Perspectives of Food Preparation Waste Management by the Restaurants in Nelson

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Declaration

I, Lashica Abeywickrama, declare that the information contained in this research project is my own work and has not previously been submitted for academic examination towards any qualification. The ideas presented are my own opinions and not necessarily those of the Nelson Marlborough Institute of Technology.

Lashica Abeywickrama — Signed

11th November 2020 — Date

Abstract

The rise of global population has increased the demand for food, and as a result, food waste has also been rising. The issue has been gaining attention due to its significant repercussions on environment, social and economic sustainability. Globally, the foodservice sector inclusive of restaurants are contributing largely to food waste. Amongst all types, food preparation waste is the highest in restaurants. Especially in New Zealand food preparation waste was at 60%. This study will contribute to establish knowledge upon strategies and challenges in food preparation waste management. The purpose of the study was to elaborate strategies that can be replicated by other restaurants. A qualitative study was conducted among 7 restaurants in Nelson, New Zealand and data was collected through semi-structured interviews.

The major causes of food preparation waste were identified as unpredictable demand, lack of skills in kitchen staff, mistakes in kitchens and meeting aesthetics of food. The best practices among the findings were repurposing, kitchen processes and controls, redistribution of surplus food and effective waste disposal. Restaurateurs claimed that lack of skilled staff, fluctuating demand, satisfying customer expectations and varied costs in waste disposal were key challenges. The potential improvements suggested were skill enhancements to drive creativity and innovation; use of technology; menu design and portion control; training and leadership. As the foodservice sector is under tremendous pressure to manage food waste effectively similar studies will aid restauranteurs to acquire knowledge on potential strategies.

Key words: Restaurants, Food preparation waste management, Food waste, Foodservice sector

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Chapter 1: Introduction

1.0 Introduction

The growing world population has inevitably increased the demand for food (Godfray et al., 2010). However, every year, one-third of the food that is produced globally, amounting to 1.3 billion tonnes is wasted before consumption (FAO, 2013; Gustavsson et al., 2011). Any food that is edible and discarded before consumption is identified as food waste (FAO, 2013; Katsarova, 2016). Food waste in the foodservice sector has gained attention in recent years because of the magnitude of waste generated and its repercussions (Betz et al., 2015; Filimonau & De Coteau, 2019; Heikkila et al., 2016). The literature illustrates that food waste has an impact on social, economic and environmental sustainability. The environmental impacts include an increase in landfills, water pollution and wasted resources in producing food (Cuellar & Webber, 2010; Massow & McAdams, 2015; Oliviera et al., 2016). Negative cost implications from both wasted food and waste disposal were highlighted as economic costs (SRA, 2010; Winnow, 2018). Moreover, an increase in food wastage threatened global food security, limiting access to edible food (Kennard, 2019; Stringer, 2016).

The scenario in New Zealand (NZ) is of no difference. It is stated that annual food wastage in NZ costs approximately NZD 872 million (New Zealand Parliament, 2018). Understanding the potential society and environmental impact, the NZ government enacted the Waste Minimisation Act 2008 (Ministry for the Environment, 2019). The research conducted by the National Food Waste Prevention Project to quantify NZ food waste has elaborated on the extent of food waste issues in cafes and restaurants in NZ (WasteMINZ, 2018). Food preparation waste is the highest proportion and is defined as the waste that occurs in the kitchen in preparing food and prepared but unsold food (WasteMINZ, 2018).

1.1 Rationale

According to recent studies, the foodservice sector is stated as the third-largest waste generator and thus, has drawn attention to effective food waste management (Gustavsson et al., 2011; Wang et al., 2018). The increasing global demand for food and the rise of dining-out trends eventually has led the foodservice sector in generating a large amount of waste (Godfray et al., 2010; Monier et al., 2010). The management of food waste can derive many benefits such as resources' efficiency, positive financial return, and sustainability for the foodservice sector (Heikkila et al., 2016; Hanson & Mitchell, 2017). Moreover, because of its substantial social, economic, and environmental impacts, the global foodservice industry is paying attention to the management of food waste effectively (De Laurentiis et al., 2020; Filimonau et al., 2020; Filimonau and De Coteau, 2019).

Food waste categorisations are not consistent among studies, but restaurants' food waste can be categorised as storage waste, preparation waste, serving the waste, and consumer plate waste (Betz et al., 2015; Engstrom & Carlsson-Kanyama, 2004). Whilst many studies around the world has quantified and prioritised the management of consumer plate waste, it is stated that the largest proportion of waste in restaurants is food preparation waste (Betz et al., 2015; Filimonau et al., 2020; SRA, 2010; Winnow, 2018). Preparation waste includes all kitchen waste generated during food preparation as well as prepared but unsold food (Engstrom & Carlsson-Kanyama, 2004).

This study aimed to establish knowledge upon food preparation waste management by restaurants in Nelson, NZ. A prior study on quantifying food waste in restaurants and cafes in NZ reveals that 61% of overall food waste was avoidable (WasteMINZ, 2018). Interestingly, 60% of food waste in restaurants and cafes was food preparation waste (WasteMINZ, 2018). Therefore, the effective management of food preparation waste is important to the restaurant industry in NZ. However, the research by WasteMINZ was only quantitative and did not explore the causes, practices and challenges of managing preparation food waste. Moreover, the study excluded Nelson as a region (WasteMINZ, 2018). This study aims to address the gap and findings would suggest improvements that restaurateurs can adopt to manage food preparation waste in restaurants.

1.2 Research Purpose and Questions

The purpose of this research is to establish knowledge of the causes, current practices and challenges faced in managing food preparation waste by the restaurants in Nelson. Food preparation waste is the highest proportion of the waste generated in restaurants and cafes in NZ (WasteMINZ, 2018). The hospitality sector has opportunities to gain benefits by reducing its food wastage (Hanson & Mitchell, 2017; WasteMINZ, 2018). Food waste in NZ is considered a key issue as it costs NZD 872 million a year (New Zealand Parliament, 2018). However, the restauranteurs claim that they are operationally challenged in managing food waste (Filimonau et al., 2019). Moreover, cross-market studies will reveal effective strategies to manage food preparation waste and benefit the entire restaurant industry (Filimonau et al., 2020). Thus, insights on the challenges would suggest better strategies to the restauranteurs in managing food preparation waste effectively.

Accordingly, the main research question is as follows:

What are the different perspectives of food preparation waste management by the restaurants in Nelson?

In order to answer the main question, the following sub-questions were designed.

1. What are the current practices of managing food preparation waste among the restaurants in Nelson?
2. What are the causes of food preparation waste in the restaurants in Nelson?
3. What are the challenges that restauranteurs face in managing food preparation waste?
4. What aspects can be improved to effectively manage food preparation waste in the restaurants in Nelson?

1.3 Research Project Outline

This report consists of six chapters including an introduction, literature review, research methodology, findings, discussion and conclusions. Chapter 1 – introduction provides the background to the study explaining the research questions. The second chapter, the literature review, establishes the knowledge on the topic through prior studies. The research methodology adopted in this research and the research process is explained in chapter 3. Chapter 4 elaborates on the findings that emerged through the semi-structured interviews conducted and explains the participants' perspective on food preparation waste management in restaurants in Nelson, NZ. Chapter 5 – discussion, analyses the research findings in comparison to the literature review and prior established knowledge. Finally, chapter 6 provides the conclusions of the study along with recommendations and limitations of the present research.

Chapter 2: Literature Review

2.0 Introduction

This chapter attempts to explore the literature on food preparation waste in the context of restaurants. The structure is designed to analyse each section under main themes and sub-themes, thus follows a thematic approach (Cameron & Price, 2009). The first section discusses food waste in the foodservice industry and defines food waste categories with emphasis on food preparation waste. The second section highlights the business impacts due to food preparation waste in restaurants. The third section discusses the different perspectives on the management of food preparation waste.

2.1 Definitions

Food Preparation Waste: Waste that occurs in preparing food due to overproduction, cutting, peeling, overcooking, spoilage, and the expiration of food.

Food Security: Individuals having access to adequate food to live an active and healthy life, at all times.

Foodservice Sector: Represents outlets or facilities that serve meals and snacks for immediate consumption on site.

Food Waste: Edible material intended for human consumption, that is discarded, lost, or degraded instead of consumption.

Food Waste Management: Implementing effective strategies to minimise food waste.

Restaurant: Business unit engaged in the provision of food and beverage to be ordered, served, and consumed at a seated environment and paid post-consumption.

2.2. Background

The hospitality industry in NZ has reported continuous growth over recent years (Restaurant Association, 2019). According to the Restaurant Association Hospitality report (2019), the growth has been primarily driven by restaurants and cafes, supported by the increase in dining-out trends. NZ currently has 9,138 cafes and restaurants and 25,386 chefs employed (Restaurant Association, 2019; Statistics New Zealand, 2019; FigureNZ, 2020b). Nelson was one of the regions with high sales growth in the hospitality industry in year 2018 (Restaurant Association, 2019). Stats are from which year, you might want to say in year 2019 or 2018, There were 108 registered restaurants in year 2020 and 291 chefs employed in (as per census 2018) the Nelson city, who were the probable participants for this research (FigureNZ, 2020a; FigureNZ, 2020b; Statistics New Zealand, 2019). However, the

NZ research on food waste had excluded Nelson as a region and therefore, it is worthy of research (WasteMINZ, 2018).

2.3 Food Waste in The Foodservice Sector

The emphasis on food waste has been escalated due to increase in world population inevitably extending the demand for food (Bagherzadeh et al., 2014; Grandhi and Singh, 2015; Kennard, 2019). Global reports and prior studies on food waste have concluded that approximately one-third of food is wasted before consumption (Filimonau et al., 2019; Gustavsson et al., 2011; Hanson & Mitchell, 2017). The Food and Agriculture Organisation of United Nations attempts to define 'food waste' as intentionally discarded food that was possible to consume (FAO, 2013; Katsarova, 2016). Hanson and Mitchell (2017), and Filimonau and De Coteau (2019) concluded that, while definitions of food waste vary among studies, the underlying basis for food waste is the wastage of food that was intended for human consumption. The management of food waste can improve resources' efficiency, derive financial returns, and drive sustainability for the foodservice sector (Hanson & Mitchell, 2017; Heikkila et al, 2016). As a result, the global foodservice industry is under pressure to manage food waste because of its substantial social, economic, and environmental impacts (Filimonau et al., 2020).

A study conducted in Switzerland upon quantifying food waste among 201 restaurants concluded that the foodservice sector was the third largest source of food waste (Beretta et al., 2013). Furthermore, within the foodservice sector, restaurants are paying attention to food waste, understanding its business and ethical implications (Martin-Rios et al., 2018). Therefore, the significance of food waste in restaurants is worthy of analysis, including an in-depth understanding of causes, challenges, and preventive measures over merely quantifying food waste (Filimonau et al., 2020).

2.3.1.Types of Food Waste

Food waste occurs throughout all stages of a food supply chain and can be referred to as any waste that is generated from production to consumption (Okazaki et al., 2008; Parfitt et al., 2010). A study conducted among four foodservice institutions in Sweden categorised food waste into five types: storage waste, preparation waste, serving the waste, leftover waste, and plate waste (Engstrom & Carlsson-Kanyama, 2004). This categorisation was used as a precedent to many studies as the foundation of food waste categorisation in the foodservice sector. The different waste types could be defined as follows (Betz et al., 2015; Filimonau & De Coteau, 2019).

Table 1.0 Types of Food Waste

Waste Type	*Description*
Storage waste	Food wasted/wastage due to inefficiencies and incorrect practices in storing systems
Preparation waste	Food wasted during food preparation, processing and cooking
Serving waste	Food wasted from leftovers in buffets, display containers at counters
Plate waste	Food wasted when consumers leave uneaten food on the plates

Source: Betz et al., 2015; Filimonau & De Coteau, 2019

2.4. Food Preparation Waste

Many empirical studies have elaborated the magnitude of consumer plate waste (Freedman & Brochado, 2009; Massow & McAdams, 2015; Neff et al., 2015; Wang et al., 2018). However, some of the studies have established that preparation waste is the highest food waste in restaurants as a proportion (Filimonau et al., 2020; SRA, 2010; WasteMINZ, 2018). A study by Papargyropoulou et al. (2016), upon a hotel restaurant in Malaysia, defined food preparation waste as waste that occurs in preparing food due to overproduction, cutting, peeling, overcooking, spoilage, and the expiration of food. Another study on restaurants by Waste and Resources Action Programme (WRAP) concluded that 45% of waste was preparation waste (WRAP, n.d.). Moreover, Sustainable Restaurant Association (SRA) (2010), concluded that in UK 65% of waste amounted to preparation. Therefore, literature confirms the food preparation waste contributed to the highest mode of waste in restaurants.

2.5. Business impact of Food Preparation Waste

2.5.1. Environmental Impact

The environmental impacts of food waste have been in the limelight of scholars which goes beyond quantifying and analysing the waste types (Hall et al., 2009; Massow & McAdams, 2015). Impacts have been identified as greenhouse gas emissions, an increase in landfills, water pollution, and energy wastage (Cuellar & Webber, 2010; Green Restaurant Association, n.d.; Massow & McAdams, 2015; Oliviera et al., 2016). Besides, studies have highlighted that consequences should not only be viewed from mere landfills and water pollution but also the number of resources and energy that were utilised to produce the wasted food should be accountable (Agency USEP, 2009; Cuellar & Webber, 2010; Hall et al., 2009). However, the Green Restaurant Association of the United States (n.d.) stated that almost 95% of restaurant food waste was recyclable or compostable. Moreover, studies have been carried out upon the potential of biofuel production through used

cooking oil, in Beijing (Khan et al., 2018). Thus, the management of food waste is possible to mitigate its impacts. Further, the use of technology, optimum infrastructure, smaller menus and training of kitchen staff are identified as best practices to manage food preparation waste (Betz et al., 2015; Engstrom & Carlsson-Kanyama, 2004; Futouris, 2017; Oliviera et al., 2016).

2.5.2. Economic Impact

Food preparation waste can result in economic impacts to the restaurants (Winnow, 2018). A study among 450 business units in 25 countries, correlated waste versus costs and concluded that waste in preparation, overproduction, and cooking errors in restaurants, causes up to 80% of the total waste cost (Winnow, 2018). Moreover, there are additional costs of waste that restaurants must bear, such as waste disposal costs, collection taxes, and landfill taxes which can ultimately hinder the profitability of the business (SRA, 2010). As such, while quantifying and understanding that the food preparation waste is the largest, restauranteurs also need to be mindful of the negative cost implications to businesses that can arise if effective management practices fail to exist. Effective food preparation waste management can derive a positive economic impact on restaurants. A study among 1200 businesses across 17 countries, showcased a return on investment of US $14 for every US dollar invested in food waste reduction (Hanson & Mitchell, 2017).

2.5.3. Social Impact

Assuring global food security, amidst the rise of population and demand for food is seen as a key challenge (Kennard, 2019; Stringer, 2016). Practices such as large portion sizes and food presentation aesthetics can lead to discarding edible food (Godfray et al., 2010). Management of growing food waste in the foodservice sector can assist in a more “sustainable and an equitable future” (Filimonau & De Coteau, 2019, p. 1). Further, effective management of food waste can lead to sustainable development through increasing food availability for people and by reducing resource usage to cultivate more lands for the global food demand (Kennard, 2019). An emerging trend of consumers appreciating restaurants who practice ethics in food waste management is seen in recent times (Cuzin, 2019). Thus, some restaurants are effectively communicating their contribution and engage in practices such as food redistribution (Cuzin, 2019).

2.5.4. NZ context

In protecting the environment from potential harm through waste and providing benefits on social, economic, and cultural aspects, the New Zealand government enacted the Waste Minimization Act of 2008 (Ministry for the Environment, 2019). Such emphasis was given because, the total food

waste in 2011, both households and industries, amounted to 327,000 tonnes with a value of NZD 568 million (Reynolds et al., 2016). A study conducted by WasteMINZ (2018) among 20 restaurants and cafes across the country, revealed that 60% of waste in cafes and restaurants in NZ was food preparation waste. Thus, studying perspectives of food preparation waste in Nelson, NZ is important.

2.6. Management of Food Preparation Waste

The foodservice sector practices many strategies to effectively manage food preparation waste as it is identified as the highest proportion of waste type (Eriksson et al., 2019; Martin-Rios et al., 2018; Winnow, 2018). Studies about restaurant food waste have revealed different practices that different countries adopt in managing food preparation waste. Different causes and challenges have been identified and multiple strategies are practiced by restaurants in managing preparation waste.

I. Demand Forecasting

The restaurant industry claims that food preparation waste can occur due to inaccuracies in demand forecasting (WRAP, 2013). Many studies have emphasised the challenge in demand forecasting accuracy because consumer demand is highly unpredictable (Heikkila et al., 2016; Sakaguchi et al., 2018). This often results in overproduction, leading to food preparation waste (Oliviera et al., 2016; Silvennoinen et al., 2015; Winnow, 2018). A study among 450 foodservice businesses identified that overproduction costed the highest out of total food preparation waste (Winnow, 2018). However, if the service design is a buffet-style, chefs are bound to prepare excess and thus, creating high food preparation waste (Monier et al., 2010; Silvennoinen et al., 2015). As a management approach, studies suggest the use of forecasting models, technologies, and reliance on past trends to assist in demand forecasting (Filimonau et al., 2020; Futouris, 2017; Tanizaki et al., 2019).

II. Repurpose, Re-use and Cross-use

Food preparation waste could arise by using fresh ingredients, meeting aesthetic guidelines of dishes, and inadequate menu and portion control (Betz et al., 2015; Chalebois et al., 2015; Kilibarda et al., 2019). As such, repurposing, re-using and cross-use of food and ingredients are currently practiced as key strategies (Filimonau et al., 2020; ReFED, 2018). Repurposing food is seen as an opportunity in restaurants to use excess ingredients or trimmings, to make a different dish or cross-utilise ingredients (Filimonau et al., 2020; ReFED, 2018). The key challenges in adapting this strategy were identified as inability to manage time and lack of skilled kitchen staff (Winnow, 2018). Skills and creativity of chefs and kitchen staff influence effective repurposing (Filimonau & De Coteau, 2019). A multiple case study research in Malaysia among five different foodservice sector outlets revealed

that the chefs where battling with time management and were rushing to finish preparation (Papargyropoulou et al., 2019). Repurposing food preparation waste such as trimmings and overproduced items were directly aiding restaurant profitability improvements (ReFED, 2018).

III. Kitchen Processes and Controls

According to prior studies, kitchen processes and strict standards in kitchens are some of the strategies adapted in managing food preparation waste in kitchens (Barucha, 2018; Engstrom & Carlsson-Kanyama, 2004; Kilibarda et al., 2019). In relation to this, first-in-first-out systems, minimal preparation, waste tracking, use of technology and refrigeration controls were implemented (Barucha, 2018; Behmen-Milicevic, 2019; Blum, 2020; Kilibarda et al., 2019; Martin-Rios et al., 2018; Shakman, 2013). However, lack of infrastructure, manual reporting inaccuracies and lack of adequate logistics were some of the challenges to have effective kitchen processes and controls (Barucha, 2018; Blum, 2020)

IV. Skills and Attitudes of Kitchen Staff

Chefs and kitchen staff have a direct influence and a link to food preparation waste that can occur through mistakes in kitchens and lack of skills in kitchen staff (Beretta & Hellweg, 2019; Goh & Jie, 2019; Heikkila et al., 2016; Winnow, 2018; WRAP, 2013). However, lack of skilled staff and high staff turnover were key challenges associated with this strategy (Winnow, 2018). A study conducted in 31 restaurants in the UK and Netherlands established that the necessary training for the kitchen staff can reduce food preparation waste (Filimonau et al., 2020). Several studies point out the importance of leadership, formal training and peer learning assists skill enhancement (Australian Institute of Food Safety, 2019; Blum, 2020; Clowes et al., 2019). The kitchen staff must carry an attitude towards effective food preparation waste management (Goh & Jie, 2019; Shakman, 2013). SRA (2018) in their study among 10 restaurants pointed out that, restaurant environmental policy, regular reporting of food waste and inclusion of food waste KPIs (Key Performance Indicators) in performance evaluations inculcated attitudes and behaviours. When the positive attitudes and rewarding are in place, the kitchen staff effectively contributed to food preparation waste management (Australian Institute of Food Safety, 2019; Clowes et al., 2019).

V. Meeting Customer Expectations

Customer expectations on high aesthetic standards of food are directly linked to food preparation waste management (Papargyropoulou et al., 2019). For instance, excessive trimmings of food to meet aesthetic guidelines can derive a high amount of food preparation waste in restaurants (Charlebois et al., 2015). In many cases to combat competition, restauranteurs had prioritised customer satisfaction over food preparation waste (Filimonau et al., 2020; Charlebois et al., 2015).

Pre-determined menu design and portion sizes are also a challenge to manage food preparation waste with regards to customer expectations (Blum, 2020). A study by Condrasky et al. (2007), among 300 chefs claimed that chefs were bound to prioritise the customer expectations on portion sizes over food preparation waste. Thus, meeting customer expectations and aesthetics of food has to be managed to achieve effective food preparation waste management (Massow & McAdams, 2015).

VI. Redistribution

Redistribution of food was practiced, either as staff meals or donations in order to manage food preparation waste (Barucha et al., 2018; Filimonau et al., 2020; Pirani & Arafat, 2016; Vittuari et al., 2017). For instance, a case study by Beretta & Hellweg (2019) claimed that by donating food it aided the business to manage 46% of the food waste. Furthermore, surplus food donations can assist restaurants to be socially responsible which in turn can derive reputational benefits (Filimonau et al., 2019).

VII. Effective Waste Disposal

Effective waste disposal is practiced through segregation of waste, to recycle or compost in order to manage the last residue of food preparation waste (Singh, 2014; SRA, 2018). However, overall, restauranteurs are cautious about minimising the disposal of food, managing it through efficient preparation planning (Hennchen, 2019). Many studies have highlighted that, the costs of disposal, taxes in waste disposal and segregation can challenge business profitability (SRA, 2010; WRAP, 2013). Some restaurants partnered with waste segregation and recycling companies to effectively manage food preparation waste (Filimonau et al., 2020; SRA, 2010).

Various studies have identified that cost reduction, enhanced company reputation, and being environmentally compliant are some of the benefits of food preparation waste management (Ball & Taleb, 2010; Filimonau & De Coteau, 2019). For instance, a study by SRA (2010) concluded that a 2-3% reduction in food waste can provide approximately 20% of cost savings for restaurants. Further, studies suggest that there are opportunities for significant cost savings through reduced labour cost in preparation, cost efficiencies in cooking, and reduced cost of ingredients, when food preparation waste is managed (Shakman, 2013; WRAP, 2013). Moreover, it is stated that by recycling practices restaurants can earn extra revenue (Blum, 2020).

For stakeholders in a business, mitigation of impacts on the environment would be important and thus, the management of food waste in the hospitality industry will improve corporate image and business reputation (Filimonau & De Coteau, 2019). Moreover, as per prior studies, management of food preparation waste allowed restaurants to build a reputation among their stakeholders such as

employees, community, and customers (HOTREC, 2017; ReFED, 2018). Further, there are additional benefits from the generated food preparation waste. Most of the kitchen waste is biodegradable and can be effectively converted to alternatives such as biofuel and compost (Sindhu et al., 2019).

While understanding the magnitude, repercussions, and enacting laws to manage food waste, research and information around perspectives of food preparation waste management in NZ is limited. The research conducted by WasteMINZ (2018) among cafes and restaurants in quantifying waste has somewhat explained the relevant perspectives to food preparation waste management. NZ restaurants practiced donations, recycling, composting, and discounting food ("Kiwis waste $1.8 billion", 2020; WasteMINZ, 2018). Further, technological assistance is managing food preparation waste is emerging among restaurants in NZ (Love Food Hate Waste NZ, 2020). However, challenges are seen in inadequate infrastructure in waste management for businesses especially in South Island ("Kiwis waste $1.8 billion", 2020). The study by WasteMINZ (2018) suggested that improvements can be implemented in portion control, repurposing, and enhancing kitchen staff skills. Hospitality training was emphasised, as creative solutions to manage food preparation waste was inadequate (WasteMINZ, 2018).

This research focused on food preparation waste given that the proportion of it is high among restaurants. Moreover, the literature states that only a few studies aimed to explore the management perspective of food preparation waste. In addition, the authors have identified that cross-market studies are necessary to establish and expand knowledge on food preparation waste management so that they could be broadly implemented (Dutta et al., 2008; Filimonau et al., 2020; Marthinsen et al., 2012). This study was conducted in Nelson, NZ as the studies in NZ have only quantified the restaurant food waste and excluded Nelson as a region.

Chapter 3: Research Methodology

3.0 Research Strategy

This chapter explains the methodology followed in this study in achieving the core research purpose. Outlining the suitable strategy at the outset allowed the researcher to conduct the research systematically and ethically.

a. Paradigm

The researcher chose constructivism paradigm to guide the research methodology. As a paradigm, it assisted the researcher to emphasise the broad human experience-based knowledge through interactions (Creswell, 2014; Kivunja & Kuyini, 2017; Mills et al., 2006). It is because that this study is based on experiences and behaviours of restaurant chefs in Nelson, regarding the management of food preparation waste. In addition, constructivism allowed the researcher to explore the subject in-depth with the participants unlike in a confirmatory research (Reiter, 2013). Furthermore, this paradigm facilitated the author to interpret meanings and co-create knowledge from what participants expressed through their own expertise around the topic (Creswell, 2014). Therefore, the constructivist paradigm was used in this study to interpret different aspects of to managing food preparation waste.

b. Methodology

The nature of constructivism supports qualitative research methodology (Creswell, 2014) for several reasons. Firstly, a qualitative study assists a researcher to understand at a deeper level than non-qualitative research as the context of a situation, including attitudes experiences and beliefs, are considered (Ambert et al., 1995; Bluhm et al., 2011; Queiros, et al., 2017). This study explored own behaviours and attitudes of chefs upon food preparation management in their own restaurants. Secondly, qualitative methodology supports exploring such varied and vivid topics, and was suitable for this study because perspectives of chefs on managing food preparation waste varied from each other (Tzschentke et al., 2008). Thirdly, qualitative methodology allows a researcher to gather intimate information of a topic through a small and representative sample effectively (Ambert et al., 1995). Accordingly, this study chose a small and representative group of chefs from different restaurants in Nelson to explore the topic in-depth. Thus, the use of qualitative methodology was best suited to explore food preparation waste management in restaurants.

c. Approach

The study used an inductive reasoning approach and the constructivism facilitated the use of such approach (Cameron & Price, 2009). It is derived through contextualising what chefs expressed, not pre-determined theories by researcher (Cameron & Price, 2009). This is because restauranteurs' experiences and behaviours are different from each other and cannot be assessed under pre-determined theories. Furthermore, inductive reasoning uses a 'bottom-up' approach seeking patterns through collecting data for any study, which was followed by this research (Myers, 2020). It allowed the researcher to cluster data into sub-sects effectively (Creswell, 2014). Thereafter, themes were immersed through the identified clusters which assisted the researcher to answer the research questions (Hair et al., 2016).

3.1. Quality of research

Qualitative methodology was chosen under the paradigm of constructivism for this research because the research questions required a dialectical approach, mutual construction of themes and interpretation of experiences, practices in preparation food waste management (Guba & Lincoln, 1994). Accordingly, the quality of qualitative research is ensured through trustworthiness as it may not carry scientific rigor, compared to a quantitative research (Gunawan, 2015; Noble & Smith, 2015). Qualitative studies are measured through trustworthiness which comprises credibility, transferability, dependability, and confirmability (Guba,1981). Thus, qualitative research tactics were used to ensure the trustworthiness and soundness of the study.

I. Credibility

Credibility refers to the extent of compatibility in findings versus reality and for this research tactics such as peer debrief was used to ensure credibility (Shenton, 2004). Peer debrief was implemented to review the research elements with a third person to act as a devil's advocate, eliminating probable manipulations or pre-determinations of a researcher (Amin et al., 2020; Noble & Smith, 2015). The supervisor played the role in reviewing the elements and assured credibility. Therefore, by peer-review credibility was confirmed in this research.

II. Transferability

Transferability, which refers to the extent of applicability of findings to relative other contexts was considered by the researcher to ensure quality (Shenton, 2004). As such, purposive sampling was used to ensure the transferability where it is the intentional selection of the sample to achieve

information-rich results (Palinkas, 2013). Thus, the sample was selected among the different restaurants in Nelson whose findings would have the ability of replication. Transferability was also ensured through using 'thick and rich descriptions' that are detailed in nature so that relatability of the study is available (Guba, 1981; Shenton, 2004).

III. Dependability

Dependability ensures the stability of data because qualitative research is about gathering insights and therefore evolves constantly (Guba, 1981). As such, if the study was repeated in future, more perspectives to current practices could get added. The researcher followed a detailed and strategic process with relatable records that has been confirmed by Shenton (2004), to enhance the dependability of a study. Moreover, it is stated that an audit by an expert can assure dependability (Guba, 1981). Thus, this research was audited by the supervisor to ensure dependability of outcomes are achieved.

IV. Confirmability

Confirmability ensures the data are more objective as possible and is applicable to this research because the data reflects participants' own experience than the researcher's preferences or perceptions (Shenton, 2004). For this research, it was ensured through eliminating any probable researcher bias that may apply, by following the detailed process and reviewing it constantly with the supervisor. Thus, ensuring confirmability by eliminating subjectivities.

3.2. Data Collection Method and Tools

Among the tools for qualitative studies, semi-structured interviews were chosen because of its conversational and informal nature of the discussion (Clifford et al., 2010). This allowed the researcher to gather different and in-depth perceptions to the topic. Firstly, it facilitated detailed exploration about practices, causes and challenges on food preparation waste. In this case, the researcher was able to gather in-depth information on the topic (Rabionet, 2011). Secondly, semi-structured interviews assisted to gather data that can be sensitive to participants (Elmir et al., 2011). Because in this study, information regarding current practises of waste management could have potentially been sensitive. Lastly, many prior studies around the similar topic has successfully acquired data through the usage of semi-structured interviews (Barucha, 2018; Charlebois et al., 2015; Engstrom & Carlson-Kanyama, 2004; Filimonau et al., 2019; Filimonau et al., 2020). The semi-

structured interviews were conducted face-to-face where it allowed the researcher to assess both verbal and non-verbal cues (Irvine et al., 2013).

An interview schedule was prepared (See appendix A) based on the applicable and relatable interview guides of prior studies (Filimonau et al., 2019; Filimonau et al., 2020). Moreover, the literature review findings were used to build question and to ensure depth of the questions (Barucha, 2018; Betz et al., 2015; Charlebois et al., 2015; Engstrom & Carlson-Kanyama, 2004; Filimonau et al., 2019; Filimonau et al., 2020; Heikkila et al., 2016; Pirani & Arafat, 2016). This assisted the researcher to align the questions to meet the research objectives effectively.

3.2.1. Strengths of Semi-structured Interviews

Semi-structured interviews assisted the researcher to build a rapport through face-to face contact with participant. Therefore, it allowed the participants to express the experiences around the topic, well (Irvine et al., 2013). This permitted researcher to access information in depth on all research questions even though they may be sensitive practices in management of food preparation waste (Dickson-Swift et al., 2007). The open-ended questions in the semi-structured interviews encouraged the natural emergence of concepts on the topic so that rich data was acquired (Dearnley, 2005). Thus, the flexibility of semi-structured interviews supported participants to divulge information freely (Adams, 2015).

3.2.2. Limitations and mitigation approaches

Semi-structured interviews were lengthy and time consuming given its conversational nature (Adams, 2015; Queiros et al., 2017). In overcoming this barrier, firstly the interview questions were prepared through guidance from prior study interview guides. Secondly, the researcher shared the interview guide prior to the interviews so that time in interviews was better managed through participants knowing the scope (Creswell, 2014). Thirdly, a review with supervisor and a pilot study was conducted to ensure time management. As researcher's communication skills are important in semi-structured interviews, the pre-prepared interview guide was practiced prior to interviewing (Irvine et al., 2013). The researcher was careful in maintaining a professional relationship not allowing any personal views to conflict the discussion that may arise in semi-structured interviews (Adams, 2010). Further, to overcome such bias, the researcher ensured to set the scope at the outset of the interview (Adams, 2010). Semi-structured interviews derived large amount of data which the researcher had to both, record and take notes without misplacing any (Sutton & Austin, 2015). Thus, in order to secure data, the researcher recorded the conversation on two devices and took notes where necessary.

3.3. Sampling Strategy

3.3.1. Participants

This research was aimed at understanding different perspectives to food preparation waste management in restaurants in Nelson. The sample was chosen among the restaurants within the Nelson city. In exploring the topic, the restaurant chefs were suitable participants for this research due to their real-time experience in food preparation. Moreover, the participating chefs were selected on a basis of having a minimum six months work experience at the respective restaurant, so that the participant will have adequate knowledge about this topic. Nelson city had 108 registered restaurants and 291 chefs employed, as of 2018 (FigureNZ, 2020a; FigureNZ, 2020b). In qualitative studies, the sample sizes are not specified beforehand and could even be a small sample to explore the topic (Boddy, 2016; Sargeant, 2012). Therefore, the researcher interviewed a sample of seven chefs from different restaurants. Prior studies that explored the same topic such as Filimonau et al. (2020) and Filimonau et al. (2019) have used a maximum of 15 restaurants from one region adapting a smaller sample size.

3.3.2. Sampling Method

The two-pronged sampling method was implemented; namely, non-probability purposive method and snowballing method. A purposive method was chosen because the participants required the subject knowledge and experience of managing food preparation waste (Sargeant, 2012; Vishnevsky & Beanlands, 2004). Some of the participants were reached through snowballing method using the inter-industry relationships among chefs in Nelson city (Ambert et al., 1995). A 35 minutes interview was booked through prior appointments with participants. Challenges occurred in setting up appointment as the schedules of participants were hectic. This was mitigated through blocking interview time before the restaurants' opening time.

3.4. Data Analysis

For this research, qualitative data analysis was performed using thematic analysis approach, where different themes were identified through coding of the collected data (Alhojailan & Ibrahim, 2012; Braun & Clarke, 2006: Nowell et al., 2017). This study reviewed different perspectives of food preparation waste management in restaurants through insights and experiences, spoken by the chefs. Thus, a thematic analysis was used to cluster insights into themes. The inductive reasoning used by the researcher further supported the data analysis process (Maguire & Delahunt, 2017). This is

because the themes arrived through inductive approach have a strong link to the data set (Braun & Clarke, 2006). The process was followed in six phases as follows (Braun & Clarke, 2006; Maguire & Delahunt, 2017).

Phase 01: Familiarisation of Data

Similar studies have emphasised the importance of familiarising and re-reading interview transcripts to gain and in-depth understanding of the content (Braun & Clarke, 2006; Filimonau et al., 2020). The researcher re-read the transcripts several times in order to immerse preliminary themes (Maguire & Delahunt, 2017). Adequate time was spent on this step, in order to assist the rest of analysis (Braun & Clarke, 2006). The sample size being smaller was an advantage (Braun & Clarke, 2006).

Phase 02: Generate Initial Codes

Initial codes were arrived at by clustering data in a systematic and a meaningful way (Maguire & Delahunt, 2017; Tuckett, 2005). The researcher used open coding, without having any pre-set codes but adjusting through the coding process (Maguire & Delahunt, 2017). The researcher ensured that each cluster provided a basic segmentation with regards to the different perspectives of food preparation waste management (Braun & Clarke, 2006).

Phase 03: Generate Initial Themes

A theme is a collection of coded data that forms meaning and identity to an experience (Nowell et al., 2017). The coded data were clustered under potential themes in alignment with the research questions. Mapping similar codes together allowed to combine and create an overarching theme (Braun & Clarke, 2006). The researcher ensured that themes carry a representation of the entire text of the coded cluster (Alhojailan & Ibrahim, 2012).

Phase 04: Reviewing Initial Themes

The arrived themes then were reviewed on the applicability of collected data. The review was conducted in two levels, first reviewing extracts under the themes to identify the fit and second reviewing all data under the selected themes (Braun & Clarke, 2006). Irrelevant or conflicting themes were found and were removed.

Phase 05: Defining Themes

As the next step, detail write-ups were done under each theme elaborating what each theme means as a story (Nowell et al., 2017). The themes were given names and cross-checked with

supervisor to ensure coherency. The researcher ensured that arrived themes were able to answer the research questions.

Phase 06: Writing the Report

The report provides a comprehensive analysis of findings and addresses the research objectives set forth. The researcher ensured that the analysis showcases a logical, coherent but concise argument to the research questions (Braun & Clarke, 2006). In supporting the elaboration of key points of the research, verbatim quotations from participants were used (Braun & Clarke, 2006). The following chapter presents the findings of the research.

3.5. Research Ethics

Any research that has human involvement needs to follow ethical guidance and the researcher should consider ethics and value in all stages of research (Akaranga & Makau, 2016). For this research, ethics application along with participant's consent form and interview questions were approved through the NMIT ethics committee (See appendix B). Thus, ensuring compatibility upon NMIT code of ethical conduct in research (NMIT, 2000). Further, informed consent was obtained from all participants, outlining the research scope and purpose (Affrin, 2018; Richards & Schwartz, 2002; Wiles et al., 2007). In addition, participants were assured protection from any social or emotional harm in disclosing their business practices by usage of pseudonyms in reporting and de-linking information from the participants (Fouka & Mantzorou, 2011; Orb et al., 2000). As such, anonymity and confidentiality were assured (Fouka & Mantzorou, 2011).

Chapter 4: Findings

4.0 Introduction

The following chapter reports the findings upon the research sub questions. The data gathered through conducting 7 semi-structured interviews with restaurant chefs and then have been coded onto different themes. The findings are detailed under the emerged themes. Further, themes are aligned to answer each sub question.

4.1. SQ1 | What are the current practices of managing food preparation waste among the restaurants in Nelson?

The current practices that restaurant chefs adapted were discussed under this sub question in understanding the status-quo. Below given themes emerged through the findings.

i. Repurpose and re-use

Six out of seven respondents expressed that they repurpose and re-use food to manage preparation waste. In elaborating repurpose and re-use, participants stated that these practices are about maximising the use of ingredients, re-using leftovers of preparation, cross-use of ingredients in different dishes and re-create food item providing a new purpose to ingredients. Participant C2 said *"Every piece of meat is used, either to flavour another dish of for stock preparations".* Participant C6 elaborating cross-use stated, *"We have recipes using egg whites and we store egg yolks separately for other dishes on menu".* Further, the one of the participants added, *"In my menu I have combinations where I can cross use ingredients without wasting in preparation".* A supportive view was spoken by C4, *"The trimmings of fish we would use in a seafood soup or fish tacos on the menu".* Leftovers such as vegetable peelings and trimmings were also re-used where participant C6 said, *"I fry potato peels and use them in garnishing, saving potato skins for a purpose".*

ii. Kitchen processes and control measures

Through interviews, it was found that majority of participants adapt different kitchen processes and control measurements to manage food preparation waste. The view was supported by five out of the seven participants and they stated that they use refrigeration, freezing, set controls on preparation methods, methods of ingredient sourcing and adherence to preparation plans were some of the processes and control measures. Participant C3 said, *"We have a kitchen bible that provides the*

recipe, method and weights so every chef in the kitchen knows the process", which lessens preparation waste. Speaking of the importance of preparation planning, participant C7 stated *"We prepare small, we prepare daily".* Participant C4 supported the view stating that they prepare often and take out only what is required for the service. Many of the participants practice preparation and refrigeration or freezing to control food preparation waste. Participant C4 said, *"We vacuum-pack and freeze".*

iii. Redistribution

In managing food preparation waste, five out of seven participants stated that they either donate, giveaway meals for staff or re-sell through different avenues. Participant C3 said *"What's currently in my freezer that we didn't use will go to donations place, for unfortunate families and a friends farm".* Participant C1 stated *"We have other avenues such as our café to sell the food".* Elaborating on staff meals, participant C4 expressed *"If we have over-prepared or we haven't used them quickly enough, we do staff meals here".* Adding to this, participant C6 said that they provide lunch meals to staff so that food preparation does not end up in rubbish bins.

iv. Waste disposal

Whilst all participants agreed that they end up having certain amounts of unavoidable food preparation waste, majority of the participants were practising composting or effective disposal in order to evade environmental and ethical implications. For instance, participant C7 stated *"I am concerned about waste going into landfills".* Participant C3 said *"If you have really nowhere to go, it goes to compost".* In a supportive view participant C1 stated that they practice in-house composting. Both participant C2 and C4 expressed that they use the community composting for the unavoidable food preparation waste.

4.2. SQ2 | What are the causes of food preparation waste in the restaurants in Nelson?

The data collected from 7 participants revealed different causes of food preparation waste in restaurants were revealed by participants and are collated as below themes.

i. Aesthetics and presentation of food

The first theme emerged through the interviews was meeting the customer expectations upon presentation of food causes preparation waste in restaurants. A five out of seven participants explained that the customers has a pre-determined expectation of the ordered dish in its presentation

and therefore, they need to trim, peel and prepare food in a certain aesthetic. For instance, participant C4 stated *"To make it presentable and looking good on a plate, there is some amount that needs to be trimmed off".* Further, the participant added that the expectation of a customer is of *"top dollar worthy"* and thus, customer expectation of aesthetics can supersede the preparation waste caused. Some preparations inevitably require a certain amount to be trimmed and peeled off which causes preparation waste. Participant C6 elaborated this view stating *"In preparing chicken thighs for example, you have some fat that you don't want to be there".* According to the participants meeting aesthetic guidelines was one primary cause of preparation waste.

ii. Demand forecasting inaccuracies

Many chefs claimed that they partially prepare food and refrigerate in their restaurants. To do the same, they estimate demand in different methods such as based on weekly trends, seasonality, events in the city, school days and holidays and public holidays. However, five out of seven participants stated that demand fluctuates often, and many times can cause food preparation waste. For instance, participant C7 said, *"Nelson is a very interesting city in hospitality, it is very unpredictable"* whilst participant C4 added, *"there are very high chance you might over-prep"*. In a supportive view, participant C3 said, *"It can go wrong quite a lot, simply because you don't want to run out of food".* Thus, many participants agreed that whilst taking many aspects into consideration, that demand forecasting inaccuracies lead to preparation waste in restaurants in Nelson.

iii. Mistakes in the kitchen

There were four out of the seven participants expressing that mistakes in the kitchen is a cause of preparation waste. It was found that the types of mistakes were burning food, overcooking, wrong cooking method versus recipe, dropping on the floor and overspill. Participant C6 said *"Chefs can do something wrong in the recipe leading us to throw away the food"*. Similarly, participant C1 *"If a stake is burnt, you can't sell that to the customer"*. Further, participant C6 expressed that *"If somethings not cooked properly. I'm not going to put it on the plate"*. Following the health and hygiene policies, food that is mistakenly dropped on the floor is not served. Thus, mistakes during preparation causes food preparation waste.

4.3. SQ3 | What are the challenges that restauranteurs face in managing food preparation waste?

This sub question was aimed at understanding the different challenges that chefs face in effectively managing food preparation waste. The findings are presented under the themes as follows;

i. Lack of skills and attitudes of kitchen staff

In expressing challenges on managing food preparation waste in restaurants participants unanimously agreed that the skills and experience of kitchen staff is a key influence. Elaborating the shortage of skills participant C1 stated, *"We don't have enough and highly qualified chefs who can control food wastage".* C7 said *"Lack of knowledge and them understanding what I want to do"* is a key challenge. Expressing the challenge of lack of skilled staff, participant C7 *"When you have new staff on training there will be lot of mistakes".* Both, participant C2 and participant C4 agreed that *"experience and skills"* matters in managing preparation waste.

Another key challenge, highlighted by five participants, is the attitudes of kitchen staff towards managing food preparation waste. Participant C7 said, *"I don't think that there is enough emphasis by chefs on respecting where ingredients come from".* Both participants, C1 and C4 said that the kitchen staff can be lazy and have a relaxed approached towards managing preparation waste which is a challenge. In a supportive view participant C3 said *"A lot of people have a view of things where, it's not my money".* In addition, participant C3 said that younger staff and inexperienced staff lacks the attitude towards managing food preparation waste.

ii. Customer satisfaction

Many participants agreed that striking a balance between preparation waste management and achieving customer satisfaction for what they pay is a key challenge. Participant C1 said, *"what they demand from the restaurants is such high quality because they're paying a higher premium, therefore in turn there's a lot of wastage".* Further participant C4 expressed the challenge as, *"It needs look pretty on the plate, but how am I making of a pretty without wasting?".* In addition, participant C3 stated that in instances where the plate doesn't look proper, they must discard and re-plate which is a challenge in managing food preparation waste.

iii. Fluctuating demand

Majority of the participants stated that fluctuating demand is a key challenge in managing food preparation waste in their restaurants. Participant C6 and C4 stated that demand fluctuations directly impact the amount of pre-preparation and the wastage out of it. Participant C4 expressed *"Some of the products doesn't have longer shelf life and prepared food can go to waste".* Participant C7 added, *"This winter season was better in demand than previous"* and thus the fluctuations.

Participant C3 commented, *"You don't want to run out, but then you don't want wastage either, so it is really a thin line".* Many participants claimed that Nelson as a region is very unpredictable on hospitality which for them as chefs is a key challenge.

iv. Varied costs

Five out of seven participants expressed that varied costs are a challenge in managing food preparation waste. They expressed that costs can occur in having skilled kitchen staff, buying high quality produce or prepared food to avoid waste, waste collection and waste disposal for recycling. Participant C1 and C6 expressed that pre-cut vegetables are expensive, and it affects overall cost management of restaurants. Adding to the view, participant C3 mentioned, *"If your company is struggling, the first thing you look at is how much are you wasting and how to stop it".*

4.4. SQ4 | What aspects can be improved to effectively manage food preparation waste in the restaurants in Nelson?

Participants highlighted the importance of managing food preparation waste and expressed different strategies that restaurants can adopt.

i. Creativity and Innovation

All participants unanimously agreed that creativity and innovation of chefs and kitchen staff is an improvement required to manage food preparation waste. Whilst participant C1 stated that its about being smart on the job, participant C7 elaborated it as *"Try and convert things into revenue".* Further, participant C1 added that it is also about chefs' ability to *"Turn it in to something else and run a special offer".* Both participant C4 and C2 stated creativity and innovation comes through how a chef or kitchen staff can use the product as much as possible.

ii. Training and Leadership

Another unanimously agreed improvement to manage food preparation waste in restaurants was provision of training and exemplary leadership. Understanding that skills and experience plays a crucial role in managing food preparation waste, participant C7 said, *"It is something that gets lifted up with training".* In expressing the need of proper leadership participant C3 mentioned, *"Lead by example".* In a supportive view of both perspectives, participant C4 stated, *"Get young chefs to start thinking about preparation waste, ask them to check the weight of rubbish bins end of the night".*

iii. Technology and systems

Four out of seven participants spoke of using systems and technology in preparation planning to manage food preparation waste. Many participants claimed that this would assist in overcoming challenges such as forecasting inaccuracies, over preparation and preparation waste controls. Participant C1 stated how they use 'Point of Sale' systems to monitor demand of menu items ordered. Participant C3 expressed, *"We have started using Safe Food Pro app"* which assisted them in managing the kitchen processes and wastage. Further, C6 elaborated that it is essential for chefs and kitchen staff to *"Do the math always"* in management of food preparation waste.

iv. Menu design and portion control

Another improvement area was on menu and portion controls. Participant C1 said, *"A good chef needs to be able to portion each dish for each customer".* The same view was supported by participant C4 stating it is up to the chefs to improve the menu. Participant C7 mentioned, *"It is really important to keep menu small, learn seasonality and specs of products you are using".* Participants expressed that menu design and portion control is an improvement that can assist food preparation waste management.

Chapter 5: Discussion

The aim of this study was to establish knowledge about different perspectives on food preparation waste management. This knowledge can aid other restaurants to replicate best practices. Based on prior studies, there is a need to explore strategies that can be adapted to manage food preparation waste (Filimonau et al., 2020). In addition, importance was placed on understanding practices from different markets to enhance knowledge on managing food preparation waste (Dutta et al., 2008; Marthinsen et al., 2012). The majority of the participants elaborated that preparation waste was the dominant waste type in their kitchens. In addition, they mentioned that it needs to be effectively managed. All the participants revealed their current strategies, challenges associated and probable improvements that can be used across the restaurant industry in managing food preparation waste.

This chapter aims to compare and analyse the findings versus the literature review. The identified themes from data are discussed under the research sub-questions.

5.1. SQ1 | What are the current practices of managing food preparation waste among the restaurants in Nelson?

The following is a comparative analysis of the current practices of Nelson restaurants in managing food preparation waste versus the practices that were evident through the literature review.

5.1.1. Kitchen Processes and Controls

A key strategy that emerged through the findings was kitchen processes and controls. Majority of the participants of this research re-iterated the need of strict kitchen processes and control measures. Findings suggested that adherence to strict controls in the kitchen aided the chefs in food preparation waste management. Further, emphasis was given on the importance of technology usage in processes in order to control food preparation waste. Among such processes and controls, participants highlighted the use of stock controls, preparation planning and refrigeration practices.

The literature points out a similar view on the importance of kitchen processes and controls in managing food preparation waste (Barucha, 2018; Engstrom & Carlsson-Kanyama, 2004; Kilibarda et al., 2019). The strategies such as stock controls and preparation planning were well accepted by prior studies (Barucha, 2018; Behmen-Milicevic, 2019; Engstrom & Carlsson-Kanyama, 2004; Shakman, 2013). A study among 63 restaurants in Mumbai revealed the importance of strict kitchen processes and controls aiding effective food preparation waste management (Braucha, 2018). Furthermore, the use of technology in kitchen processes was an emerging concept in NZ restaurant industry as well (Love Food Hate Waste NZ, 2020).

5.1.2.Repurpose, Re-use and Cross-use

Findings emphasised that repurposing is an effective strategy to adapt to food preparation waste management in restaurant kitchens. In this regard, participants extended the scope by stating that maximizing the use of an ingredient can lessen food preparation waste. Furthermore, findings elaborated on the importance of having a menu design that facilitates repurposing and maximising ingredient usage. The choice of using fresh ingredients versus pre-cut or partially prepared ingredients was a deciding factor for food preparation waste generated in the restaurant kitchens. Participants highlighted that while it causes an increase in food preparation waste, they preferred using fresh ingredients. Therefore, repurposing along with re-use and cross-use of food in their kitchens were found to be important.

According to prior studies, it is apparent that repurposing, re-use and cross-use of ingredients were effective strategies in managing food preparation waste (Filimonau et al., 2020; ReFED, 2018). Repurposing eliminated the spare ingredients and trimmings being wasted but used effectively in other dishes (Filimonau et al., 2020; ReFED, 2018). Participants of this research claimed that the use of fresh ingredients contributed to an increase in food preparation waste. A study in Switzerland on quantifying food waste revealed that the use of fresh ingredients generated 32.35% wastage compared to 10.02% of the waste generation of those who don't use fresh ingredients (Betz et al., 2015). Repurposing was also identified as a potential strategy for NZ cafes and restaurants (WasteMINZ, 2018).

5.1.3.Redistribution

The findings of this study confirmed that the redistribution of food was a preferred strategy in managing food preparation management. Many different avenues were chosen to redistribute food so that food preparation waste at restaurants was managed at a minimum. Some were still able to direct them to resell in their partner cafes. Some of the participants used staff meals and donations as a means of food redistribution. The donations were provided for charities, animal farms and unfortunate families. These practices were revealed as the most common approaches in prior studies as well (Barucha et al., 2018; Filimonau et al., 2020; Pirani & Arafat, 2016; Vittuari et al., 2017). A study among 31 companies in Switzerland revealed that they were able to reduce food preparation waste by 46% through donations (Beretta & Hellweg, 2019).

5.1.4.Effective Waste Disposal

The chefs of this research were not only concerned about the business growth but also the environmental and ethical implications that arise through ineffective food preparation waste

management. Thus, the findings revealed recycling and composting as best practices to manage the last residue of food preparation waste that was unavoidable. Participants implied that ethical and environmentally friendly practices such as recycling and composting were prioritised over a mere landfill. These practices were considered as ethical strategies to evade the environmental impacts of food preparation waste in restaurants (Singh, 2014; SRA, 2018). Moreover, it was found that most of the kitchen waste was biodegradable and could be effectively disposed of or used to create an alternative such as biofuel (Sindhu et al., 2019).

5.2. SQ2 | What are the causes of food preparation waste in the restaurants in Nelson?

The participant chefs elaborated that food preparation waste can include trimmings, peelings and overproduction. In relation to this, findings revealed that customers had a pre-determined expectation of how the dish is presented for what they pay. This was a major cause of food preparation waste as chefs had to trim and peel, sometimes in excess in meeting customer demands. However, while taking measures to manage food preparation waste, findings showcased that there is an amount of food preparation waste in certain dishes, which was inevitable.

Literature also confirmed that food preparation waste includes all waste that occurs during the cooking and preparation of food in restaurant kitchens (Papargyropoulou et al., 2016). Studies highlighted that prioritisation was placed upon meeting the presentation guidelines of a dish by chefs, versus the generated food preparation waste (Charlebois et al., 2015). It was apparent from the literature that, chefs trying to meet aesthetics can lead to edible food being wasted (Godfray et al., 2010). The foodservice sector is inevitably under pressure for the food waste it generates (Filimonau et al., 2020). This indicates that edible food is discarded just to meet aesthetics. Such practice can be adversely viewed upon the industry on its responsibility of ensuring food security (Filimonau & De Coteau, 2019).

The demand in the restaurant industry fluctuates due to many reasons. Most participants agreeing to demand forecasting inaccuracies suggests that it is a key driver of food preparation waste. Further, findings elaborated that consideration of weekly trends, holidays and events can mitigate the impact to a certain extent. However, participants suggested that it is an unavoidable cause of food preparation waste in restaurants. According to prior studies, the restaurant industry has identified that this is one of the major causes that can lead to overproduction (Heikkila et al., 2016; Oliviera et al., 2016; Silvennoinen et al., 2015; Winnow, 2018). For instance, a study among 51 foodservice outlets in Finland established that overproduction is a key contributor to food preparation waste (Silvennoinen et al., 2015). Moreover, in alignment with the findings, the literature confirms that the

use of technology, forecasting models and relying on past trends was effective in improving forecast accuracy (Filimonau et al., 2020; Futouris, 2017).

The findings confirmed that mistakes in the kitchen were a cause of food preparation waste. Participants elaborated that overcooking, wrong cooking methods and food dropped on the floor happened often in their kitchens. As a result, it is apparent that mistakes in kitchens are common in restaurants. Nevertheless, the chefs were prioritising hygiene, health and safety of the food served and therefore, did not mind throwing away such food in preparation. Literature too, confirms that different types of mistakes that can happen in a restaurant kitchen can result in food preparation waste (Heikkila et al., 2016). In addition, prior studies pointed out that this can occur through a lack of skills in kitchen staff (Beretta & Hellweg, 2019; Goh & Jie, 2019; Heikkila et al., 2016; Winnow, 2018; WRAP, 2013). A study among 52 food and beverage outlets in Australia revealed that skill levels of the kitchen staff are a key cause of mistakes in restaurants creating food preparation waste (Goh & Jie, 2019).

5.3. SQ3 | What are the challenges that restauranteurs face in managing food preparation waste?

A key challenge that the findings suggested was the inability to accurately forecast the demand to prepare food. This was a result of the industry having highly unpredictable demand that varies due to different reasons. Findings elaborated that demand fluctuation was an unavoidable challenge and resulted in food preparation waste in their restaurant kitchens. Many restaurants had a process of partially preparing their food and storing it accordingly. In this regard, either it resulted in overproduction or spoilage where partially prepared food often was wasted. Extending the knowledge, findings suggested that the region being a tourism-led can also contribute to food preparation waste. This was because the predictability of demand fluctuated often depending on the tourist arrivals.

Literature also identified that demand fluctuation is a common challenge in the restaurant industry (Heikkila et al., 2016; Sakaguchi et al., 2018). As such, overproduction was evident and therefore, food preparation waste management was a challenge (Oliviera et al., 2016; Silvennoinen et al., 2015; Winnow, 2018; WRAP, 2018). Some studies further emphasised the cost incurred through inaccuracies in demand forecasting was high and that was a challenge for restaurants (Winnow, 2018). However, the literature confirmed that the restaurant industry has accepted that demand is highly unpredictable and therefore, inaccuracies can lead to food preparation waste (Heikkila et al., 2016; Sakaguchi et al., 2018).

According to the findings of this study, satisfying the customer with the food served at the restaurant was the priority. This resulted in a key challenge of striking a balance between customers' expectations of food versus the amount of food preparation waste generated. The majority of participants who are well-experienced chefs, claiming this as a key challenge suggests that there aren't any grounded solutions. The foremost consideration was that customers having a pre-determined expectation for what they pay, what is on their menus as portions and the chefs were bound to achieve it. Unfortunately, meeting aesthetics increased food preparation waste. This is because of excessive trimmings or re-plating to achieve the required presentation.

The literature points out a similar view where many restauranteurs prioritised customer satisfaction over the amount of food preparation waste generated (Charlebois et al., 2015; Filimonau et al., 2020). Further, it is stated that this was necessary to combat competition (Charlebois et al., 2015; Filimonau et al., 2020). It was apparent that there is a direct link between meeting aesthetics of food and food preparation waste in restaurants (Papargyropoulou et al., 2019). Findings and literature are comparable where both confirm that unnecessary trimmings caused by meeting aesthetics lead to food preparation waste (Charlebois et al., 2015). Moreover, a qualitative literature review on food waste management also highlighted that, when the menus and portions are set and the flexibility to adjust is limited, it can lead to an increase in food preparation waste (Blum, 2020). This is because the chefs are bound to follow the given menu and portions to meet the set customer standards and expectations (Condrasky et al., 2007).

Based on the findings of this study, a key challenge for managing food preparation waste in restaurants was the lack of skills and attitudes of chefs and kitchen staff. All participants' unanimous agreement to this fact proves the direct link and influence it has on food preparation waste management. However, the challenge is not only the skills of the current staff but also the challenge of finding skilled labour in the industry. Newly recruited staff would inevitably generate more food preparation waste until they get used to the processes. Whereas, skilled chefs knew about managing food preparation waste better. Moreover, findings highlighted the lack of a positive attitude towards food preparation waste management was an associated challenge. It was apparent from findings that less gratitude is given to the environment. In addition, staff can take a relaxed approach in preparation, which impacts in managing food preparation waste in kitchens.

The literature confirms this view with many studies establishing the direct link of skills and attitude of kitchen staff against the food preparation waste management (Beretta & Hellweg, 2019; Filimonau et al., 2020; Winnow, 2018). Furthermore, prior studies ascertain that effective food preparation waste management requires the right attitude of the kitchen staff (Goh & Jie, 2019;

Shakman, 2013). The NZ research on food waste in cafes and restaurants also points out the need for enhancing the skills of chefs and kitchen staff (WasteMINZ, 2018). Nevertheless, the restaurant industry faces a challenge in recruiting skilled chefs who would have both experience and the attitude towards managing food preparation waste (Winnow, 2018). Moreover, it is confirmed that the right attitude and skills can aid in effective food preparation waste management (Australian Institute of Food Safety, 2019; Clowes et al., 2019).

The findings of this study also revealed that varied costs associated with food preparation waste management are another challenge for restaurants. They expressed that some approaches to managing food preparation waste such as sourcing better-quality ingredients of pre-cut ingredients, high wages of skilled staff and waste disposal can cost them, hindering business profitability. Similarly, literature echoes that cost associated with waste disposal, taxes etc can have an adverse effect on business profitability (SRA, 2010; WRAP, 2013). Further, the literature points out that some restaurateurs considered the expenditure on food preparation waste management as a cost of business rather than an investment for good (Hanson & Mitchell, 2017).

5.4. SQ4 | What aspects can be improved to effectively manage food preparation waste in the restaurants in Nelson?

5.4.1. Creativity and Innovation

One of the unanimously agreed improvements out of the findings is the need for creativity and innovation of chefs and kitchen staff. This aids and links to the management of food preparation waste in restaurant kitchens. It was stated that the chefs and kitchen staff should be capable of being smart and use ingredients at its maximum, to effectively manage food preparation waste. Creativity and innovation were stated to be increasing the revenue and profitability of the restaurant operation as waste is reduced or minimised. Literature has also emphasised a direct link between the skills of chefs and kitchen staff versus the effectiveness of food preparation waste management (Beretta & Hellweg, 2019; Winnow, 2018). For instance, repurposing, re-use and cross-use of ingredients were well-accepted strategies of which, creativity and innovation are a foremost requirement (Filimonau et al., 2020; ReFED, 2018). WasteMINZ (2018) in their study on cafes and restaurants in NZ also pointed out that the hospitality industry training lacked the emphasis upon culinary creativity.

5.4.2. Training and Leadership

Findings re-iterated the importance of training and exemplary leadership can improve food preparation waste management. All the participants expressing the need for training and leadership suggests that there is room for improvement that can assist in managing food preparation waste in

their kitchens. Besides, they believed that enhancing skills through training can uplift the ability to manage food preparation waste effectively. In relation to this, the leader's role was emphasised as equally important. The need for training and leadership is widely mentioned in the literature as an influence on managing food preparation waste. A study done in 31 full-service restaurants in the UK and Netherlands established that adequate training can enhance food preparation waste management (Filimonau et al., 2020). In addition, studies have expressed the need for exemplary leadership, peer-training and formal training as requisites for developing the skills and attitudes of the kitchen staff (Australian Institute of Food Safety, 2019; Blum, 2020; Clowes et al., 2019).

5.4.3.Technology

The use of technology in managing food preparation waste was highlighted as a probable improvement for restaurant operations. This assisted chefs and kitchen staff in effective preparation planning. Further, it helped in minimising forecast inaccuracies and overproduction. It was evident that some of the chefs in Nelson used point of sale systems and food apps. However, these chefs were well experienced and were savvy of technologies from their prior experience in other countries or cities in NZ. The literature points out how technology can aid food preparation management in several ways. The use of technology in kitchen processes assisted chefs with better control and measurement (Barucha, 2018; Behmen-Milicevic, 2019; Blum, 2020; Kilibarda et al., 2019). Technologies also assisted in managing demand forecasting effectively (Filimonau et al., 2020). It was evident that NZ restaurants have commenced the use of technology in managing food preparation waste (Love Food Hate Waste NZ, 2020).

5.4.4.Menu Design and Portion Control

Improvements to the menu design and portion control were considered to aid food preparation waste management in Nelson restaurants. The onus, however, was placed upon the head chefs to have a menu design that minimises food preparation waste. Further emphasis was given to having smaller and non-wasteful portion sizes and again, participants mentioned that a skilled chef would be aware of the optimum portion size. In addition, seasonality and specs of the ingredients used in each dish in the menu were to be considered in its design, to effectively assist food preparation waste management. Literature echoes similar views where menu designs and unnecessarily large portion sizes were leading to food preparation waste (Condrasky et al., 2007; Godfray et al., 2010; Kilibarda et al., 2019). Pre-determined menus with less flexibility were also highlighted as a challenge in food preparation waste management (Blum, 2020).

Chapter 6: Conclusions

6.1. Conclusions

The obvious impacts of increasing food waste are continuously highlighted around the world (Filimonau et al., 2020; Hanson & Mitchell, 2017; Heikkila et al., 2016). The foodservice sector is expected to act responsibly in this regard as the sector contributes largely to global food waste. Thus, cross-market studies will be important to reveal multiple strategies that can be replicated industry-wide. This study was aimed to establish knowledge on the food preparation waste management practices among selected restaurants in Nelson so that other restaurants can replicate the best practices. It is evident that food preparation waste is a key concern among the different waste types in a restaurant (Filimonau et al., 2020; SRA, 2010; WasteMINZ, 2018). Therefore, restauranteurs were keen to effectively manage the same knowing both, the repercussions and benefits. The study connoted that chefs were very much aware of the causes of food preparation waste in their kitchens. Some aspects were accepted as unavoidable, such as mistakes in the kitchens. In contrast, some aspects such as demand forecasting were continuously worked upon in managing food preparation waste.

A substantial degree of similarity between the best practices was evident through the study in managing food preparation waste. Variations were limited other than the innovative practices that some of the restaurants adapted. The best practices included strict kitchen processes and controls, repurpose, re-use or cross-use of ingredients, redistribution of surplus or excess food through donations or staff meals and effective waste disposal. The proposed innovative practices were the use of technology and apps in kitchen processes, forecasting and waste measurements.

To implement these practices, restaurateurs faced many challenges and obstacles. This hindered both effective food preparation waste management and their business profitability. The lack of skilled kitchen staff, attitudes of kitchen staff, inaccuracies of forecasting due to fluctuating consumer demand, meeting aesthetic guidelines according to customer expectations and costs associated with waste disposal were some of the challenges. In a NZ context, lack of infrastructure especially in South Island on effective waste disposal was highlighted.

The improvements and enhancements were also suggested through the findings to effectively manage food preparation waste. A primary requisite was building creativity and innovation capabilities among chefs and kitchen staff. In relation to this, the need for reformed hospitality training was emphasised. Further, the commitment and contribution of superior staff, leading by

example was highlighted. The use of technology to improve accuracy in processes and controls was an emerging trend that had proven to be a success. In addition, flexibilities in menu designs and controlling portion sizes were found as directly aiding food preparation waste in restaurants.

In summary, the restauranteurs possessed knowledge of the impacts of food preparation waste management. They had identified its potential benefits and influence on business profitability, environment and business ethics. Many best practices were revealed that could be easily replicated by any restaurant despite the design or the scale of the business unit. Despite all the challenges, many improvements were evident to effectively manage food preparation waste management in restaurants.

6.2. Limitations

In exploring the different perspectives of food preparation waste management, the limited time for this study was a concern. The researcher was only able to conduct seven interviews and was also limited to Nelson city only. A wider sample size would have added more strategies to the knowledge base. The researcher was not able to manage different cities in the Nelson region given the time constraints. Further, this research is limited to the perspective of chefs only. The research did not consider the managerial purview on food preparation waste management especially with regards to its practicality and feasibility of implementation.

6.3. Recommendations

The research highlights that many of the best practices require adequate training of chefs and kitchen staff. Finding experienced chefs is a challenge in the industry. Therefore, it is worthwhile to consider improving the skills of the current staff. As literature, NZ research and participants pointed out the education providers can consider the practical challenges of food waste management. Thus, the relevant institutions consider the inclusion of food waste management into the hospitality curriculums.

The use of technology is emerging in the foodservice sector. The benefits upon economic returns and the environment are obvious from many prior studies. However, the usage of technological aid in Nelson restaurants was limited. It is recommended that industry associations and organizations such as Restaurant Association NZ and WasteMINZ should effectively create awareness and support businesses in the use of technology to manage food preparation waste. Moreover, the engagement of different business stakeholders on food preparation waste management is important. This ensures the commitment from all areas of a business.

6.4. Future Research

Food preparation waste can be looked at from different managerial perspectives such as chefs, restaurant staff, managers and owners. In addition, observations of the practices could have been conducted. Such methods would have added value to the study. A cross-city comparison within one region would have widened the knowledge of food preparation waste management. Thus, the research could have added more value. Thereafter, organisations such as WasteMINZ can replicate the same research model in other cities to conduct an extensive national analysis. This would aid in managing the food waste issues in NZ when knowledge is shared among the industry.

A quantitative study followed by a qualitative study to understand the practices and challenges would be worthwhile than studies in isolation. This will assess the magnitude and also provide in-depth insights into food preparation waste management. Moreover, the focus should be given on food preparation waste among other types as it constitutes the largest proportion of waste in NZ cafes and restaurants.

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Appendices

Appendix A

Interview Guide

Perspectives of Food Preparation Waste Management by the Restaurants in Nelson

Draft Questionnaire for Interviews

A) Causes

1. Could you please share information about general food waste at your restaurant? (Types of waste? where?)
2. What types of food waste happen when you are preparing food in the kitchen?
3. What are the main causes of waste in preparing food?
4. What about waste created through prepared but unsold food?

B) Current Practices

1. Currently, how do you manage the amount of preparation waste in kitchen?
2. What current actions do you follow to manage different types of preparation waste in the kitchen?
3. What do you do with prepared but unsold food?

C) Challenges

1. Which type of food preparation wastes are hard to manage?
2. What are the barriers you face in managing food preparation waste?

D) Improvements

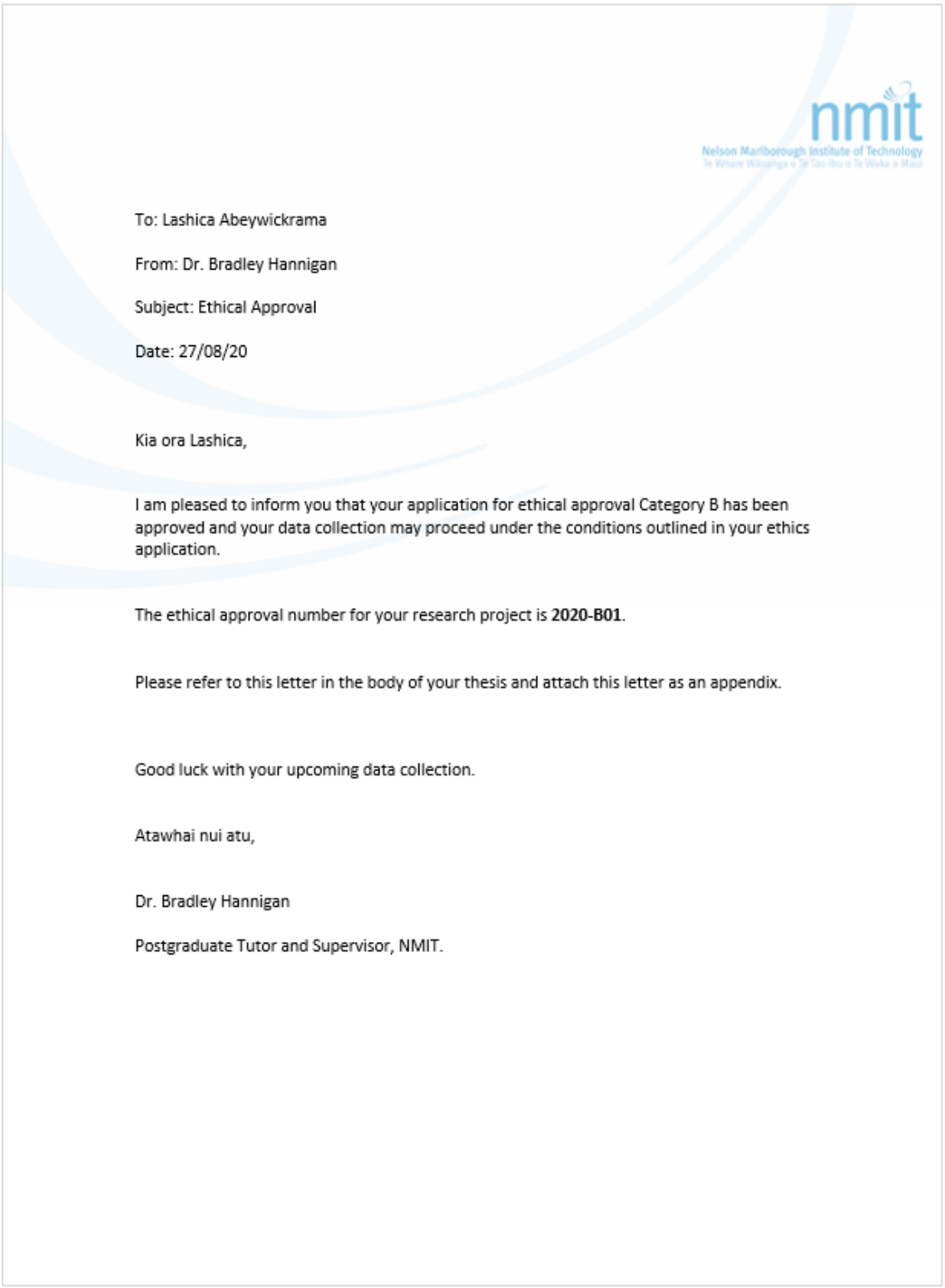
1. In your opinion, how waste can be managed effectively while preparing food?
2. What are your suggestions to handle the challenges you face in preparation waste management?
3. According to you, what benefits can be achieved by managing food preparation waste?

Would you like to provide any other information related to this project?
Do you have any questions about the interview or project?

-End-

Appendix B

Ethics Approval



nmit
Nelson Marlborough Institute of Technology

To: Lashica Abeywickrama

From: Dr. Bradley Hannigan

Subject: Ethical Approval

Date: 27/08/20

Kia ora Lashica,

I am pleased to inform you that your application for ethical approval Category B has been approved and your data collection may proceed under the conditions outlined in your ethics application.

The ethical approval number for your research project is **2020-B01**.

Please refer to this letter in the body of your thesis and attach this letter as an appendix.

Good luck with your upcoming data collection.

Atawhai nui atu,

Dr. Bradley Hannigan

Postgraduate Tutor and Supervisor, NMIT.