systems thinking, where the interaction and relations or connections between the interventions through cause and effect were used in the visual methods to explain how food safety and food waste could be controlled in the food catering services.
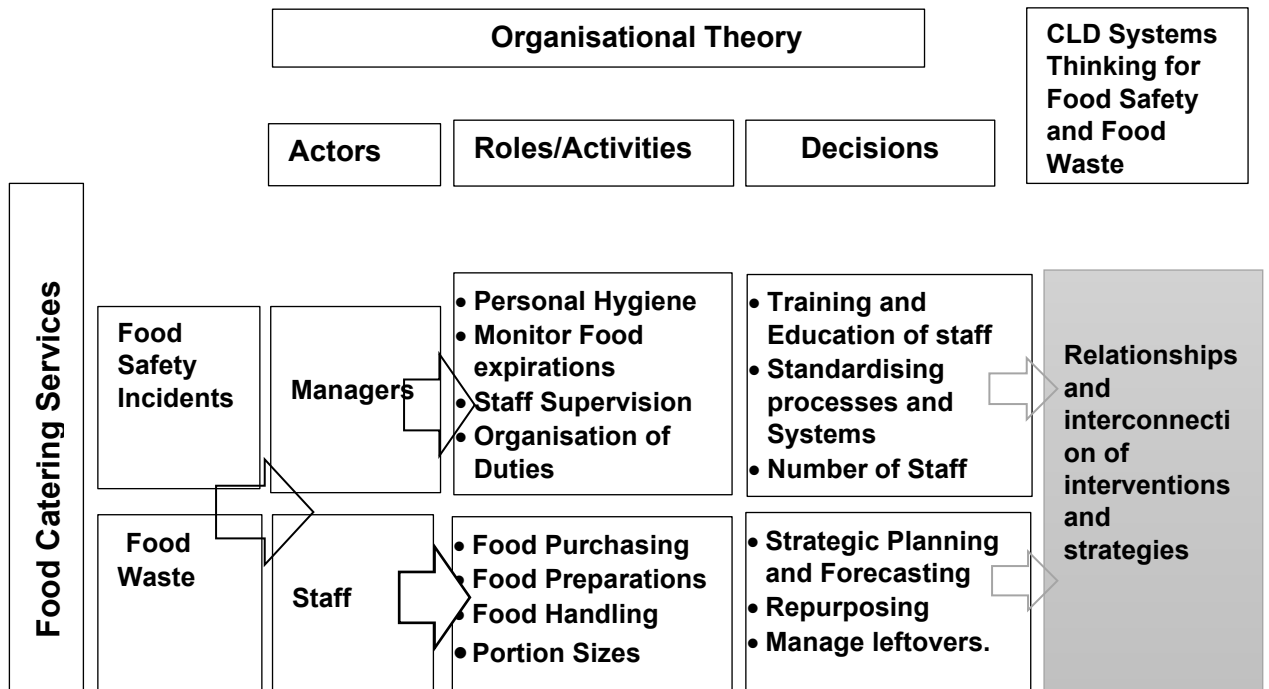
Figure 5-1 Modified TF for FS and FW Management with a CLD Systems Thinking

5.5 Chapter Summary

This chapter has presented and described the research findings. The findings are provided under a theme or subtheme to address the research questions and the study objectives. Each theme had a verbatim excerpt accounting for each finding. The essence was to provide a reader with a picture and context. The researcher described the participant's experiences on multiple aspects of food safety and food waste in their context.

Chapter six presents an analysis, interpretation, and synthesis of the research findings. The findings are compared and contrasted with the previous studies to determine the current study's consistency, similarities, or differences.

CHAPTER 6 : DISCUSSIONS OF FINDINGS

6.1 Introduction

Chapter five presented the research findings generated from the analysis of the empirical data. The chapter also provided participant excerpts to give readers the picture and context of the interviews and observations on food safety and food waste in the food catering services.

Few studies have sought to understand how managers and staff deal with food safety and food waste and their decision-making approaches toward controlling food safety and food waste in food catering services (Neff et al. 2015; Gorton and Stasiewicz 2017). The current research aims to explore the lived experiences of managers and staff in food catering services to better understand their decision behaviour approaches in controlling food safety and food waste. Moreover, looking at the strategies and decisions managers and staff made using the systems thinking approach contributes to a deeper understanding of controlling food safety and food waste in the food catering services.

This discussion chapter aims to demonstrate how this research's findings are significant in cognisant of the reviewed related studies. Therefore, this chapter shows how the findings addressed the research questions, study objectives, and the research problem using a framework constructed from organisational theory. The findings are interpreted and compared to the literature on food safety and food waste and its significance and relevance to previous studies. The first is an overview of the study background and settings and the research design and methodology used in this research. Second is a presentation of the discussion of the research findings. The third is the systems thinking approach, which the researcher used as a lens to achieve better decision-making in controlling food safety and food waste in the food catering services.

6.2 Background and Setting

In this phenomenological qualitative research, the participants included managers and staff. The participants were purposively selected in Vancouver restaurants and catering services. The non-participant observations complemented the interview in data collection. The interviews were face-to-face and telephone because of COVID-19 pandemic travel and contact/distance restrictions.

6.3 Research Design and Methodology

A qualitative hermeneutic phenomenological approach enabled a better understanding of food safety and food waste in restaurants and catering services. The rationale for using the approach was to obtain a deeper insight and understanding of the lived experiences of the managers and staff in their settings. As a result, the research conducted in-depth semi-structured face-to-face interviews with twenty-five participants. The participants included managers and staff because they dealt directly with the food catering services. The research site was Vancouver because of the accessibility and availability of time and resources required to conduct the research. Each interview lasted forty-five to ninety minutes and more than two hours of observation sessions. The two strategies validated and improved the study rigour and its findings.

The collected data were inductively analysed and compared with the narrative from each participant and the direct observation field notes. All this involved the research questions and organisational theory in mind, and the resulting themes provided the answers and addressed the research questions.

6.4 Discussion of Findings

Controlling food safety and minimizing food waste in the food systems has been well documented (Gustavsson et al. 2011; Priefer et al. 2016; Thyberg and Tonjes 2016). However, most studies concentrated on the food supply chain, wholesalers, retailers, and consumers. Probably, this was associated with the small

percentage (nine percent) of food that ends up wasted in restaurants (Gooch et al. 2019).

Following the related study findings in the literature covered in Chapter 2, the current discussion compares and contrasts the participant's accounts. The arguments were stressed in previously reviewed studies and assisted in differentiating from other similar research or topics. Therefore, this study provides the lived experiences of managers and staff as presented in the findings under each research question.

6.4.1 Main Research Question One

The main research question sought to understand how food catering service managers and staff used the systems thinking approach in decisions to address food safety and food waste challenges in their settings. The managers and staff did not use a specific approach even though the activities and challenges in the settings were not isolated but interrelated. Therefore, addressing the challenges using a systems thinking perspective other than each isolated challenge would make a lot of sense.

The findings that emerged from participants and shared were enhanced partnerships, collaborations, monitoring activities, and prioritizing food safety culture. Although the participants did not come forthright to show that they used systems thinking, the researcher found that they could systematically analyze the problem, break it down into its parts and determine a solution (Schaveling and Bryan 2018). Senge (2006) stated that one way to obtain a lasting solution involves understanding and defining the problem. Participants demonstrated they did, but the problem of food safety and food waste continued or remained uncontrolled.

The participants described their understanding of food safety and food waste and their relationship. This provided the basis for deciding the strategies for the presented solutions. Given that food safety incidents and food waste causes are

complex and interrelated, the understanding described would be vital in diagnosing the root cause and determining a sustainable or fundamental solution. Moreover, the challenges or problems of food safety and food waste are considered constituent parts; solving one left the other, or new ones emerged; hence, it was repetitive.

A review of existing literature emphasised partnership, collaboration, and teamwork (Gustavsson et al. 2011). In contrast, Ascheman-Witzel et al. (2015) and Schanes et al. (2018) echoed partnerships, collaboration and integration as strategies for solving food waste problems, and Halloran et al.(2014) supported the notion that the systems thinking perspective increased awareness of food waste and improved customer knowledge. Similarly, Mella (2012) and NZWC (2018) supported the findings on using systems thinking to solve complex problems. Most probably, this would apply to restaurants and catering services.

The researcher adopted the archetype, shifting the burden. In this archetype, managers and staff must understand the problem before decision-making to find the solution. They must appreciate the interrelationship between the issues to avoid providing symptomatic solutions. The available resources, such as time and capital, i.e., human and finance, were crucial and would support implementing systems thinking.

6.4.2 Sub Question One

This research found that managers and staff understood food safety and waste and what the research question sought. The themes and subthemes described food safety incidents in restaurants as noncompliance with food preparation protocols, leading to food contamination and endangering customers' health. The finding supported the existing literature, given the participants described the relationship between food safety and food waste. However, there was a failure to discuss the quantification of contaminated food which went to waste. According to Abdulla et al. (2013), quantifying food at any stage of the food supply chain

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assisted in explaining the reason behind food waste; as a result, managers and staff would be in a position to decide on a solution.

Participants also highlighted that food safety and food waste were about systems and processes conducted in restaurants and catering services. The systems and processes demonstrated that managers and staff appreciated that food safety and food waste were unavoidable; the human factor played a significant role. Prior studies and documents noted a similar argument and stated that food safety and food waste arose from food handlers' actions and decisions (NZWC 2018). The finding was in line with the concepts in organisation theory and the themes in the theoretical framework, demonstrating a supported structure and boundary of the current research.

The participants understood the reasons behind serving customers safe food and maintaining their businesses. Hence supporting food safety, controlling food waste and having sustainable businesses. Literature has similarly indicated that restaurants and their staff are responsible for ensuring safe food provision to customers (Arendt et al. 2013; Grover et al. 2016). The consequences of food safety incidents included litigation, business closure (Harris et al. 2018), and food waste loss, including loss of money and affecting the environment, economy, and society (Chaudhary et al. 2018; Van Bemmel and Parizeau 2019).

6.4.3 Sub Question Two

This sub-research question sought to understand what influenced or caused food safety incidents and food waste in food catering settings. The findings appeared similar to the influences of food safety, and food waste in other parts of the food supply chain elucidated in the literature. Other than lack of supervision and leadership, participants highlighted other causes, such as inadequate knowledge and staff behaviours and practices that Arendt et al. (2013) noted in the previous studies.

Furthermore, the findings showed that food handling procedures influenced food safety and food waste. Similarly, related studies noted that processes including cleanliness, personal hygiene and tools/equipment caused food safety incidents and food waste (Murray et al. 2017). In contrast, some participants stated that they observed all these and registered no food safety incidents except for unavoidable food waste. The finding contradicts the food catering service reports, regulatory reports, and customers' presentations in public health units that reported regular food poisoning.

Almost all the participants mentioned the findings on inadequate training, complemented by the reviewed policy documents. The aspect of the training, just as stated in theory, was essential because it enhanced knowledge and awareness and influenced staff behaviours. Arendt (2013) and Racicot (2019) emphasised that inadequate training and knowledge affected attitudes and behaviours to influence food safety incidents at the consumption level.

Participants observed that the behaviour of the customers and the food portions served to customers contributed to food safety incidents and food waste in restaurants, respectively. The findings on customer behaviour agreed with earlier studies that argued that both staff and customer behaviours and habits were responsible for the increasing food safety and food waste at the consumption level (Gilbert 2012). The issues under this theme were inadequate hand washing, unacceptable cleanliness levels, and poor sanitation. On the other hand, Principato (2018), in an extensive review, found that serving large food portions contributed to food waste at the consumption level. Most customers cannot consume all the food, and the restaurants cannot reuse or reheat the leftovers.

The participants were unclear about the nature and appearance of food to increase food waste. It was more likely restaurants tended to modify food through repackaging, thereby not realizing the effect of food waste. However, literature noted that fruit, for example, size, shape, and appearance, resulted in customer rejection

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and discarded as food waste (Halloran et al. 2014; Thyberg and Tonjes 2016; Van Bemmel and Parizeau 2019). However, there is a possibility of cutting the unpleasantly shaped food into small pieces that disguise the shape and fetch more money. In theory, modifying size, shape, or appearance repurposes food to control spoilage; hence, it is unsafe for human consumption and discarded as waste.

The participants shared that the work environment and sociocultural norms were key to food safety and food waste influences. Although the literature discussed work environment influences, the argument was a lack of resources to handle food (Murray et al. 2017) and inadequate resources to maintain the required hygiene standards (Nesbitt et al. 2014). In contrast, the participants associated the work environment with the heavy workload and human resources aspects.

The sociocultural norms seem to influence food safety and food waste because both the consumer and the staff consider food provisioning in restaurants. Some customers are family members who share their meals even in restaurants (Principato 2018). Papargyropoulou (2016) suggested that food safety and food waste must consider consumption and factors involved, such as culture and social elements of the settings. In contrast, recent studies argued that sociocultural norms had little to play in food waste at the consumption level (Närvänen et al. 2020).

Many participants described that restaurant business policies and tools influenced food safety incidents and food waste in their settings. Business policies often comprised many complicated issues for food handlers to follow, consequently dividing attention and contributing to food contamination. According to Harris (2018), improper use of tools and equipment was responsible for food contamination at the consumption level. The practices suggested that the inappropriate use of tools and equipment in restaurants and their defectiveness influenced food contamination, affecting food safety. Interestingly, researchers associated improper use of tools and equipment and defective tools with improper food cooking practices (Guchait et al. 2016; Gorton and Stasiewicz 2017).

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Similar to other researchers, MacRae et al. (2016), Gooch et al. (2019), and Nikkel et al.(2019), the findings of this study revealed that excessive food purchases led to food spoilage and food waste. The spoilage and food waste resulted from food storage challenges such as deterioration in freshness and quality. However, other participants highlighted that inaccurate food forecasting and planning of food consumption were responsible for the excessive food supplies in restaurants. Further, some food supplies are contaminated, spreading disease-causing organisms to other food during storage. Interestingly, this was complicated further by improper food handling, and excessive food prepared remained unconsumed.

The literature stated more causes and influences of food safety and food waste in restaurants than the reported findings. For example, the findings showed that packaging and marketing campaigns of food sellers encouraged more purchases. Extensive menus also contributed to excessive food preparation that became unconsumed and businesses' unpredictable nature (Okumus 2019).

6.4.4 Sub Question Three

The third sub-research question sought to understand the lived experiences of the decision behaviours on strategies to control food safety incidents and minimise food waste in food catering services. The themes presented in the findings supported the previous literature. Participants stated that the decisions made were the reason for the absence of food safety incidents in their settings except for food waste— which the researcher found interesting given the daily reports on food poisoning. The first finding emphasised staff training and education on food safety and food waste as a critical strategy. For instance, DiPietro (2016) noted that staff training reduced infractions and resulted in reduced food safety incidents. However, In an earlier study, Arendt (2013) emphasised the need to train staff. And, interestingly, a reported food safety incident called for staff re-training (BBC 2018).

Under this theme, the subtheme shared that the training included formal and practical training programs to ensure staff obtained the required information,

education, and knowledge to increase their awareness of food safety and waste. The practice supported the existing literature as it appeared to minimise food safety incidents and food waste (Schanes et al. 2018). Similarly, MacRae et al. (2016) and Van Bemmel and Parizeau (2019) found that information and education improved awareness among food handlers and reduced food waste in the food supply chain.

The participants in the study also stated that improving staff knowledge facilitated business cultural change and enhanced personal hygiene and general cleanliness in restaurants and catering services. Such an account lends perfectly to Mondejar-Jimenez et al. (2016) comments on improved habits, attitudes and practices in the food industry to control food safety and food waste. Moreover, earlier studies argued that staff training broadened staff attitudes, changed behaviour and increased conformity to acceptable food standard levels (Neal et al. 2012).

The theme on the organisational skills in food catering service activities with subthemes such as record and data management, monitoring of food date labels and organising foodstuff in storage facilities and food preparations was an important finding shared in addressing food safety and food waste in restaurants. Based on the organisational theory (OT) and the constructed theoretical framework, this study adopted the structure, roles/activities, and decisions as crucial in an organisation (Jones 2013). After appreciating the causes or influences of food safety and food waste in restaurants, the managers and staff devised strategies to solve the problem. Research studies support the findings that recording and monitoring skills (Panghal et al. 2018) facilitated identifying the critical control points vital in controlling food safety incidents. In addition, monitoring could ensure the quantification of food wasted, thus planning food purchases, revising food menus and cooking food at standardised temperatures (Lazell 2016; Stancu et al. 2016). Following these strategies would mean the food handlers or food catering service operators would control the amount of food prepared in their settings and the food portion sizes identified as causes of food safety incidents and food waste.

Existing literature on food safety and food waste and the findings on standardizing systems and regulations highlighted an essential strategy for controlling food safety and minimizing food waste in restaurants and catering services. Authors Wallace et al. (2018) and Lytton (2019) profoundly argued the importance of food systems in food supply chains, of which restaurants and catering services fall. In addition, studies showed that earlier strategies, such as training and education, improved awareness of standards and regulations required in food systems (Gustavsson et al. 2011; Ali et al. 2019). As a result, food inspections enhanced food regulations and standardising food systems (Wang and Van Fleet 2016).

Further, other themes and subthemes indicated findings that concurred with the conclusions of the existing literature, albeit in other areas of the food supply chain. For instance, the theme of human resource strategy was necessary because restaurants had many employees, and most people used it to launch their careers. Therefore, staff required routine supervision and leadership for effective and efficient operations. Guchaitt (2016) noted that supervision and management assisted in reducing food safety errors and mistakes. In contrast, minimal staff compensation demotivated staff and affected the business; collaboration and teamwork affected cohesion and staff performance.

There was a theme on improving food procurement and proper tools and equipment available to the food handlers. Restaurants and catering service centres planned their food procurements to ensure the amount procured was used up in time or had sufficient storage equipment on site. Research studies emphasised the availability and use of tools and equipment to control food safety adequately and food waste (Guchait et al. 2016; Harris et al. 2018). Other key subthemes shared in this finding included benchmarking competitors using the available information technology. These included digital thermometers and investing in tools and equipment that assisted food preparation. Others were colour-coded cutting

surfaces and kitchens for specific foods and installing automatic laser hand washing points.

Based on the study findings on managing leftovers, the participants shared the repurposing of leftovers to control food spoilage, quality deterioration, and food waste. This finding meant the excessive amount of food prepared, the large menus, and low customer food consumption led to much-unconsumed food and customers' attitudes or affordability. Doing nothing to this food increases the amount of food waste. Therefore, the leftovers would be frozen and reheated for another meal. Alternatively, the leftovers were given to staff at the end of the day, donated to the shelters and people without housing, or provided to farmers to feed animals. Studies conducted by Stachu (2016) and Schanes (2018) concurred with this finding and supported the arguments that were repurposing and recycling control the deterioration of leftovers.

6.4.5 Other Research Finding

The participants shared exciting, unique, and surprising responses in the study under barriers and motivators of controlling food safety and minimizing food waste. The participants expressed concern that financial resources impacted food safety and food waste. The action demotivated them and contributed to staff actions or behaviours and the recorded food waste in restaurants. The staff had to maintain their jobs, control food safety, and minimise food waste.

Another subtheme on human resource planning aspects highlighted its effects on staff performance. Staff confronted a heavy workload because of low staff numbers, yet they received minimum pay. These situations demotivated staff and affected their performance. Moreover, in pre-COVID times, the staff were required to work when sick. Related literature highlighted this point in the hospitality sector (Arendt et al. 2013; Racicot et al. 2019).

The final subtheme illustrated the effect of food regulations and food waste disposal. The participants stated that the stringent regulations were barriers to donating leftovers. This increased food waste in restaurants and left out those in need or who did not have enough to eat. The participants also observed costs associated with disposing of the leftovers, adding costs to the food catering service or business operations.

Lastly, the learning point from this research was how the researcher understood and interpreted the findings. The presented discussion focused on the adopted theory and constructed theoretical framework from one point of view. Therefore, there are multiple ways to interpret the research findings, given that qualitative research is subjective. Although the previous and related studies noted similar reasons or arguments stated in this research findings, many of these, such as training needs, increased awareness, and enhanced knowledge (Arendt et al. 2013; Gooch et al. 2019), are debated in the control of food safety incidents and reduction of food waste. The increased cases in the hospitality industry demonstrated the need for this research. Participants argued that this was the key to controlling restaurants' food safety and food waste in the researcher's findings. The other half disagreed, and the emphasis was on systems and processes.

Based on the above discussion and the theoretical framework (Chapter 3, Figure 3-2), it is apparent that controlling food safety and minimising food waste was complex and not looked at with a broader lens. Hence, there is a necessity to bring in interconnectedness and relationships to provide a better understanding, deeper insight, and better decisions. Many decision-making approaches were used (Aruldoss et al. 2013); however, the researcher adopted the systems thinking approach. The rationale for choosing systems thinking was attributed to the approach being recognised as a practical and powerful strategy (Maani 2017: p.30; Sherwood 2023) in understanding complex situations such as food safety and food waste. The strategy assists in solving complex problems and making decisions in several situations that are similar to controlling food safety and food waste.

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6.5 Systems Thinking

Systems thinking is an approach or method by which we try to understand why organisations or variables in a complex situation interact, relate or are connected through cause and effects using visual methods to explain the dynamics of the situation. The researcher introduces systems thinking because it is a powerful tool used in complex situations to make decisions, but it was not visible in the research findings. Most especially, the strategies the managers and staff used or decided on were related or connected. The researcher demonstrates how systems thinking would enhance decisions to control food safety and food waste in food catering services.

Systems thinking has several archetypes or prototypes useful in organisational situations. These include fixing what backfires, escalation, limits to success, drifting goals, the tragedy of the commons, growth and underinvestment, value creation, and shifting the burden (Senge 2006; Schaveling and Bryan 2018; Sherwood 2023). Each archetype has a story theme, and a behavioural partner demonstrated in its structure. The researcher adopted shifting the burden because of its suitability in explaining the interconnectedness and interrelationship of the variables and responses on food safety and food waste stated in the above findings. Therefore, the researcher opted for a causal loop diagram (CLD) model to enhance food safety and food waste management in food catering services. Selecting training as the central strategy influencing staff education and knowledge and the archetype of shifting the burden, below is the model's explanation and interpretation.

6.5.1 The Causal Loop Diagram (CLD)

Causal loop diagrams (CLDs) show how we understand system structures of cause and effect. They illustrate the cause-and-effect relationships existing within a given system. CLDs provide a language describing understanding a system's dynamic, related, and interconnected variables; doing so assists in obtaining a deeper understanding of a situation. In this research, the CLD was around the

strategy and decision of staff training to enhance food safety control and minimise food waste. Therefore, we can link the variables illustrating the casual relationship. The behaviour and how loops come together led to a coherent story about a problem or an aspect (Kim 1992).

The purpose of this study was to better understand how managers and staff dealt with food safety and food waste and how they decided to address control of food safety and food waste in their settings. The participants revealed several points and discussed the reasons for the findings above. However, the researcher noticed that inadequate training led to a lack of knowledge and awareness, subsequently influencing the decision behaviours and practices attributed to food safety and food waste. As a contribution to knowledge, the researcher identified staff training as an important variable in improving food safety and food waste in the food catering industry. To support training as an important strategy, previous food safety and food waste studies within the food supply chain emphasised its importance (Arendt et al. 2015; MacRae et al. 2016; Principato 2018). However, the researcher looked at training using the systems thinking approach. Identifying the interrelationships between the defined variables provided a better position to find a solution than viewing the variables individually. Further, the CLDs assisted in connecting and determining relationships between variables in a system, which would have been difficult in a linear system. The following subsections deal with how to build CLDs and the behaviors of different loops.

6.5.2 Building Blocks of CLD

The building blocks of a CLD are variables, arrows, links and loops. The variables determine the behaviour of the dynamic system. The arrows show the connection or relationship between the variables, the cause and influences/effect (or increase and decrease) to explain the loop diagram. The variables joined by the arrows are marked with **"S"** or **"O"** indicating how the variables affect each other. For instance, a variable change causing a positive relationship in another variable is

marked with an "**S"** or **+** for the same at the arrow. Likewise, when variables move in the opposite direction or one variable moves up as the other moves down or decreases, a negative relationship is marked with **"O"** or **–** at the arrow, denoting the opposite direction.

6.5.3 Balancing Loops (B)

The balancing loops marked **B** continuously keep the system at a required level of performance. The loops stabilise and resist the change that occurs in the opposite direction. Negative feedback characterises them. Also called goal-seeking, the negative feedback keeps systems steady and stabilises them in a required state. Similarly, the balancing process would enhance one variable against the other, resulting in a continuous increase, decrease, or change in the variables.

6.5.4 Reinforcing Loops (R)

These loops marked **R** causes a change in a specific direction and result in more change in the same direction. A successive change in a variable cumulatively adds to that variable in the same direction (Kim and Anderson 2011)**.** They either cause growth or decline in a specific direction as they increase or change progressively around the loop—positive feedback loops. Also, there are delayed relationships marked (**||)** for reasons such as required resources and the speed of adaptation to the required standards. It is important to note that reading the loop could start with any variable and direction.

Balancing and reinforcing loops are combined to describe a process or behaviour of a system. In this research, as demonstrated below, several loops are combined to show how several variables are related or connected to assist in decisions aimed at controlling food safety and food waste in food catering services. The following subsections discuss the value of archetypes and the choice of archetype selected for this research—shifting the burden.

6.6 The Types of Archetypes

Archetypes are recurring, systemic organisational structures that depict circumstances at multiple levels or scales. Organisations experience internal or external systemic challenges. Therefore, archetypes assist us in understanding the challenges; hence, their use in exploring a problem, improving awareness of an unfolding aspect, focusing on anticipating difficulties and determining strategies to obtain solutions (Kim 1992; Kim and Anderson 2011). The purpose of demonstrating the archetypes was to learn and reflect on the stories or situations depicted and apply them in the current research on decision-making in controlling food safety and food waste in food catering services.

6.6.1 Shifting the Burden

The common practice is providing a fix focusing on symptoms, forgetting or missing the actual causes of a problem. In shifting the burden, the options for solving a problem provide a symptomatic or fundamental solution. An asymptomatic solution provides a temporary solution, cools the pressure, and erodes the potential to find fundamental solutions, hence recurring of the problem. Providing a fundamental solution is considered time-consuming or expensive. As a result, a cycle of symptomatic solutions with undesired effects hinders a decision-maker from considering fundamental solutions to the problem. For instance, in this research, one of the key findings was staff training to address food safety and food waste in the food catering settings. However, training staff without identifying the root cause of the problem led to recurring food safety incidents and food waste. Therefore, a fundamental solution was required to address food safety challenges and food waste in food catering services. Kim and Anderson suggested that a strategy to manage shifting the burden is completely doing away with the symptom or identifying symptoms and addressing them fundamentally.

6.6.2 CLD for Systems Thinking of Food Safety and Food Waste

Based on the research findings, the researcher identified variables and their relationships or interconnection to develop a CLD. The purpose of the CLD was to demonstrate how systems thinking could be a powerful tool to guide in addressing complex situations such as food safety and food waste in the food catering service. This tool has shown success in strategic planning, decision-making and problem-solving. However, this tool focused on decision-making in this research.

Figure 6-1 below shows the key identified variables as training of food catering service staff, the number of staff in the setting, the staff practices and behaviours and the level of food safety and food waste. There are three main feedback loops: R1, R2, and B1. The figure further shows that staff practices and behaviours change with staff motivation changes with the level of staff skills and resources influenced the disposal of the food catering service setting. Adequate staff practices and behaviours significantly influenced food safety and minimised food waste. Similarly, increased staff supervision improves food safety and minimises food waste. However, adequate staff practices result in enhanced strategic planning to uphold the food catering service standards—the link characterises delays associated with time for adoption and implementation. The figures below explain the three main feedback loops as individual figures.
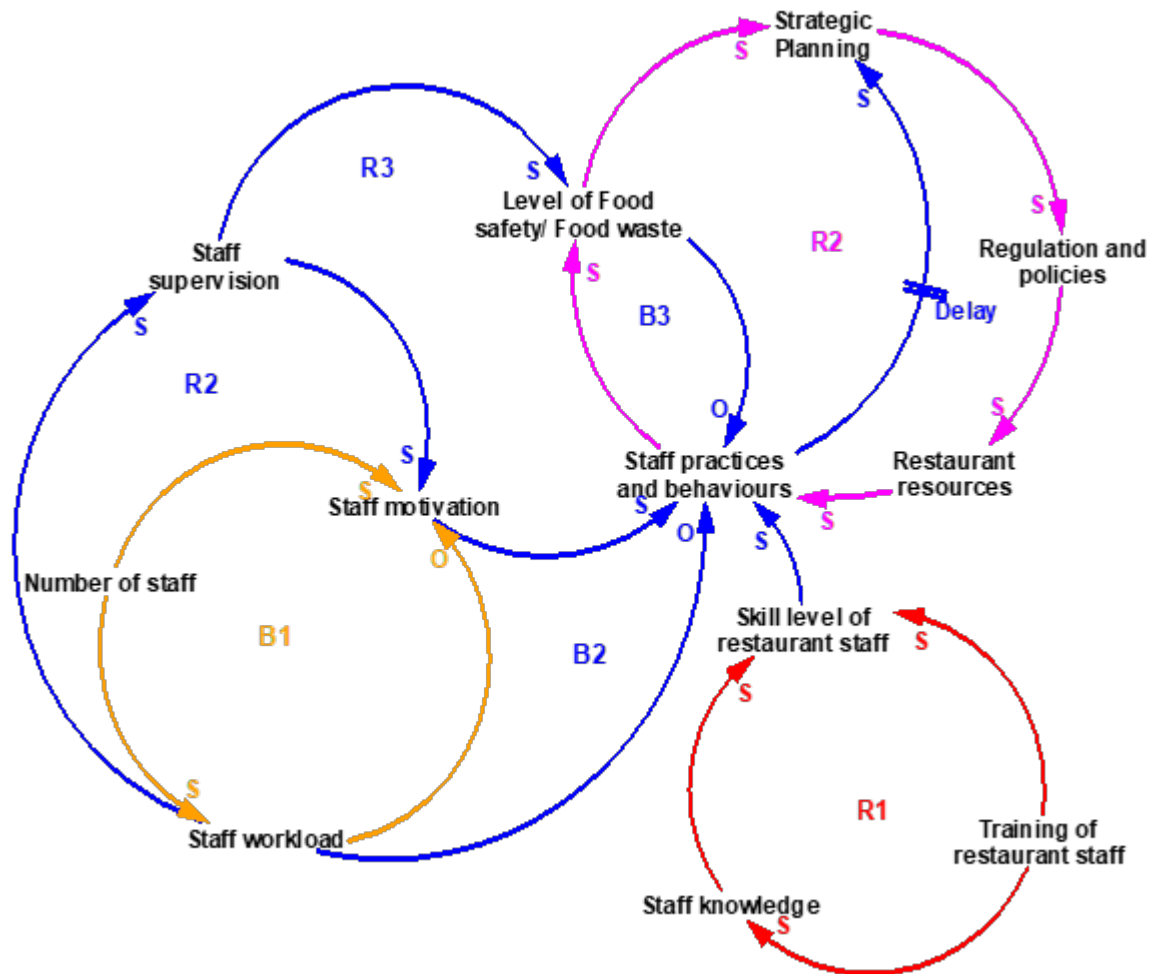
Source: Author (2022)

Figure 6-1 CLD Systems Thinking Model for Food Safety and Food Waste

Figure 6-2 below illustrates the training loop. In the loop, the more staff training, the more knowledge acquired, and improved staff skills showing the link as an "**S**". At the same time, further staff training led to better catering service staff skills, with an "**S**". The links marked with "**S**" means moving in the same direction. Therefore, staff training strategies to address food safety and food waste could enhance staff knowledge and improve their skills to improve their practices and behaviours.
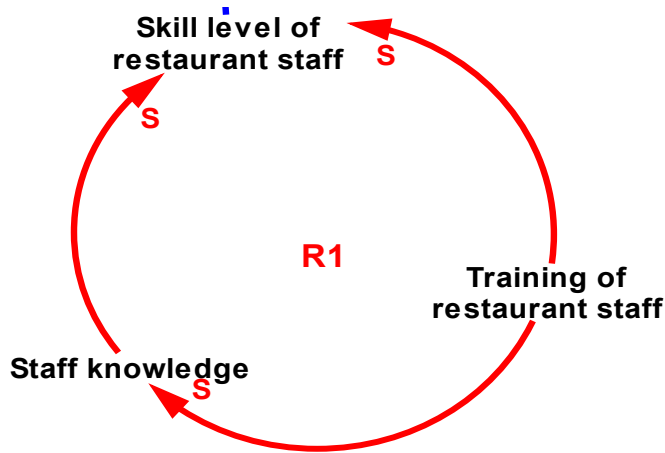
Source: Author (2022)

Figure 6-2 Training Loop

Figure 6-3 shows a feedback loop on the staff practices and behaviour. In the loop, adequate staff practices and behaviours imply higher food safety levels and minimal food waste. The attained levels of food safety and food waste mean more strategic planning. More planning influences the development of more food procedures and policies, which influences more required resources. And the more the available resources, the better the staff practices and behaviours. Starting with staff practices and behaviours—there is an enhancement and reinforcement within the loop known as positive feedback and a reinforcing loop "R2".

Source: Author (2022)

Figure 6-3 Staff Practices and Behaviours

Figure 6-4 shows the relationship between the number of staff in a restaurant, their workload, and their level of motivation. As the number of staff increases, there is sufficient work distribution amongst themselves; hence an "S". However, the link between staff workload and motivation indicates that an increase in staff workload results in low staff motivation, marked with an "O". In contrast, sufficient staffing influences staff motivation—hence an "S". In this feedback loop, the sought goal is staff motivation; therefore, the causal loop is a balancing loop "B1."
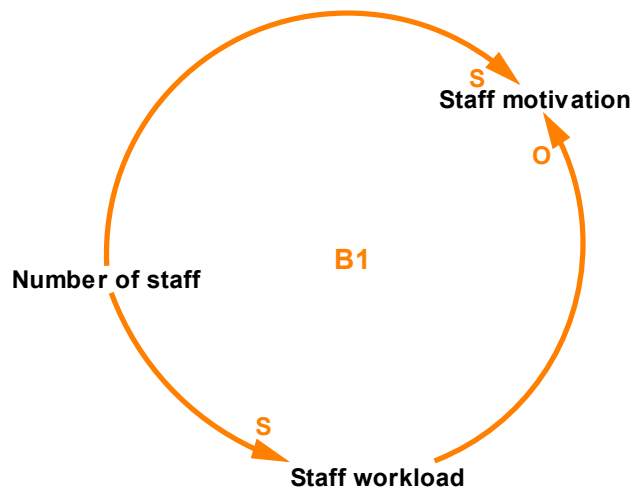
Source: Author (2022)

Figure 6-4 Restaurant Staff Motivation

6.7 Advantages of Using Systems Thinking

Combining loops formed the CLD used in determining the relationships between variables, incorporated into a strategy or a decision such as training to enhance control of food safety and minimise food waste in the food catering service. The model best suits the archetype, shifting the burden. Explaining symptoms and addressing them fundamentally would mitigate the recurrence of the problem. This researcher has shown in the model above that using the relationships and connections between strategies once optimised results in a fundamental solution and prevents the recurrence of the symptoms that explain enhanced decisions to control food safety and food waste in the food catering services.

Most especially when the strategies and interventions are known, when practitioners use a systems thinking approach, they would have the advantage of including the neglected areas. For instance, training targeting awareness and improved knowledge would include behaviour change, practices, and other related aspects. Other than training focusing and attending to the causes, a broad perspective is considered that avoids a repeat of similar problems. The result is a strategic decision to solve the problem—of controlling food safety and food waste in food catering services.

6.8 Chapter Summary

This chapter has discussed the research findings in relation to the literature. The discussion compared and contrasted the research findings to the reviewed studies to demonstrate the research originality and contribution. Surprisingly, there were many similarities and differences between the current research findings and those in the previous studies.

The discussion also emphasised that much as systems thinking was not brought up in the participant's discussions, using systems thinking to find the fundamental solutions to food safety and food waste in food catering services was an important and potential solution. The researcher listed the different archetypes that organisations could use. Shifting the burden was identified to suit having better decision-making in controlling food safety and food waste. Emphasis was on the training participants discussed as a key strategy for addressing food safety and waste. The researcher suggested and demonstrated using CLDs as a possible way to look at training using the systems thinking perspective to address food safety and food waste.

The next chapter concludes the research, presents the implications to theory, policy, and practice, the research contribution and suggests areas for further research. The final part is the reflection on the doctoral research.

CHAPTER 7 : CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS

7.1 Introduction

Chapter six discussed the research findings in food catering services. It compared and contrasted the research findings and the findings from the previous studies. Based on the findings, the chapter introduced the systems thinking approach and the CLD to explain how to enhance currently used strategies to make better decisions to control food safety and food waste in the food catering services.

This chapter concludes the research. The chapter first provides the research overview and summary of the research. Next is a discussion of the implications and how this research contributes to practice and knowledge. This is followed by highlighting the research limitations, recommendations for future research and a reflection on the doctoral research journey.

7.2 Research Overview

The research problem was the limited research examining how managers and staff in food catering services dealt with food safety and food waste and how they made decisions. This research set out to fill the research gap by stating the research aim, which was to explore the lived experiences of managers and staff in food catering services to better understand their decision behaviour approaches in controlling food safety and food waste. To achieve this aim, four objectives were set that assisted in answering the main research question. The main research question was, "*In what ways do food catering services managers and staff lived experience use the systems thinking approach to control food safety and minimise food waste*?" Three sub-questions supported the main research question. Organisation theory framed the research questions and guided the entire research process based on three concepts that influence the functions of an organisation, thus the structure, activities and decisions.

Table 7-1 below lists the set research objectives and demonstrate the outcome of each objective. The outcome is based on the in-depth semi-structure interviews and observations used to gather data from twenty-five participants.

Table 7-1 Research Objectives and Their Outcome

Research Objective	Outcome
1. To obtain the experiences of food catering service managers and staff to understand how they make sense of food safety and food waste	The participants showed and explained their understanding of food safety and food waste and described how they experienced it in their settings.
2. To explore the causes and influences of food safety and food waste experienced in restaurants and catering services	The participants listed and explained the causes and influences that led to food safety and food waste in the daily operation of the restaurant and catering services.
3. To review and evaluate the strategies restaurants and catering services experienced and used in controlling food safety and reducing food waste	The participants enumerated all the strategies and interventions used in controlling food safety and food waste, some of which were reactionary and led to symptomatic relief with chances of recurring
4. To examine the experiences and approaches such as systems thinking in controlling food safety and reducing food waste.	Participants lacked appreciation for any specific approach in their decision behaviour. For instance, they lacked a broad picture of the interrelationship of the strategies and interventions and hence were not using systems thinking.

The research adopted a qualitative phenomenological approach to gain in-depth insight into the food catering service's multiple aspects of food safety and food waste. The rationale for choosing the approach was the appropriateness of obtaining the lived experiences of the managers and staff, which was important in understanding the phenomenon under study (Merriam and Tisdell 2016; Creswell and Creswell 2018). Data were gathered using in-depth interviews and participant observations from twenty-five purposively selected participants within restaurants and catering services in one of the cities of metropolitan Vancouver in Canada. The

collected data were thematically analysed (Clarke and Braun 2015; Braun et al. 2019). The rationale for using inductive thematic analysis was its suitability in comparing the experiences across the gathered data, its wide use in analysing different forms of qualitative data and its strengths in bringing out themes reported in the final reports.

The research found that food safety and food waste in the food catering services were attributed to internal and external processes and systems within the operations. Among these were inadequate staff training and planning, improper practices such as poor food preparation procedures, and using food cutting boards and basics like cooking thermometers. Others included a lack of organisation skills, customer behaviours, food portion sizes, work sociocultural norms, standardised systems, awareness, and low food safety culture. These causes and influences are interrelated but were never appreciated, and solving each was done independently, suggesting managers and staff did not appreciate the use of the systems thinking approach in making the decisions(Sherwood 2002; Sherwood 2023)

In summary, the researcher suggested enhancing food safety and food waste control in food catering services and using the systems thinking approach, as discussed and demonstrated in Chapter six, Section 6.6. Also, the approach has had wide success in related institutions and organisations. With the existing training tools, systems thinking could minimise food safety, food waste, and consequences.

7.3 Research Implications and Contribution

According to Van de Ven (2018), engaged scholarship argues that researchers conduct research that contributes to theory and benefits practitioners. He further stated including practitioners in designing research and participating as participants or providers of responses to the research interview questions. The findings of this doctoral research add to existing theory and benefit the practitioners. That is why a summary report is prepared and communicated to their benefit and potential improvement of their operations to control food safety and food waste. The

following subsections present the contributions of this research to practice and knowledge.

7.3.1 Contribution to Practice

The food catering service is one industry that employs many people with the highest turnover (Martin-Rios et al. 2018). Current research suggests involving managers and staff dealing with restaurant services, including food safety and food waste, and making decisions (Coskun and Ozbuk 2020). Practitioners could learn from the findings of this research and use suitable decision approaches to sustain their businesses and retain customers and staff. Addressing the influences of food safety and being cognizant of their interrelatedness using improved training tools could enhance awareness and improve practice behaviours. This has been emphasised in previous research (Arendt et al. 2015; Racicot et al. 2019) and demonstrated in this research. Similarly, food waste decisions could emphasise key attributes such as planning, organisation, procurement and preparations. Staff performing specific roles could make better decisions to minimise food waste and its impact.

The target audience of this research is the food catering service managers, staff and all the people involved in making decisions in the food systems of restaurants and catering services. These practitioners are essential in their specific roles because a deficiency in one step leads to a break down of the whole process or system. First, this research contributes to a better understanding the existing relationship between the interventions to control food safety and food waste in their setting. An appreciation of the connection would encourage the practitioners to address problems with fundamental solutions other than symptoms that keep recurring, as demonstrated in Fig 6-1. Practitioners could use the model by identifying a specific intervention or strategy, finding the related strategy and finding a fundamental solution, hence integrating it into their decision-support approaches.

Evidence shows that institutions or organisations have successfully used this approach to solve problems and attain better solutions (Senge 2006; Mella 2012; Schaveling and Bryan 2018; Sherwood 2023) and could therefore be used in the food catering services. Most often, practitioners provide information and challenges to researchers and fail to adopt or implement the suggested solutions (Van de Ven 2007; Van de Ven 2018; Franklin 2022). In line with the arguments of these authors, the researcher involved several managers during this research's development stages to ensure the gap existed. The research plan is to summarise this research's key findings and communicate them to the restaurant practitioners through their monthly magazine. Despite the research covering a small area of metropolitan Vancouver, the summarised report would reach and benefit many practitioners because the magazine is free and accessible to interested readers.

To sum it all up, this research contributes to practitioners in the food catering services responsible for ensuring safe food is provided to customers and minimum food is wasted. The research suggests emphasising training to improve knowledge and awareness, behaviour change and practices; appreciation of the relation and link between factors responsible for food safety and food waste such that a holistic approach is used in decisions geared to address the problem other than the symptoms; and designing models similar to the one suggested in this research to assist staff make strategic decisions.

7.3.2 Contribution to Knowledge

Little research has sought to understand how managers and staff deal with food safety and food waste and make decisions in food catering services. As Neal et al. (2012) and Coskun and Ozbuk (2020) suggested, a dearth of research focuses on managers and staff of food catering establishments because of their important role. This research at this juncture is imperative to fill this gap. The aim of all stakeholders in the food catering services is to provide safe food to minimise customer sickness, hospitalisations and even death associated with consuming

contaminated food (Panghal et al. 2018; Gizaw 2019) as well as minimising food waste and its consequences (ECCC 2019; Gooch et al. 2019). The researcher sought the lived experiences of the managers and staff to better understand the situation in the food catering services. The researcher further identified and delineated the lack of appreciation of a useful approach—systems thinking and articulated its applicability using a CLD model.

Undertaking qualitative phenomenological research on food safety and food waste in the food catering services indicated interventions or strategies could be related to controlling food safety and food waste. The research contributes to knowledge uniquely and distinctively, demonstrating the relationship between the intervention and how the system thinking approach could minimise food safety and food waste.

Food safety and food waste remain an issue in food catering services, so researchers, policymakers and Governments have taken a keen interest and suggested measures to address them. Obtaining the lived experiences, interpreting the meaning and suggesting using systems thinking to make decisions opens different ways to look at food safety and food waste in the future. The researcher argues that the system thinking approach is unique because the researcher identified the issues through interactions with the managers and staff living the experiences.

To sum up, first, the research findings showed the key causes and influences experienced by managers and staff that were similar to other stages of the food supply chain. Identifying the relations between the interventions and strategies provides insight and a better understanding of how to decide to control food safety and food waste, as shown in the LCD model. Second, the research adopts the hermeneutic phenomenological approach to explore the lived experiences of managers and staff, providing other researchers interested in investigating multiple aspects of food safety and food waste to compare the different stages of the food

supply chain. Third, the researcher used thematic analysis based on recommendations from Braun and Clarke (2021). Given the subjectivity of qualitative research, it would be interesting for other researchers to use the same analysis technique and obtain similar findings. Finally, this research contributes to research on food safety and food waste from the Canadian perspective. It would be of value to a researcher in other areas despite the difference in resources and food systems.

7.4 Research Limitations

Bell, Bryman and Harley (2019) posited that research has limitations. This research highlights three limitations. First, the research adopted a qualitative phenomenological approach to seek the lived experiences of managers and staff of food catering services. The approach recommends interviewing six to thirty participants for at least ninety minutes (Creswell and Poth 2018) to gain deeper insight into their lived experiences. However, it was difficult to interview all the participants for this long time because some participants were unwilling to provide many details. They considered the subject very sensitive for their positions and the businesses they work for. In addition, the interviews were conducted during the peak of the COVID-19 pandemic. Much as the researcher ensured to establish relationships, direct contacts and travel were restricted, and some of the restaurants were closed because of the lockdown and lack of customers. However, the researcher tried to meet and discuss with participants and even secured observations in their facilities. In some cases, the researcher used telephone interviews to obtain data. Also, qualitative research is subjective, which could lead to different interpretations and meanings from interviews.

Second, although this research had twenty-five participants and obtained saturation at this point, the number of participants is small. The researcher tried to obtain rigour and validity through more than one method, interviewed participants for more than forty-five minutes and returned to participants with transcripts to verify and validate their discussion points. The researcher had limited time and resources

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to conduct extensive and exhaustive research. Therefore, the findings of this research can not be generalised to the entire food catering services. Future researchers could use this as the starting point to conduct broad research in the same area using many participants for extended interviews and observations and other research methods such as surveys.

Third and lastly, food catering services have differing resources, work cultures and country-specific food systems. The findings in this research could not be generalised to other settings or countries. For instance, this research complemented interviews with direct observation; hence, it was challenging to ascertain how the presence of an intruder as a researcher affected staff actions, activities, and behaviours. This allows other researchers to conduct similar related research specific to their settings and food systems.

7.5 Recommendations for Future Research

This research makes three recommendations for future researchers. First, researchers in the same field could consider using the systems thinking approach to support decisions to reduce food safety and food waste in other geographical areas, using a more significant number of participants and a different research design. The options for the research design include narrative, case study and ethnography. Alternatively, the researchers could use a mixed-method approach. Second, future researchers could consider using specific participants, for instance, managers, supervisors and kitchen staff, in their capacities or roles and then compare the results. This is important because each staff in different positions has diverse experience and training and sees things differently. Third, with technological advancement, future research could consider studying the effects of staff training on modified food packaging, technological monitoring and the use of sensors for detecting food safety and food waste in restaurants with resources and advanced technology such as artificial intelligence (AI). These could be benchmarked on other industry players to enhance control of food safety and food waste.

7.6 Reflection on the Doctoral Journey

In this section, the researcher shares the reflection on the DBA journey. Studying for the Executive DBA at the same time as a full-time employee has been exhausting, rewarding, and enriching. It has involved sacrifices, perseverance, and commitment. However, I have learned many things, from time management to planning and organising task accomplishment, since admission to the course in June 2016. Along the journey, I have read articles, books and guides written by authoritative authors and watched videos that motivated me to accomplish this work even when it was difficult. Before reporting for doctoral studies, I had a headache that has since developed into a permanent one I have learned to live with. I am currently on expensive medication for its management. I have appreciated accomplishing something requires patience. I have learned that conducting a good study starts with well-crafted research questions and listening to your supervisor. I have learned an important research skill. In this skill, identifying a critical article or reading material could lead to other important articles in the biography and references that I would have otherwise missed—snowballing technique. I have learned to critically read and understand research articles and evaluate, summarise, and synthesise them.

I was motivated to conduct the current research by the events happening worldwide, reading about the global challenges of food safety and food water in the media from social, political, economic and environmental perspectives. As a public health professional, I have interacted with many people affected by food safety incidents in my day-to-day assignments. People get sick after ingesting contaminated food, while others are hospitalised. I also came across cases that were not reported or identified. Within the community, I observed that much food was dumped in landfills, yet many people were starving or lacked nutritious food. Combining these issues led me to identify the study topic. I then started a journal to

note ideas, key papers, and references. I discussed this with my supervisor, who advised me to identify a researchable problem and key research questions. I found this very helpful during the dissertation writing process. I had the challenge of coming up with a clear research proposal. However, the huddle was overcome with guidance from my supervisor and reading several guides. Next was the literature review. I had a lot of material to write about, and it was challenging to select what to include and exclude from the literature review chapter. Several writings and revisions were done to arrive at the presented review in this report.

The interview process had a couple of challenges. Though the participants were easily selected and had no objection, the COVID-19 pandemic made the interview process difficult because of travel restrictions and the closures of restaurants and food catering services. Nevertheless, the few restaurants that remained open agreed to participate in the interviews with their staff and direct observation sessions. The interview process taught me skills to obtain information of interest that applied to my professional practice.

Transcribing and data analysis took many hours, but it was an excellent learning skill. I am competent with several qualitative data analyses and software such as ATLAS.ti 9, QDA Miner and NVivo 12. I also discovered using reference software such as Endnote 9X, 20 and drawing software, Vensim PLE. The process has enabled me to learn how to handle and manage a large amount of data, analyze, interpret, and make conclusions and recommendations that are tight and unambiguous. I have developed an extensive database of research material from textbooks, research articles, bookmarks of renowned universities, video courses and volumes of printed documents and reports.

7.7 Chapter Summary

This chapter has concluded the research. The research aim was to explore the lived experiences of managers and staff in food catering services to better understand their decision behaviour approaches in controlling food safety and food waste. This research has shown that managers and staff made decisions based on the situation that led to managing symptoms. They lacked the big picture of using approaches such as systems thinking to support their decision-making behaviors. Most significantly, the strategies highlighted are related and interconnected. The researcher demonstrated how systems thinking that has been used in similar situations could be used in finding a fundamental solution and enhancing control of food safety and food waste. This provides the practitioners with a tool to support the decision behaviour of controlling food safety and food waste in the food catering services.

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APPENDICES

Appendix A: Ethics Approval Form

UNIVERSITY of
BRADFORD

Dear Paul,

Ethics Application: E782

Title: Making Sense of Food Safety and Food Waste: Lived Experiences in Food Catering using Systems Thinking

Your ethics submission and documents have now been reviewed by the Chair of the Research Ethics Panel.

I am pleased to inform you that the Chair has confirmed approval of this study, with no further ethical scrutiny required.

NOTE that this approval is for this study only.

Should there be any changes to this study, you must inform ethics@bradford.ac.uk.

Once your changes have been reviewed and you have the approval to proceed, only then can you recommence the study.

Failure to do so will render your original approval invalid and withdrawn.

Please add a sentence to any material you share with participants confirming that ethics approval has been granted by the Chair of the Humanities, Social and Health Sciences Research Ethics Panel at the University of Bradford on 30/01/2020.

Best wishes

Naz

UNIVERSITY of
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ETHICS REVIEWER'S COMMENTS FORM

This form is for use when ethically reviewing a research ethics application form. Please note: your comments will guide the Panel in their decision and will be forwarded to the applicant for information.

1. Name of Ethics Reviewer:	Reviewer 1
2. Date Application Received:	14/01/20
3. Deadline Date for Review:	29/01/20
4. Date Review Received:	29/01/20

5. Research Project Title:	Making Sense of Food Safety and Food Waste: Lived Experiences in Food Catering using Systems Thinking
6. Principal Investigator (or Supervisor):	Amir Sharif/Paul Tenywa
7. Academic Department / School:	Management/FoMLSS

8. Do you have any potential conflict of interest with regard to this project application: If you answered YES, then please clarify why and return this form without reviewing: If you have in anyway helped the researcher with this application, pleaseindicate how much input you have had:

Approved - recommended comments for information only	Amendments required	Application to be seen by the Panel	Application not adequately completed – please re-submit	NOT be approvedfor the reason(s)given

9. Please note a list of changes made and a track change copy of each altered document should be returned when the application is resubmitted

10. Reviewers comments:

Appendix B: Communication with potential participants

Dear [Potential Participant],

I am writing to you concerning a study on food safety and food waste in the food catering services. As a doctoral student, I am studying how the managers of restaurants and their staff understand food safety and food waste in the food catering service and how they mitigate them. I request you participate in this study to share your experiences and perspective. The interview is projected to last between 45 and 60 minutes.

I have attached the informed consent form containing all the information about the study. Please let me know if you are willing to participate in this study no later than…. You can contact me through my e-mail or telephone to schedule a suitable time and agree on an interview place that is convenient for you.

Thank you for your understanding and cooperation,

Yours Sincerely,

……..

Appendix C: Informed Consent Form

INFORMED CONSENT FORM

Food Safety and Food Waste Management Experiences of Restaurants and Food Catering Services' managers and their staff in Vancouver Using the Systems Thinking Perspective

You have been selected to participate in this research study. The purpose of this qualitative phenomenological study is to understand better how restaurants and catering service managers, supervisors and food servers relate food safety to food waste. And, examine and compare the strategies used in improving food safety and minimizing food waste in differing social and cultural settings of Bradford and Vancouver. The study attempts to obtain your experiences and perspectives of food safety and food waste in your workplace. As a participant, you are being invited to participate and provide your perspectives in this study.

The benefit of this study to you and the stakeholders in the food industry that include restaurant owners, employees and customers is to gain a deeper understanding of most effective strategies to control food safety and minimise food waste.

Your participation in this study will require at most 60 minutes and will comprise answering a set of semi-structured interview questions that will be posed by the researcher. The researcher will additionally conduct an observation of the actions and behaviours within the settings. A second or third interview will be conducted specifically to follow up on questions or responses that require further elaboration. The researcher does not intend to conduct more than three interviews with a participant. All interviews will be audio-recorded using a Sony recorder, transcribed using a software and will be provided back to you for your comments and verification as a way of validating. The audio-records will be kept in a secure and locked facility and will be erased after submitting the final report.

All the information obtained in the study will be kept confidential and your name will not appear anywhere in the report or subsequent publications. All the data collected will be stored in a secure and locked cabinet and will only be accessible to the researcher to finalise the dissertation or thesis (not exceeding 2 years). The data will be destroyed after completing the dissertation, submission and approval by the University.

If you have any questions or concerns about your right or position of being a participant in this study please direct it to the researcher (Paul Tenywa) at +1 (778) 881 4391 or contact the University of Bradford, School of Management Tel: +44 (0) 1274 236554. I retaliate that this study does not and will not pose any risk to you or harm you in any way. The researcher will not provide any compensation.

Finally, I thank you for accepting to take part in this research study and remind you that you are free to make a decision not to participate in the study including withdrawing at any time or stage without any objection. Remember your decision will imply all the information collected up to that point will not be included in the final report.

Appending your signature, indicates your consent to participate in this study and shows you have understood the information presented hereof. You are provided with a copy of this consent form for your records.

_____

Printed Name of participant

_____   _____

Signature of participant   Date

Paul Tenywa: Researcher: +1 (778) 881 4391

Appendix D: Interview Schedule

Interview Protocol : controlling food safety and minimizing food waste in food catering services aligned to the theoretical framework that framed this research.

The researcher explained the study purpose and informed the participants on consent and confidentiality. This explains their rights and their ability to withdraw from participating in the study.

The researcher sought permission to audiotape the discussion/interaction for a later transcription

Questions:
1. How long have you worked in the restaurant /food catering service industry?
2. Please tell me more about …..?
3. What has been your role in that period?
4. What do you understand by food safety?
5. Could you explain that…. ?
6. What do you understand by food waste?
7. How do you relate food safety and food waste?
8. What are the causes/influences of food safety incidents/ food waste?
9. What else do you think of?
10. Please explain more about that….?
11. What are the barriers and motivations?
12. What else did you expect…?
13. Please give/provide me.. more information or explanation on that….?
14. Can you share with me your experiences in relation to food safety and food waste in restaurants?
15. Tell me of a time when….. ?
16. What are the strategies used in controlling food safety and minimizing food waste?
17. Are there any benchmarking, partnerships, or collaborations in finding solutions?
18. What else do you think we have omitted in our discussion?
19. Dou you have any think to add or tell me about….?

Time of interview:………………………………………………………………………….

Date:……………………………………………………………………………………….

Location:…………………………………………………………………………………….

Participant/ gender………………………………………………………………………..

Experience/years:………………………………………………………………………..

Position:……………………………………………………………………………………..

Age:……………………………………………………………………………………………

Interview Protocol : controlling food safety and minimizing food waste in Restaurants and food catering services

Appendix E: Observational Protocol

Observational Protocol: food safety and food waste	
Reference:……………… Site/Place:…………................ Date:……………………..	
Time:……………. : Duration:…………….. Target Participant:…………………….	

	Descriptive Notes (What happened)	Reflective notes (experience/hunches/learning
	Question:	
	Comment:	

Source: Adapted from Creswell (2013) pp.169

Appendix F: Diagrammatic Representation of an Observed Setting

Researcher

Exit

Entry

Hand wash basin   Customers   Customers   Customers

Staff   Staff

Staff
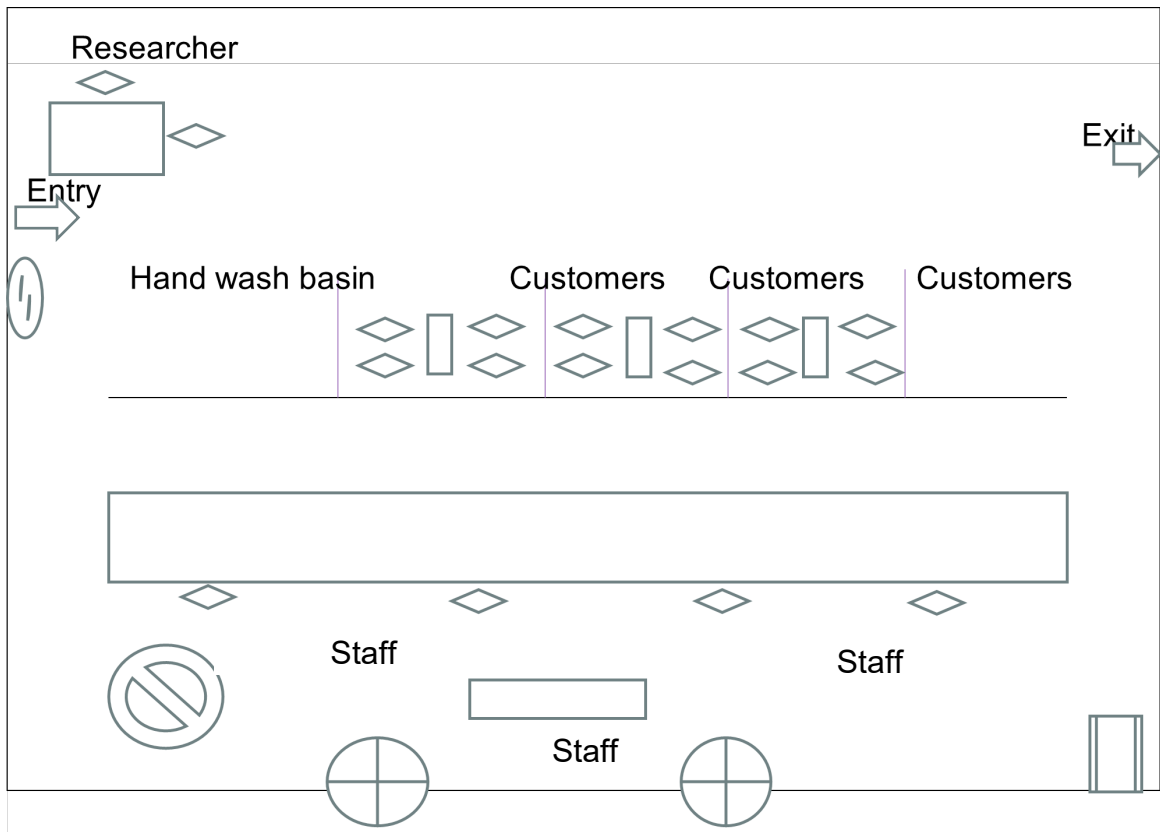
Example of One of the Observation Settings (Source: Author 2021)

Appendix G: Example of an Interview Transcript

FH25 Transcript

I would like to know-how long you have worked in the restaurant industry and the food industry in general?

I just wanted to say that I think this is a really interesting topic that you've chosen. I think it's great, and I think they do go hand in hand, so it's good it's really interesting stuff.

So, in the restaurant industry, I've been working with our organisation for about seven and a half years now and before that, I worked at in Ireland in the restaurant industry.

And what have you been doing specifically, or what has been your role?

Many different roles, so in Ireland, I worked in a restaurant as a barman for a couple of years then since moving to Canada and working with (….) I've worked in the finance department in the corporate office in accounting, then moved into operations and dealing with the operating system so technology in the restaurant, for the last three years dealing with restaurant food safety, handling food and all the control points and everything in the restaurant, and then most recently with environmental initiatives.

What do you understand about food safety in restaurants?

So, food safety in what I see in our restaurant environment is our responsibility to provide our guests with the level of safety when they come for food in our restaurants. For us that they can expect to come to enjoy great food and go home with nothing but good memories and good experiences. It I how we in the restaurant and our responsibility to meet all the control points and everything like that. And then further up the supply chain, obviously there's a great responsibility of food safety as well as making sure that we have a good understanding of where our food comes from and how it gets to us. Once it's in the restaurant, everything is visual and in front of us so that we can control it that way. But having it cut out understanding of where food comes from is every measure we take until we serve it to a guest.

How about food waste, what do you understand by food waste in restaurants?

So, food waste in restaurants, I guess there are different types of it in a way. There is food that is wasted from perhaps not accurately be able to forecast discounts and sales for any particular period. Then there is also a degree of waste in everything, even if we're operating at capacity. For instance, we have vegetables; we have waste because you can't use everything like the peel and cuttings or tails. So, that's going to be wasted. There are many different ways, but I think the majority focus on inaccurate forecasting or events that cannot be expected to result in excess products that we can't use or can not be consumed.

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Other than what you have highlighted above, why do you think are some of the causes of food waste in the restaurant other than that?

I think so poor forecasting. So, if you If you're not accurate in that the level of sales you're expecting or the volume of guests you're expecting, and you're over-ordering, you're going to have a lot more waste, of course. So, that is one factor because everything you want to prioritise food safety has to have pretty strict expiry dates. All of that, so over-ordering will lead to a significant amount of waste.

On the other hand, what causes food safety incidents in restaurants after you mentioned something to do with the critical control points?

There are a number of things. I think a lack of understanding of employees perhaps prioritization of food safety. The level of training I think that is provided to staff is very important. They need to know why food safety is the most important thing, not just because we tell them that it's a certain way to do things, but why there's a certain way to do things. They need to understand and appreciate the repercussions that can arise with food safety incidents. I, therefore, think training is a huge factor that's the biggest one and then obviously there's just cost so, do monetary costs being food safe at times so discarding product because it hasn't sold in a certain amount of time or making sure you're paying for all your equipment to function properly or paying for extra equipment. If you have adequate room for product in the coolers or freezers, for example, so there can be a cost associated with it, of course, of course, it's a cost that's worth spending because the alternative is a lot more costly, but not everybody sees that at all times I don't think.

Do you find that food safety is related to food waste in restaurants?

Oh yes, perhaps you could definitely say that safety practices could perhaps result in higher food waste. Other factors include not doing your forecasting properly or accurately as expected. The result is that sales will be over a period of time if you want to keep those food safety controls in place. If you are ordering too much of your food and storing too much, if we want to keep those levels of food safety in place, you will have to waste food. This is the relationship I see between food safety and food waste.

Earlier, you mentioned a lack of knowledge and staff training, yet we have systems, processes, and people. How do you explain these facilitate food safety incidents and food waste in restaurants?

I think incidents of food safety and food-borne illness happen when something has been missed, something has not happened, or something is allowed to happen. In short, either you have not cooked food properly, or you've held it at an incorrect temperature, or you haven't stored the food properly. Something along the way is gone wrong, which tells me that food safety in that restaurant is not a priority. So, either the staff haven't been trained on these control points or understand why the control point is important. But maybe to minimise food waste if you're in a restaurant environment where you're prioritizing your food waste, or you're prioritizing maximizing your profit at any costs. Well, maybe you could maybe don't throw out

product when you should because you don't want to have that waste, which can be obviously at the expense of food safety.

On the other hand, you have systems and processes. One of them mentioned something to do with the missing processes or steps and so on and not prioritizing, so how are systems and processes influencing food safety incidences and food waste?

Systems and processes are crucial. It is important to make sure that you don't have to get food-borne illness situation or get food-borne illness outbreaks because you need to make sure that the same Food safety levels are held every day. If you don't have systems in place and rely on people to know what to do or trust people to know what to do, everything that isn't written down and measured is open to interpretation. Anything that is open to interpretation will lead to errors, so it needs to have a detailed system in place and a process in place and a measurement tool to make sure that those systems in those processes are being followed. If that's not the case it's inevitable that things will not be the same all the time and any interpretation will lead to errors.

Other than processes and systems, you have tools and equipment to assist operations. How do these facilitate food safety incidents and food waste?

I use our chain as an example, yeah (…) we've got systems in place from before the food gets in, but once let's use beef as an example. Once beef gets into one of our restaurants it is the same in every single restaurant. What happens next is placed in the freezer (…) from there we pull it out of freezer it has the same expiry date everywhere, so long it can be used. We have a process of recording the product tracking code if we need a recall on that or if we need to track it. The beef is prepared on the grill and it's cooked from the same amount of time and reaches the same temperature. We do that the same way in every single restaurant at least tested every single time tested and record the temperature. The key point is to see that there is recording the same that prevents any food-borne illness outbreak. We know that gives us the result that we want. If we don't have those systems and process in place and we just say that you have to keep it under 4 degrees Celsius you have to cook it to 160 degrees Celsius and yet have to hold it at 140 or so, yeah, you have to show you 160 Fahrenheit and you have to hold it at 100 40 Fahrenheit before you give it to a guest or customer.. (…). Well then we're not giving anybody details to do it so there's no training there, we are just saying that's what you have to do without explaining how you have to do it that will lead to a food-borne illness incident.

What do you think are the barriers and motivations for people in the restaurant industry to address food safety and food waste issues?

I would think primarily resources and then money. When you work in the restaurant industry, you potentially have quite a lot of turnover of employees. Employees may not last that long, investing a lot of time in training a person, investing lots of resources to get under food safety certification, which can mean that you have to pay that employee while they're doing the certification. You have to pay for their certification and then if you're in an organisation like ours you also have the mandatory training that anybody has to do. It can be costly so, and so that can definitely be a barrier. Then you know if you're an employee working in the way of food safety it's perhaps because you haven't had that training, you don't understand or really care why it's so important. You're getting paid and if you don't know that you could potentially get someone very sick well then you don't really care if you cut a corner or not. Then for food waste, a barrier I think that's in place in terms of minimizing or you know for that from the healthy reduce it I think it comes at the expense sometimes the food safety. Another barrier for properly disposing of food at the cost of composting and organics and everything like that

And what of motivation motivations for the management of food waste?

Well obviously it just the same reasons really under reverse. If you can minimise your waste well then you're not throwing away money.

From our previous discussion, it appears you have many things you do to address food safety concerns and food waste. Do you have plans to cut down food safety incidents and food waste in your restaurants?

Yeah so we build continuously all the time and try to make sure that everyone knows and understands that food safety is number one. In reference our most important responsibility as an organisation is food safety. if we don't get that right well then it doesn't matter what else we do. Building that culture is something that we spent a lot of time working on and then resources so our strategy is to know and assess where we are identifying opportunities and then look to implement new tools and reinforce them. So, we are constantly trying to constantly talk about food safety and waste and help our operators create new tools and resources. The reasons to talk about food safety is that for every employee to know, it's the first thing they hear is the last thing they hear and everybody in the organisation understands the importance. There's a lot of our training till that is geared towards doing the right things so it's not just you know you have to cook this beef Patty to 160 Fahrenheit but you have to cook until 160 Fahrenheit because…(…) Once people understand the reasoning for things it's that there are a lot more likely to follow the systems and processes

OK, so now, like you at the level of operations, you must be encountering staff at different levels; what message do you give them concerning the multiple aspects of food safety and food waste?

Our expectation is zero guests to get food poisoning at any of our restaurants. So, nobody to become ill as a result of eating at one of our restaurants. Zero violations on any health inspections. For a health inspector to come in we expect zero violations that's for each individual restaurant. Although that is not always achievable on a large scale, it is definitely achievable for each individual restaurant. In a nutshell, the expectation is to be the food safety leader in your restaurant.

Are these expectations achieved?

Yes many, the majority do and not everyone and not always. There are a number of issues or problems. There are things that can get in the way. So, while we're trying to build this food safety culture it's not always there. So, if a supervisor or manager in the restaurant cut corners can get caught, high staff turnover not everyone understands or prioritises things the same way. So, that can be an issue of accountability in the restaurant, which can definitely be a factor. in If the restaurant is not being too successful, sometimes are caught up in other things trying to minimise expenditure to maximise what they're getting out of current things. So, if you've got a piece of equipment that can't reach the temperature no matter what the staff do, it will not reach the temperature. So, you need to invest and get a new piece of equipment, but sometimes different things can get away with of that they shouldn't but sometimes they do for people. That can be effective success and can definitely be one and then you know no matter how much you try, not everybody will embrace the same principles as the organisation. Sometimes it's just harder to get through the people for that so that can be a limit as well no matter how many times you train people. Some people just don't care, don't see things the same way

Tell me more about the expectation based on the different environment restaurant work in?

 I would say they are independent of us and are likely to provide different results. For instance, temperature may be required at a certain level, and it never at that. The equipment failures or electricity surge or technology changes they would affect operation on of some restaurant equipment. I would believe that one falls into that small percentage and definitely that happens where you know things are out of our control sometimes where equipment might fail or something like that. In that case, I talk about food waste if we got a good food safety culture or which we are trying to build, and we've done a good job of explaining why and people are embracing prioritizing safety. If we have an equipment failure like that, we're going to have a lot of food waste because we will not serve it to guests. We are going to discard it. That is what we do not want to happen, and we don't want to keep that where maybe compromised and give it to a guest to reduce waste, but perhaps customers compromise the safety of a guest so we would want to sacrifice that product

You also highlighted something to do with staff training. Do you have specific training programs to address or target food safety and food west? Please explain

Yes, So, we've got overall a training program for all employees and we have separate training for management employees. There are modules that are related to food safety. So, there is one for food safety specifically, another one for general cleanliness and cleaning and then more recently we have one related to COVID-19 and food safety.

Briefly give me an overview on the training program on food safety in restaurants

Yes, for food safety, the employee one has a lot in there about what we talked about thus the systems and processes. It explains what they have to meet, and the levels of explanations are quite basic. Then at the supervisor manager level, it goes into more detail about the why behind everything and why everything is done. It goes into detail about how to develop a food safety culture in your restaurant. This in tern helps to know and encourage team members to prioritise food safety and help ensure that you don't have any safety issues or reported food-borne illness incidents in your restaurant. As well, in the internal training we have partnerships externally with food safety certification providers so they feel safe the equivalent across Canada. Certification ensures that you have reached that level in any given province you say that you understand food safety.

How frequent are these training programs?

So, every employee does the new employee training which is the basic one. Then all management should do the managers training as well. The training is a one-off that has to be completed. We are aware people need to constant training and that is being worked on. And we are figuring that out. We also have training experiences where we have assessments on the performance of restaurants. Our corporate business managers go into restaurants sometimes and several times a year and do what we call a compliance assessment. We also have external partners that go in as well and they focus specifically on food safety, do an assessment for several hours and then leave behind all the learnings for the restaurant to workout

Do you have a specific requirement for somebody to train for this after joining your restaurants?

It is just new employee training that they have to complete which includes the component of food safety. True there is food safe level 1 but that is for only British Columbia. We have a partnership with a company called TRAINCAN. The program provided by this company is acceptable in all the provinces of Canada. There is a requirement for a certain number of staff and varies by province, but a certain number of staff in the restaurant have to have food safety certification, which is food safe-1 or equivalent. So, we have a partnership between TRAINCAN for our restaurant employees to go for training at a discounted price

You work in the food environment, and we very well know that food attracts many things that include rodents or rats and mouse and things like cockroaches and insects or flies. Can you share with me your experience in relation to food safety and food waste in restaurants?

Yeah I look after our pest control program as well. We definitely have issues or have had issues with it and when I can get in a restaurant environment it will always be an issue. You have to be on top of good food safety and cleanliness as your best defence against the pest issue. As part of the assessments that I was talking about earlier on, there are related to pests. We make sure that entry points are taken care of, to make sure that you've everything is clean, there's no attractants for any pests and to make sure that there's no evidence of any pests droppings. We have also created a partnership with a pest control provider to get level of service at a discounted price because it's very important to get professional people doing your pest control program. Additionally, the staff must ensure steps must be taken to monitor these rodents or pests and report them timely. Because delay leads to destruction and contaminating of everything. We ensure also that right everything for safety practices is covered and placed above the ground . As part of our daily checklists completed in the restaurants every day, a section says to ensure that you know there's no evidence of pests.

On occasions, staff have flu or cold and have to work. So, what can you tell me about their influence on food safety incidences and food waste in restaurants?

Safety I think..(…) that I think viruses and things like that in a restaurant environment realistically were probably an issue before. But because people have a mentality that you have to come to work, you can't call in sick; often management has the same mentality that you should come to work and you shouldn't call in sick if you can walk. Now that's inevitable as before COVID-19. It's inevitable that people were getting sick as a result of that I think is the reality we don't have any documented cases or anything like that. And if you're a guest going to a restaurant you might get it an illness you might not know that you got it from that restaurant you might not think that it's from that restaurant but in reality you could have a staff member that transmitted it to you. Since Covid-19 is I think that's much less of a problem because nobody is coming to work you know because you wouldn't be allowed and the standard procedures in place, but I think it definitely was an issue.

What do you think the staff had say about reporting to work while sick and risk to others and guests?

I think this probably about the restaurant operator perhaps. If staff do not get to work, it's harder on restaurants and you know before COVID-19 everyone thought it was fine to continue that way.

Why do you think people force their way to work well knowing they are sick let alone what you mentioned about lack of knowledge awareness and the related implications to the business?

I think it's probably related to money as well. So, financial security can be a factor. There is always no sick pay in the restaurant involved. If you don't come to work perhaps you don't get paid so in that case if you're living paycheck to paycheck you're going to go to work irrespective of your condition.

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What of the resulting implications?

Definitely, it is never the right thing to do because of the resulting implications to the business.

So, what is your policy as an institution, or do you have a policy in place that nobody should work sick?

No, I don't know if you know about our organisation. It's a franchise model. It will be the individual operator's responsibility to enforce it or implement or make sure that it isn't the case that people work when sick.

What would you do as the top management, what would you advise them?

I mean that's a reality as well that's why I did mention that earlier I think not a franchisee or the operator is definitely at that time, more than likely putting some pressure on the employee as well. Because they don't want to be down a team member for a shift.

Do you have an insurance plan or something like that to cover employees?

Well it's hard to plan for it. I think the restaurant would work one staff member down, though it is always not easy for people to do. Then that's why staff end up coming to work because if you're a person down and puts more pressure on your teammates and the sickly person you don't want to put more pressure on your teammates.

For example, do you benchmark one facility and other facilities that do not match your standard level?

We have many examples in the training instances where situations have gone wrong, so we use that as case studies for people and constantly benchmark ourselves against competitors. We have some software in place that allows us to do that, so we benchmark the performance for each restaurant in each region and nationally against all of our major competitors. We also have access to every know health inspection and everything that happens at any of our restaurants. We have at best at the head office as well so if there's any issues we follow-up on them directly to get them addressed.

Please add something to the food safety culture you mentioned in our earlier discussion

The food safety culture is very important to us because with a good food safety profile means as well as unnecessary waste of food are stopped. We are trying to develop it into the first thing on everybody's mind. So, having a strong food safety culture is critical especially as we grow. As we grow, we tend to lose sight of that and if we loosen our standards or don't have these if we don't have this culture well then it's only a matter of time before somebody gets sick. So, by consistently talking about culture, we want restaurants daily without food safety checklists

throughout the day different processes and procedures that bring people back to thinking about the good experience. We're always talking about when I'm at the head office for always looking at new tools to talk about it and plus new resources down for our operators to take advantage of. There is always something new and there's always a reason to focus on it and talk about it.

Ok, thank you so much for that; now we've discussed a lot of things. From your perspective, as somebody who is at the corporate level, what is something holistic you can do to handle all these problems to control food safety and food waste in restaurants?

For food safety , we don't compromise so we talk about the food safety culture and that's first and foremost the most important thing at our organisation. There's no compromise on that that's our priority afterwards comes quality and afterwards comes guest experience. But the 1st first part of that is food safety if we don't have that culture in place at that's what all of these issues arise so that's how we holistically approach it. The organisation's priority and expectations are clear, so we talked about that earlier on as zero incidences of anybody getting sick and zero health inspection violations.

Food waste depends on what food waste we are trying to define, i.e. what we send to landfill or food waste that we sent to organics and composting or his food waste that we donate to other organisations. This involve reuse or repurposing. Any food that we take in and don't give to a guest basically is food waste. Now we minimise through training and accurate forecasting and showing the benefits for operators that the low the food waste, the more you make. We emphasise that one of the things that we actually work on is not to waste by trying not to send anything to a landfill. So, we're doing two things were introduced an organics program but we're also introducing the donation program so that any food that we don't use in our food catering service is donated to local charity if its good and of quality.