# GETTING A TASTE FOR FOOD WASTE

An ethnographic exploration into the generation of hospital food waste prior to patient consumption

Sarah Louise Goonan

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# Abstract

Foodservice organisations, particularly those in hospitals, are large producers of food waste. The foodservice literature to date has predominantly focused on technical elements of the foodservice system at the expense of the human interaction/influence on this system. By combining elements of systems and practice theory, a new conceptual framework is developed and used to explore the generation of food waste, and how it is influenced by practices of foodservice personnel. This thesis seeks to understand the reasons for hospital food waste prior to the point of consumption. Additionally, it aims to provide recommendations on how to generate sustainable practices and minimise food waste within foodservices.

A qualitative, ethnographic research approach is adopted in this study. Three New Zealand hospital foodservices are selected as research sites, all of which are contracted to an external foodservice provider. Data collection techniques include document analyses, observations, focus groups with kitchen staff, and, interviews with managers. The combined model of systems and practice theory provides a structural framework for data collection and thematic analysis.

Most food waste occurs during service and as a result of overproduction. Reasons include inconsistency during portion control, forecasting challenges and the unpredictable nature of the hospital environment. Additionally, attitudes, habits and previous work experience of foodservice personnel are discussed as influential factors of waste generation. Implications of food waste are perceived differently by different levels of staff. While managers raise discussion from a financial perspective, kitchen staff draw upon financial and social implications. Overall, minimal discussion occurs around environmental consequences of

wastage. Organisational plans and policies, controls and use of pre-prepared ingredients assist in waste minimisation. While two different waste management systems are in place, compliance to these varies within and between sites.

Combining systems and practice theory reveals interesting links between elements (materials, images and skills) of waste-related practices that occur throughout the hospital foodservice system. It highlights areas of sustainable consumption and those where more sustainable practices could be formed. This thesis supports the need to move beyond economic success, incorporating social and ecological values as measures of sustainability. In hospital settings, food waste involves many people and therefore strong communication is vital. In light of this, current results illustrate how waste-related practices are integrated and influenced by multiple practitioners within an organisational environment. Ultimately, integrating systems and practice theory offers a new approach to foodservice management, incorporating both sustainable development and the perceptions of practitioners. It provides a foundation to lead further research on sustainable practices within the wider foodservice sector and dietetic practice.

# Preface

Joint academic supervision of this research was kindly accepted by Dr. Miranda Mirosa, from the Department of Food Science, and Dr. Heather Spence, from the Department of Human Nutrition, at the University of Otago. Lauren Scott, Strategic Partnership Manager of the supporting foodservice company, took on the role of Professional Advisor. Our shared passion for foodservice and environmental sustainability initiated the concept of this research.

The candidate was responsible for the following:

- Research proposal
- Submission of ethical approval
- Research registration and approval through the Counties Manukau and Waitemata District Health Board's Research Centres.
- Application for funding
- Communication with the Professional Advisor
- Development of data collection tools
- Recruitment of focus group and interview participants
- Conducting document analyses, observations, focus groups and interviews
- Transcribing verbal data
- Development of the combined systems and practice theoretical framework
- Thematic analysis of data
- Thesis write up

This research was completed from January 2012 until November 2012.

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| | |
|---|---|
| NZD | New Zealand Dollars |
| D | Document Analysis |
| O | Observation |
| F | Focus Group |
| I | Interview |

# 1.0 Introduction

Increasing attention is being paid to the global issue of food waste, with growing concern around the environmental, social and economic costs (1-3). Food which is produced but not eaten, contributes to ecological side effects including waste of natural resources and avoidable emissions of carbon dioxide from landfill (2, 4). Social implications of food waste, such as hunger and malnutrition, are included in the triple bottom line framework of sustainability alongside its environmental and economic aspects (3, 5). It was recently estimated that on a global scale, about one-third of food produced for human consumption is lost or wasted, totalling approximately 1.3 billion tonnes per year (2). Therefore, worldwide efforts are required to address the issue of food waste.

Foodservice organisations are businesses or institutions responsible for the provision of meals outside the home, including schools, hospitals, restaurants and cafeterias (4). Accountability for ecologically sound and financially viable decisions around waste are increasingly important for foodservice dietitians and managers (6). During recent years, raised public awareness of sustainable behaviour has encouraged the 'greening' of the foodservice sector (7-9). For example, initiatives around local food procurement (9, 10), water conservation (7, 9, 11) and general waste reduction (7-9, 11) are well covered in the literature. Research in various foodservice settings has indicated that about one-fifth of the food delivered to foodservice institutions is lost (12). Despite this, few studies have focused on how and why food waste is produced and how it can be prevented.

The provision of nutritious, safe and appealing meals that are produced within budgetary constraints is a key goal for any hospital foodservice organisation (4). Hospital foodservices

have been found to generate higher amounts of food waste than retirement living centres, university dining halls, schools and community based feeding centres (13). However, regardless of the efforts made by foodservice dietitians, managers and staff, a high waste rate of hospital food continues to be a problem. Many studies set in hospital foodservices have focused on plate waste, which in general, has been more thoroughly investigated than any other type of food waste (14-18). These studies provide useful insights into the quality and quantity of the waste stream composition and the nutritional impacts of food waste on hospital patients (18, 19). However, little emphasis has been placed on food waste generated prior to the point of consumption.

Support from foodservice employees is key to the success of waste management practices (12, 20). Yet, few studies have taken a qualitative approach to explore the perceptions, attitudes and practices of foodservice personnel specifically on the issue of food waste (10, 21). Such information would be useful to hospital management, dietitians and foodservice providers, to develop people-focused, practical recommendations to minimise wastage, leading to environmental, social and cost benefits. Therefore, the proposed research will contribute towards filling this gap by asking the following questions: In hospital foodservice settings, how and why does food become wasted prior to the point of consumption? Is the generation of hospital food waste influenced by the practices of foodservice personnel? What recommendations can be made to minimise the volume of food waste in order to achieve a more sustainable foodservice system?

# 2.0 Literature Review

The global issue of food waste is alarming, with growing concern around international hunger, resource conservation as well as environmental and economic costs (1, 2). The meaning of food waste is often defined on a situational basis. Although sometimes used interchangeably with the term 'food loss', previous authors have defined food waste as the waste generated towards the end of the food chain (22). As the current research investigates the latter part of the foodservice system (from procurement to service), the term 'food waste' is used hereafter.

Levels and causes of food waste generation vary throughout the world and are dependent on the specific conditions of a geographical area. High income countries, for example, experience the majority of wastage at consumption (1, 2, 12). Food which is produced but not eaten, leads to ecological consequences including waste of natural resources and avoidable emissions of carbon dioxide from landfill (2, 23). Additionally, social implications of food waste, such as hunger and malnutrition, are as equally concerning as environmental issues (22). Results of a recent study suggest that globally, an estimated one-third of food produced for human consumption is lost or wasted, totaling to approximately 1.3 billion tonnes annually (2). Therefore, despite the economic situation of a country, worldwide efforts are required to embark upon the issue of food waste.

Existing research provides valuable insights into food waste within foodservice organisations, particularly regarding: waste assessments, financial implications of food waste, waste-related practices, and, individual attitudes and behaviours around sustainable practice. Following a general introduction, these topics will be discussed in turn placing a specific focus on hospital environments. Drawing on examples by previous authors, the latter part of the review will

explore the theoretical frameworks of this study, systems theory and practice theory. To conclude, the amalgamation of these two theories will be discussed and the application of a combined theoretical model justified.

## 2.1 Food Waste in Foodservice Organisations

Foodservice organisations are large consumers of natural resources and the need to reduce the amount of solid waste, including that from food, is urgent (23). Past research on food waste within institutional foodservices has been predominantly conducted in schools, universities, hospitals and healthcare facilities. Illustrating the extent of the problem, hospital-based studies found that total food waste ranged from 19% to 66% per meal service (10). On a broader scale, the foodservice and hospitality sector in the United Kingdom sends approximately 600,000 tonnes of food waste to landfill per year (24).

Foodservice food waste can be categorised into production (or trolley) waste (due to the storage, handling or over-ordering of food), and plate waste (due to food being served, but left uneaten). Plate wastage has been the most thoroughly investigated type of foodservice waste (1, 19, 25-27). This is particularly true for hospital settings, with an emphasis on food waste in relation to the nutritional concerns of a population, or as a measure of client satisfaction (18, 19). Authors have raised concern, not only regarding the significant waste in resources, but also as the nutritional needs of patients were not achieved, despite an adequate supply of food (14, 28, 29). Although the generation of waste occurs throughout all stages of the foodservice system (1, 10), no hospital-based study was found that used a systems approach to explore food waste throughout each component of the systems model (30). Within schools and restaurants the most compelling evidence reports that losses related to the handling of food are relatively small, at 4-11% of total food delivered to the institution (12). In contrast, Sonnino &

McWilliam found trolley waste (26-55% of food cooked) to exceed the amount of plate waste (6-24% of food cooked) (10). Further investigation is warranted into food waste generation prior to consumption, to better understand and interpret these findings in hospital foodservice settings.

## 2.2 Waste Assessment

Knowledge of the waste stream is fundamental for evaluating the design and disposal system of foodservice organisations, and to identify opportunities for waste reduction (23, 31). Currently, there is no standardised method for conducting waste assessments. A simple method may involve a walk-through observation, compared to a more extensive investigation of waste-related practices at different stages of the foodservice system (23). Many researchers have conducted waste stream analyses to compare the quantity and quality of waste within foodservice settings (20, 31, 32). Generally, this method involves collecting all waste, sorting it by type (for example, paper, plastic, metal and food), and finally weighing each category of waste (23). Although waste stream analyses are deemed highly accurate and precise, they are also costly and time-consuming to perform (23). Previous hospital-based studies found that food contributes to up to 50% of the total waste stream (32, 33). Following plastics, Atlin et al (31) identified food as the next largest component of the total combustible waste. Although it has been mentioned that hospitals produce more food waste than other institutions (13), evidence shows that the amount of waste generated is case dependant, varying between different organisations (20, 23).

Depending on the type of institution, various factors have been found to affect the quantity and quality of food waste. In hospitals, the clinical condition of patients, environmental factors, food and menu issues are likely to contribute to high waste rates (13, 18). Other

studies have identified that the time of meal (breakfast, lunch or dinner) (34), type of ward (14, 32, 33) and style of service (18, 34) influence the waste stream. Interestingly, Edwards & Nash found food wastage by females is higher than that of males (34) . Mattoso & Schalch determined higher waste rates in private hospital rooms compared to public (33). In consistence with other foodservice settings, the menu, use of pre-prepared ingredients, and forecasting system affect the amount and type of food waste produced in hospitals (18, 34). Although these studies provide useful quantitative data, little insight is gained regarding the reasons behind waste generation. Nevertheless, high rates of waste production, along with the nutritional value of meals in patient clinical care, make hospital kitchens an ideal setting for further investigation.

## 2.3 Financial Implications of Food Waste

Diminishing landfill space and changes to landfill operations have increased the cost of waste disposal (35, 36). Over a 28 day period, Barton et al (14) determined the cost of food waste on four wards of a University Hospital to be £139,655 (approximately 273,650.00 NZD), excluding labour and overhead costs. In the wider foodservice and hospitality sector, £724 million (approximately 1419 million NZD) a year could be saved by reducing food waste in the United Kingdom (37). The financial burden of food waste places additional responsibility on foodservice managers and dietitians to make ecologically sound, yet financially viable decisions around waste-related practices (6). A compelling study investigated the most cost effective waste disposal strategy in four different foodservice cases (36). In consistence with previous research (38), no particular disposal method provided the same results in all cases analysed, and factors such as facility, labour hours and inflation rate all influenced total costs (36). Wie et al (36) highlighted the importance of other criteria when making decisions around

waste disposal practices, such as environmental issues, the mission and goals of the institution, and position in the community. However, it appeared that the financial implications of food waste outweighed other criteria in the decision making process. This is also illustrated by a survey of school foodservice directors in America, which indicated that costs were perceived as more important than environmental factors when making operational decisions (39).

## 2.4 Waste Management Practices

A solid waste management system can significantly reduce the amount of waste generated within an institution, and therefore should be employed by all foodservice organisations (20). Emphasis is placed on source reduction practices as the preferred method of waste management, followed by recycling and composting, and finally disposal in combustion facilities and landfills (6, 38). Hospitals report to have adopted sustainable practices with recycling programmes being the most common (40). In a broader foodservice context, similar findings were obtained by a 2009 environmental survey (41). Results showed that 76% of operators managed a recycling program, 55% had waste reduction practices, and 13% participated in composting organic waste (41). Many organisations however are yet to adopt sustainable initiatives. Previous research has highlighted barriers for implementing waste management programmes such as increased labour, lack of resources, not having government enforcement, and limited space in the facility (11, 42).

Williams & Walton identified strategies to minimise the amount of plate waste generated in hospitals including: improved quality and presentation, flexible portion sizes, offering a range of food choices, and, protected meal times (18). In regards to hospital production waste, Sonnino & McWilliam suggested redistributing unneeded meals to feed hungrier patients (10).

In restaurant and school-based settings, interviews have been conducted with foodservice staff during which staff expressed concern about the amount of wastage produced due to the handling of food. Common practices were established, namely, prioritising the storage of chilled and frozen goods, stock rotation, reuse of leftovers, seek waste reduction ideas from experienced staff, and, monitoring temperature control (12). In order for waste reduction practices to be sustained, Kim et al (20) emphasised the need for continuous education to increase employee awareness. Practical source reduction activities, along with staff training, significantly reduced the amount of waste produced in that study. Similarly, the importance of having specifically trained hospital staff members has been highlighted as a way of reducing over-ordering and plate waste (28). Although the latter study did not find staff training to reduce waste levels, limitations should be noted such as the 10% response rate to the voluntary staff training sessions.

## 2.5 Behaviours and Attitudes around Food Waste

Foodservice managers and dietitians play an important role in the running of foodservice institutions, where efforts to conserve resources and make environmentally friendly decisions can have significant effects (6, 21). New Zealand accreditation standards for dietetic education include competency requirements for management and foodservice management (43). Sustainable foodservice management is included in foodservice courses in partial fulfillment of these competencies in the University of Otago's dietetic curriculum (44). However, the question remains, what are the drivers behind food waste-related decisions in foodservice organisations. The majority of research around waste-related attitudes and behaviours has been conducted on individual or household scales, often reflecting a single snapshot in time (45-47). Less attention has been paid to organisational settings, and few studies have explored

the attitudes and behaviours of foodservice personnel specifically in relation to food waste (12, 21, 45, 46).

Wilson & Garcia investigated beliefs, attitudes and behaviours about environmentally friendly practices within hospital and healthcare foodservices (21). Participants were foodservice managers, clinical dietitians, dietary aides, food technicians, and senior management. Results showed that 94% of participants either 'agreed', or 'strongly agreed' to initiatives within the waste management category. Statements with the highest belief scores included those about reducing waste going to landfill and recycling (21). These finding are comparable to an individual-based study which found decreasing the use of packaging to be the most important environmentally-friendly initiative, followed by recycling (46). Despite finding positive results for beliefs, Wilson & Garcia determined that fewer participants recommended implementing waste reduction strategies within their foodservice organisation (21). Participants identified challenges such as lack of time to investigate new initiatives, lack of support from senior staff, lack of emphasis on sustainable decision-making, and increased costs associated with sustainable practice and resources (21). As illustrated by Tucker & Speirs, initial experience in environmental activities can quickly set long-term attitudes, so long as no adverse experiences are encountered (47).

Patterns have been identified between specific behaviours carried out in the home and beliefs about food and the environment (21, 46). In most categories, Wilson & Garcia also found scores for positive behaviours to be lower than positive beliefs (21). Conversely, Lea & Worsley determined a moderate consistency between reported beliefs and behaviours among Australian consumers (46). These varied results contribute to the debate on whether sustainable and environmentally driven beliefs are transformed into practice (21, 47, 48).

Many factors have been highlighted to influence beliefs or decisions around sustainable practice, examples include; social norms and media, the public image of an organisations and pressure from colleagues or consumers (21, 39, 49).

Surveys and questionnaires are regularly used to investigate attitudes and beliefs about environmental issues. However, common limitations have been highlighted such as respondent bias, social desirability bias and misinterpretation of terminology used in questions (21, 46). Adopting both qualitative and quantitative techniques, a hospital-based study used mixed-methodology involving onsite observations of catering practices, informal interviews with foodservice staff and a quantitative waste analysis (10). Likewise, Engström & Carlsson-Kanyama conducted semi-structured interviews with staff members to better understand their attitudes around food waste and source reduction strategies (12). These examples shed light on the importance of communication with and participation of foodservice staff, to better understand how and why decisions are made around food waste.

## 2.6 Systems Theory

A systems approach to management is often used in foodservice organisations as it focuses on the organisational objectives throughout all performances and activities and facilitates problem solving and decision making (4). Therefore, its application is highly relevant to the current study in relation to food waste.

A system is defined as 'a collection of interrelated parts or subsystems unified by design to obtain one or more objectives' (4 p.2). In the 1960's, the concept of combining separate parts of an organisation into a conceptual whole began to emerge. Systems theory originated from scientific management theory in the late 19$^{th}$ and early 20$^{th}$ century, which focused on meeting

organisational goals through efficient work performance (30). Later management models identified the influence of social and psychological factors on employee productivity and satisfaction. Research then shifted towards technological and mathematical models which were used in organisational decision-making (30). In 1968, Ludwig Von Bertalanffy proposed that the focus should be on the totality of an organisation, hence systems theory was introduced (30).

The systems model illustrates the applications of systems theory to a foodservice organisation (4) (figure 1). It presents the idea that organisations are made up of a series of five key processes, also known as subsystems. According to Payne-Palacio & Theis, these include: identification of the organisational goals (outputs), assessment of environmental opportunities or threats (environment), assessment of the organisation's resources and capabilities (inputs), identification of the organisational structure (operations), and, development of the management structure (management) (30). The systems model guides foodservice managers and dietitians to organise vast amounts of information. Moreover, it illustrates that changes made in any one area will affect or create changes in another area (4).

In 2004, Engström & Carlsson-Kanyama suggested that food waste should be looked at in a systems perspective, particularly when making decisions around waste reduction practices (12). Since then, only a few studies have been guided by a systems approach (10, 12, 50), one of which was conducted in hospitals (10). In 2007, the American Dietetic Association presented a systems model to illustrate the importance of a sustainable diet and food system (6). This evidence provides insights into food waste and opportunities for sustainable development at various stages of the wider food system (6, 12, 50). In a hospital context, Sonnino & McWilliam highlighted the need for improved communication between patients

and staff to enhance the understanding in reasons behind food waste (10). To current knowledge, the systems model *per se* has not been used as an organising concept to investigate food waste in foodservice institutions.

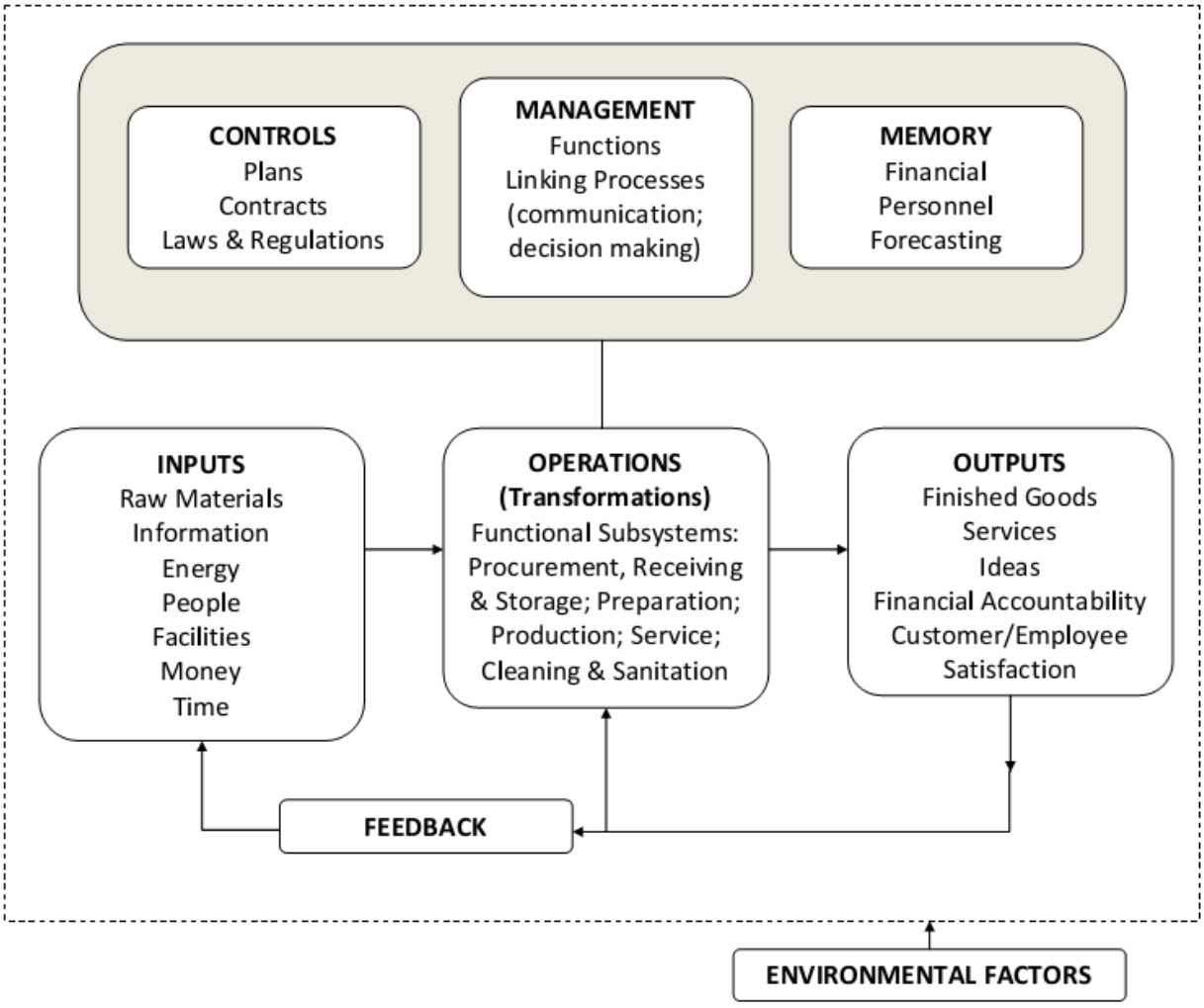


Figure 1. The systems model: Adapted from Payne-Palacio & Theis (51)

## 2.7 Practice Theory

During recent decades, increased attention has been drawn to the conceptual framework of practice theory as a means of understanding sustainable practices in everyday life (52-54). Researchers have used practice theory to investigate a wide range of daily activities including; sustainable food consumption (54), Nordic walking (55) and taking a daily shower (52). The idea emerged in 1984 when Giddens (56 p.2) observed that the grounding of social sciences 'is neither the experience of the individual actor, nor the existence of any form of social totality, but social practices ordered across space and time'. Previously, behavioural models have been used as a means of understanding human behaviour, many of which focus on the individual's responsibility for the outcome of his/her actions (53). In contrast, practice theory removes the individual and his/her social structure from the centre of analysis, and instead, shifts research towards the practice itself and the consumption involved (53). In other words, attention is drawn to making practices more sustainable, as opposed to educating or persuading individuals to change their actions (57).

The existing literature poses conflict around the definition of a practice, hence there is no standardised practice approach (58). Previous research on social practice underlies the processes of establishing routine and social order (59). Reckwitz (60) claimed that a practice is a behavioural routine which consists of several elements, including bodily knowledge, mental activities, 'things' and their function, all of which are interconnected to one other. More recently, Pantzar & Shove illustrated that practices are collections of elements including, images (meanings or symbols), skills (forms of competence or procedures) and materials (things or technology) (55) (figure 2). Furthermore, practices are created, stabilised and ceased, as links between elements are formed, challenged or broken (55). To clarify these

concepts, an example of cooking is provided: The practice itself is cooking, where as the cook would be referred to as the actor or practitioner. Cooking involves a specific set of images (the purpose of the meal, how the food should taste or the aesthetic appeal of a dish), skills (chopping food, grating or preparing garnishes), and materials (pots, knives, menus or cooking facilities). The links between the various elements of materials, images and skills can be produced and maintained throughout the duration of meal preparation, as well as over many years of cooking.

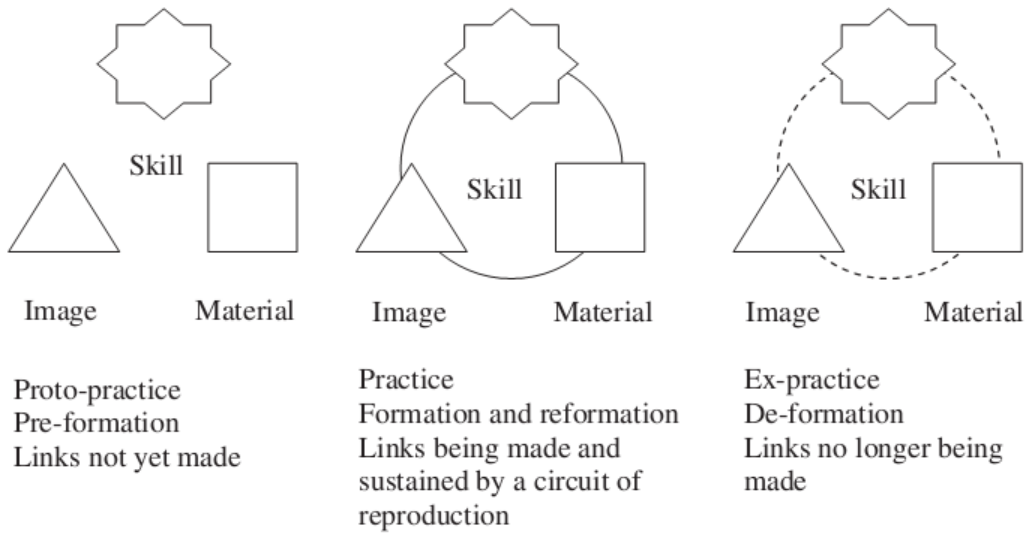


Figure 2. Forming, sustaining and breaking links between elements of practice (61)

Using an ethnographic approach, previous authors have been guided by practice theory to develop a deeper understanding in sustainable consumption around food and the environment. The conceptual framework of practice theory directs research towards the seeing and doings of everyday life, and therefore, it requires a methodology capable of capturing such information (53). As opposed to relying entirely on the results of a single data source, existing

research has incorporated various forms of evidence including; documentation analyses (54), observations (53, 54), focus groups (52, 54) and interviews (52-54).

## 2.9 Amalgamation of Systems and Practice Theory

This thesis offers a novel approach to foodservice research by combining elements of systems and practice theory. From a systems perspective, it intends to evaluate the hospital foodservice organisations as a whole, by exploring the generation of waste within the various components of the systems model (inputs, operations, outputs, controls, management, memory, environmental factors and feedback) (4). The application of systems theory aims to assist in the problem solving and decision making around food waste-related issues, whilst keeping the organisational goals of the foodservice provider in mind. Using a similar style to Hargreaves (53), the current study also adopts the conceptual framework of practice theory as outlined by Pantzar & Shove (55) . By removing the individuals from the core focus of analysis, it aims to investigate the practice of waste generation during the preparation, production and service of hospital meals. This involves exploring the elements of waste generation (namely, materials, images and skills), through the perspectives and practices of foodservice personnel.

## 2.10 Conclusion

Existing research provides useful insights into the generation of food waste in foodservice settings. In particular, food waste volumes, waste reduction methods, and, individual attitudes and behaviours on sustainable practices have been well documented in the literature. However, further exploration into hospital food waste prior to patient consumption is justified. Although there are many benefits for foodservice dietitians and managers who adopt a systems view, systems theory primarily focuses on technical elements of the foodservice

system and does not provide a framework to understand practices of human inputs. The current study provides an innovative approach to foodservice management by combining systems and practice theory.

# 3.0 Objective Statement

Two predominant gaps in the existing literature provide grounding for this research. Firstly, the majority of hospital-based studies on food waste have focused on patient plate waste. Secondly, no existing literature was found that adopted a practice-based approach to gain insights into waste-related practices in hospital foodservice settings. The current study seeks to develop understanding about the reasons for hospital food waste prior to patient consumption. It aims to introduce a more people-based approach to foodservice management, taking into consideration the attitudes and behaviours of foodservice personnel.

Objectives of this thesis include:

1. Develop a conceptual framework by combining elements of systems and practice theory.
2. Use the integrated framework to:
    a) Explore how and why hospital food becomes wasted prior to the point of consumption.
    b) Develop understanding of how the generation of hospital food waste is influenced by practices of foodservice personnel.
    c) Provide recommendations to minimise the volume of food waste in order to achieve a more sustainable foodservice system.

# 4.0 Participants and Methods

## 4.1 Research Design

The majority of research on food waste in hospital foodservices has adopted quantitative methodologies. Drawing on previous research about sustainable consumption (53, 55), the current study uses a qualitative, ethnographic approach to investigate the practice of food waste generation during the preparation, production and service of hospital meals. Data collection was carried out between 15th May and 25th July 2012 at three of New Zealand's hospital foodservice sites in a major city. Refer to Appendix A for ethical approval.

## 4.2 Rationale for Research Design

Ethnography has been defined as the art and science used to describe a group or culture (62), a concept which has been adopted by scholars from many academic disciplines. Angrosino (63) suggests that ethnographic case studies are particularly fitting for research topics that are not yet supported by large bodies of evidence. Given a) the lack of literature on hospital food waste prior to patient consumption, and b) the recent shift towards understanding sustainable consumption through practice theory, an ethnographic approach is well suited to this study.

Traditionally, ethnographic research is conducted on-site during which the researcher becomes immersed in the natural environment of the study participants. The researcher gains a realistic understanding in the participants' everyday lives, providing a basis for further investigation (64). Data collection involves a variety of techniques, allowing insight to be gained from a range of different perspectives (63). Data collection techniques adopted in the current study are documentation analyses, observations, focus groups and interviewing, each of which will be discussed in this chapter.

Practice theory directs research towards the seeing and doings of everyday life. Investigating through a range of data collection techniques allows such information to be captured (53). Ethnography focuses on people in a collective sense, exploring their learned or shared behaviours, customs or beliefs (63). This idea parallels the conceptual grounding of practice theory by removing individuals from the centre core of analysis (53).

Angrosino (63 p. ix) claimed that 'qualitative research starts from the idea that methods and theories should be appropriate to what is studied. If the existing methods do not fit to a concrete issue or field, they are adapted, or new methods or approaches are developed'. This provides rationale for combining elements of both practice and systems theory (4, 53), developing a new conceptual framework which is applicable to the context of this study.

## 4.3 Selection of Foodservice Sites

Ethnographic case studies can be conducted at almost any place where people interact in natural group settings (63). Three of New Zealand's public hospitals, which are contracted to an external foodservice provider, were chosen as research sites. The following reasons provide justification for selected foodservice sites:

- All sites prepare meals in the hospital kitchen using a cook-fresh production system which is then distributed to various parts of the hospitals. Therefore, the generation of food waste prior to the point of consumption is confined to the kitchen.
- All hospitals are comparable in that they follow a similar two week menu cycle.
- Each hospital site allows access to a large group of staff.

Foodservice sites are referred to as hospitals 1, 2 and 3 and a brief description of each is provided below.

## 4.4 Description of Foodservice Sites

Hospital 1 provides meals for patients of hospital 1, Meals on Wheels clients, two satellite sites as well as a staff and public cafeterias. In September 2012, the Nutrition Manager of Hospital 1 reported that over the last financial year (September 2011 – August 2012), an average of 1752 meals was served per day (excluding cafeteria meals).

Hospital 2 provides meals for patients of hospital 2, Meals on Wheels clients and the staff and public cafeterias. Infant's and children's menu are offered to the paediatric unit. In September 2012, the Nutrition Manager of Hospital 2 reported that over the last financial year (September 2011 – August 2012), an average of 680 meals was served per day (excluding cafeteria meals).

Hospital 3 is a large public hospital. It provides meals for patients in hospital 3, the mental health unit, spinal unit, Meals on Wheels clients, caregivers as well as staff and public cafeterias. In September 2012, the Nutrition Manager of Hospital 2 reported an average of 2420 meals was produced per day (excluding cafeteria meals).

## 4.5 Site Visits

Site visits were carried out at Hospitals 1, 2 and 3 over a two week period in March/April 2012. The researcher had previous foodservice experience in all hospital kitchens as part of the University of Otago's Dietetic Curriculum, and, in 2012 has been employed by the foodservice provider as a menu processor at two of the sites. This extracurricular experience provided background knowledge and enhanced the researchers understanding in hospital foodservice environments.

Site visits familiarised the researcher with the hospital settings and participants in context of the research topic. Using the foodservice systems model, a tabular tool was developed and used during the visits (Appendix B). Notes were made on foodservice operations and areas in which waste could be generated. This information was used for planning the data collection tools. Each site visit lasted approximately two to three hours and was conducted prior to and during lunch service.

## 4.6 Development of Data Collection Tools

Based on the site visits, data collection tools were developed for document analyses, observations, focus groups and interviews (Appendices C, D, E & F). The tabular tool used during the site visits was modified to incorporate elements of practice (images, materials and skills). Draft data collection tools were reviewed by the Professional Advisor and two of the company's Nutrition Managers.

## 4.7 Data Collection

Figure three illustrates the data collection process and integration of data collection techniques (figure 3).

### 4.7.1 Documentation Analyses

Archival research involves investigating material that has been stored for research, service or other purposes. This may include both official and unofficial data. A documentation analyses data collection tool was used to explore existing records at hospitals 1, 2 and 3 over a two week period in May 2012 (Appendix C). Initially, a walk-through observation was conducted to identify any material or documentation that could be related to the generation of food waste. Documents investigated included company policies and plans, production and service

materials, waste records and quality assurance tools and records. Data collection was conducted over three to five hours at each site. Each session involved reading material, taking relevant notes, and in some cases, clarifying details with the nutrition manager. Information gathered was grouped according to the elements of practice (materials, images and/or skills) within the systems model framework.

### 4.7.2 Observations

According to Angrosino (63 p. 37), observation is 'the act of perceiving the activities and interrelations of people in the field setting through the five senses of the researcher'. It is the most objective ethnographic skill as it requires no, or minimal, interaction with the people under the study (63). The current study adopts Gold's (65) role of observer-as-participant, in which the researcher observes for brief time spans to set the context for interviews or other types of research. In this case, the researcher is known and recognised, but related to the participants solely as the researcher (65).

Observations were conducted under natural settings at hospitals 1, 2 and 3. One observation was conducted per site lasting approximately 9 hours (9.00am – 6.00pm). On arrival, the researcher used job descriptions and staff rosters to develop a tentative schedule for the observation. This provided knowledge on what activities were happening, when, where and by whom. Based on findings from the site visits, the observation was roughly based around the following events; sandwich preparation, nutritional supplement preparation, menu processing, lunch production, lunch service, lunch post-service, dinner menu processing, dinner production, dinner service, dinner post-service and forecasting. Brief conversations were held with foodservice personnel when details required clarifying.

There is no universally accepted format for recording during observations, however checklists and free-form narratives are commonly used (63). A combination of these styles was applied in this study. Observation notes took on Singleton's (66) recommendation by incorporating the following elements:

- A running description of the day's observation using blank paper. Detailed notes were taken on the setting, people, individual actions and group behaviours, making as little interpretation as possible. Approximately every hour, the time was noted to assist in remembering the order of events. An observation data collection tool was referred to as a guide throughout the observation (Appendix D).
- Ideas and notes for further information use. These refer to spontaneous ideas related to data collection and data analysis, for example, potential questions for focus groups or interview.
- Personal impressions and feelings experienced whilst observing in the field as they may indicate biases clouding the observations.
- Methodological notes which include any ideas related to the techniques used to conduct research, for example, difficulties in collecting data and biases that might be introduced by the data collection techniques.

As mentioned by Sangasubana (67), it can be difficult to observe and collect information at the same time and it can be useful to rely on equipment. A sketch of the kitchen layout was drawn at the beginning of the observation in order for the researcher to gain a better understanding of the facility and the flow of food waste. Photographs were taken of food waste generated (Appendix G).

Information gathered was grouped according to the elements of practice (materials, images and/or skills) within the framework of the foodservice systems model (51).

### 4.7.3 Focus Groups

Focus groups were held in the staff room or cafeteria during the employees' main lunch break. As suggested by the Nutrition Managers, each discussion was kept to a maximum of 30 minutes to encourage attendance. It was not feasible to include all foodservice personnel in the focus groups due to the large number of staff. Therefore, potential participants were identified (during observations) as those with most involvement in and relevance to food waste-related activities. A mix of suitable participants was assured by inviting supervisors, cooks, menu processors and kitchen assistants to take part in the discussions. An ethical issue of this study was to ensure participants were able to freely express their views on food waste generation, so managers were interviewed at a later stage rather than being included in the focus groups.

Posters were displayed in each kitchen outlining the aim of the study (Appendix H) and information packs were supplied to Nutrition Managers for those expressing interest in the project (Appendix I). Information packs for focus groups included an invitation letter, an information sheet explaining the study, a consent form and a short questionnaire (Appendix I). One week prior to each focus group, the research conducted a kitchen walk-through to encourage attendance and answer any questions employees may have had.

A focus group guide was used as a framework for discussion as described by Krueger & Casey (68) (Appendix E). Five open-ended questions were drafted based on information obtained from the document analyses and observations. These covered the following discussion areas: general thoughts on food waste in the kitchen, challenges around food waste

minimisation, rules and regulations around food waste management and prevention, experience and training in food waste and systems and procedures around food waste generation.

Focus groups were conducted in a conversational style so the precise nature of the questions had not been determined in advance and depended on how the discussion developed. After all participants had read and signed consent forms (Appendix I), focus groups were convened, facilitated and audio-taped by the researcher. Discussions were then transcribed and individual's names and hospital sites were coded to protect the identity of participants.

### 4.7.4 Interviews

Interviews were conducted with seven managers: two Nutrition Managers, a Chef Manager, a Production Manager, the Strategic Partnership Manager and the Health Safety Quality Assurance Manager. Participants were chosen as representatives from each site who manage various groups of foodservice personnel. An interview guide was developed as a framework for discussion as described by Krueger & Casey (68) (Appendix F). Five key questions were drafted based on the information obtained from the document analyses, observations and focus groups. The open-ended, semi-structured questions were similar to those in the focus group guide and were used flexibly, being omitted or adapted according to how the conversation developed. All participants, after having read and signed the information sheet and consent form (Appendix J), were interviewed and audio-taped for between 10 and 20 minutes. The interviews were then transcribed using Microsoft Office Word 2007 and participant names and workplaces were coded to protect the identity of participants.

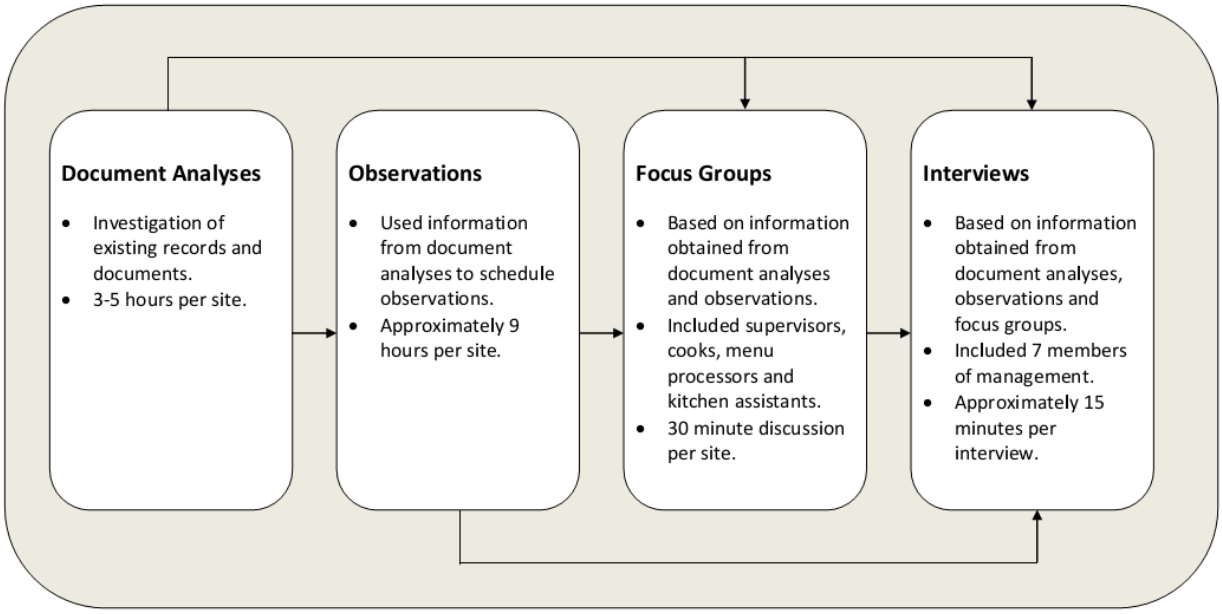


Figure 3. Data collection process and integration of data collection techniques

## 4.8 Data Analysis

Thematic analysis is a method for identifying, analysing and reporting patterns or themes within data (69). Braun (69) provides a 'recipe' for researchers to undertake thematic analysis in a theoretically and methodologically sound manner . Using Braun's guidelines to steer the process, thematic analysis was conducted for the current research. A theoretical, thematic form of analysis best describes the approach adopted in this thesis. This form tends to be guided by the theoretical interest of the research as opposed to being data-driven, and is more fitting when relatively specific research questions are being coded (69).

An integrated model of systems and practice theory was developed and used to structure the analysis process (figure 4)**.** Analysis was performed manually using Microsoft Office Excel 2007 spreadsheets and Microsoft Office Word 2007 documents. The researcher became

familiar with data from document analyses, observations, focus groups and interviews by transcribing verbal data, reading, re-reading, consulting the literature and noting down initial ideas (69). Grand-parent nodes were created according to the components of the systems model (inputs, operations, controls, management, memory, outputs, feedback and environmental factors) (30). Within each grand-parent node, information was assigned to parent nodes that related to the systems model's subsystems. Under each systems component, data was then coded and collated into child nodes according to the practice theory's elements of practice (materials, images or skills) (55). Figure five illustrates the data coding by using the 'Management' systems component as an example (figure 5). Coded data was grouped together according to two major themes, reasons for food waste prevention or generation, and attitudes or perceptions on food waste. During this process, attention was also paid to the identification of new codes, for example, other ideas around sustainable practice (unrelated to food waste). Data was then summarised and integrated with evidence including selected extracts, quotes and photographs. Finally, key concepts and findings were documented.

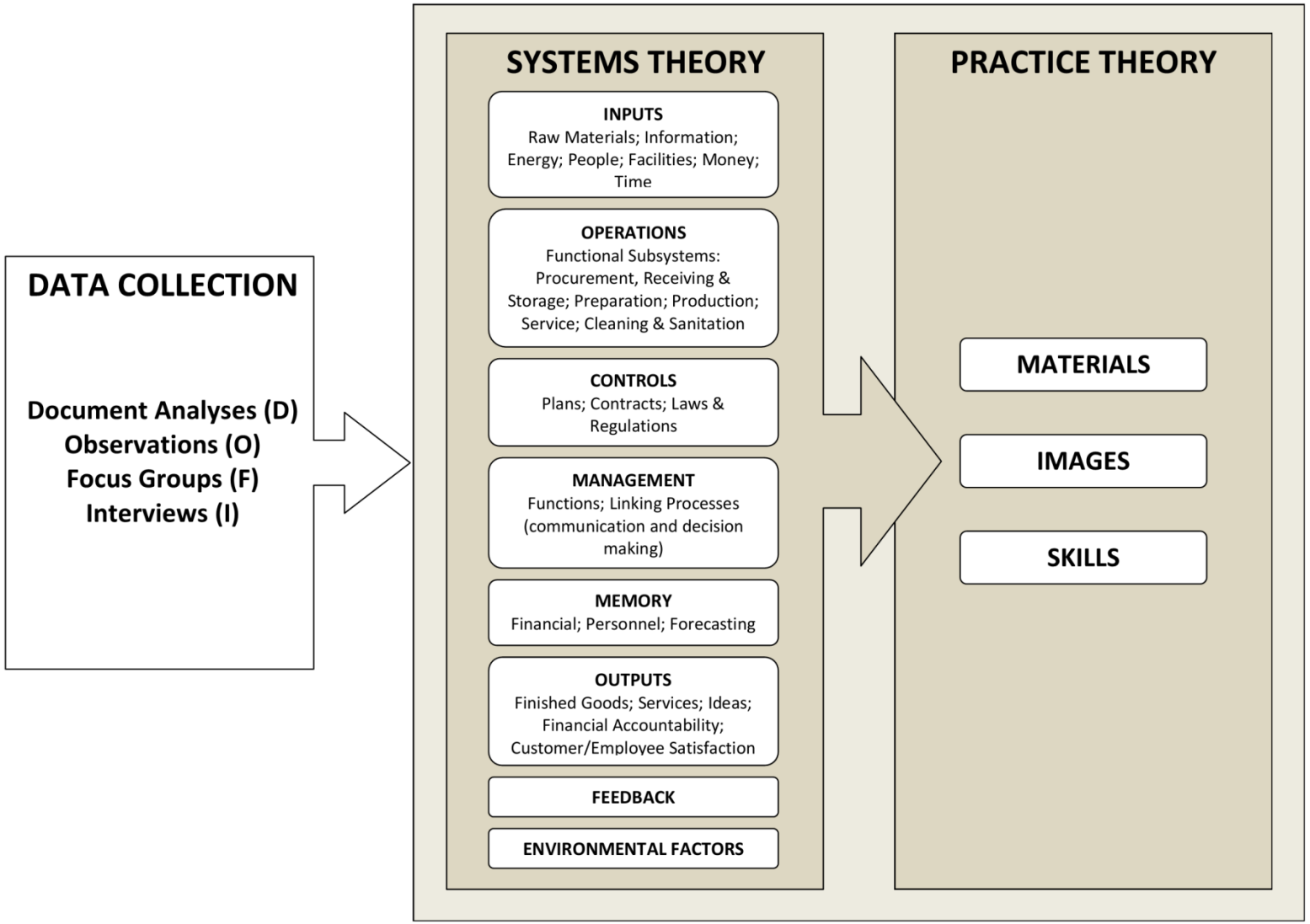


Figure 4. Integrated model of systems and practice theory

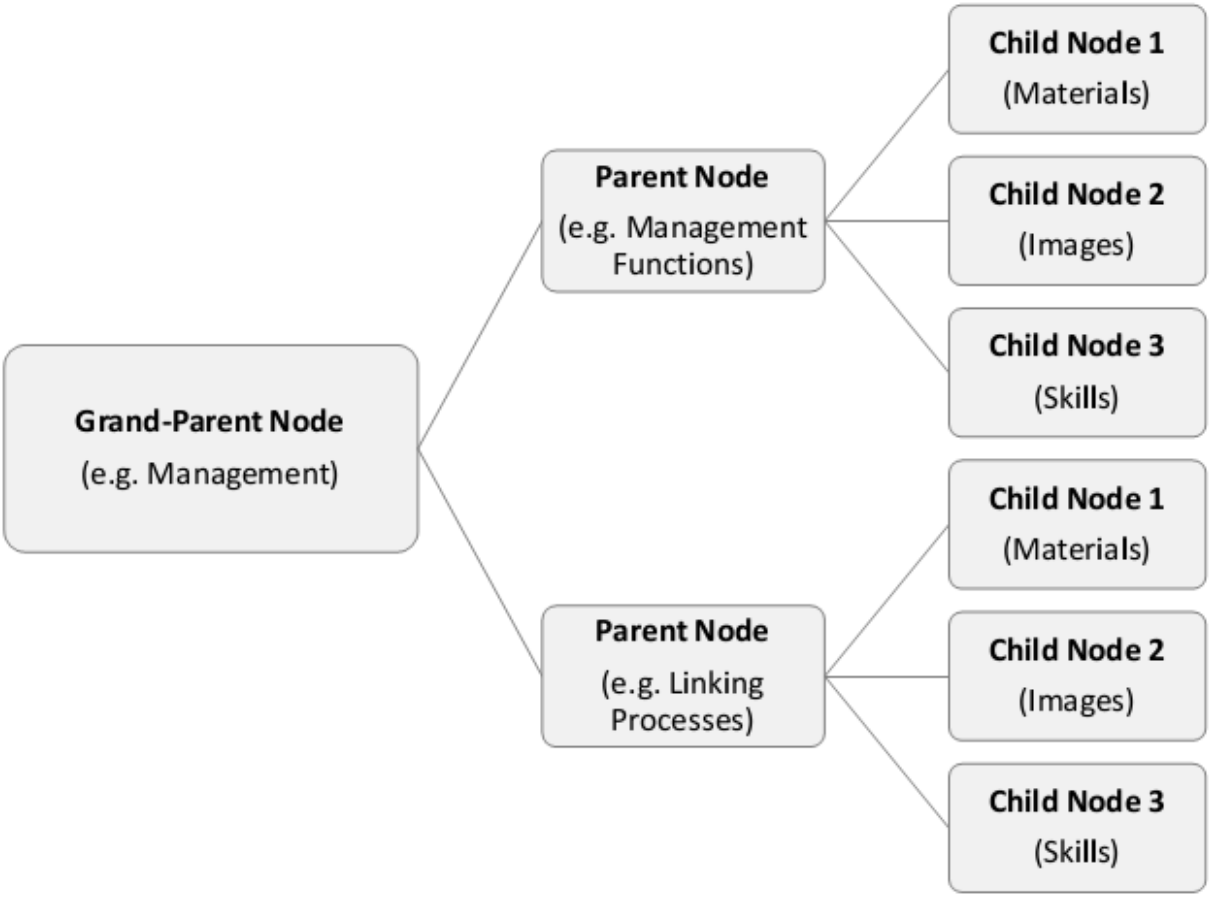


Figure 5. Thematic map of data analysis for 'Management'

# 5.0 Results

The following section summarises the findings of the document analysis (D), observations (O), focus groups (F) and interviews (I) from hospitals 1, 2 and 3. The integrated model of systems and practice theory was used to structure results (Figure 4). Only those parts of the systems model which were associated with the generation of waste are reported on. To maintain accuracy, all quotes are in their original format and have not been corrected to ensure they are grammatically correct. Summarised figures are presented for each component of the systems model throughout this section (figures 6-39).

## 5.1 Inputs

**Definition of Inputs:** Resources such as money, material, time, and information required by a system (30).

### 5.1.1 Materials (as Inputs)

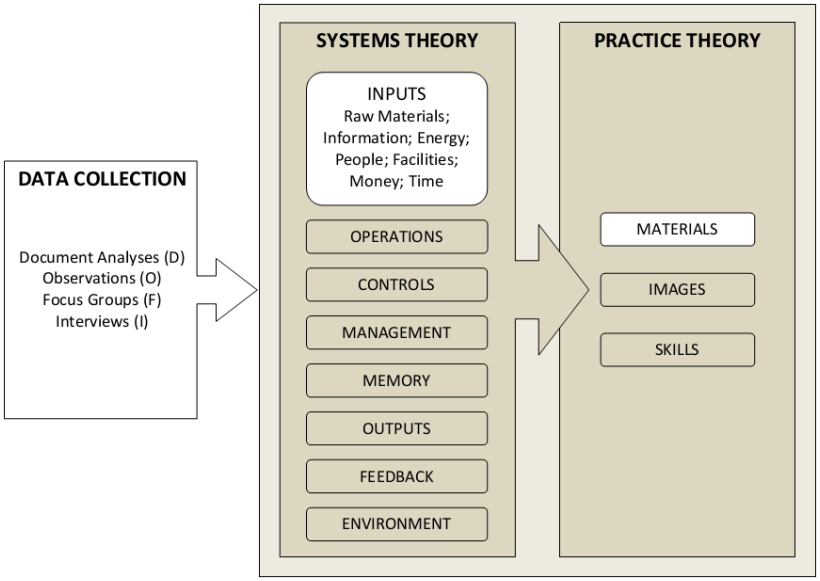


Figure 6. Integrated model of inputs and materials

### Raw Materials

The use of pre-prepared ingredients significantly reduces the amount of food waste generated during the preparation and production of hospital meals (O, F, I). Fruits and vegetables in particular are bought pre-cut, sliced and/or peeled and therefore, minimal food waste is produced during recipe preparation (O, F, I). Manual handling of fresh produce was observed only during sandwich preparation, for example, slicing of lettuce and tomatoes (O).

**Information**

Number of occupied beds and staff training were two notable forms of information relating to the generation of food waste (D, I). Hospital and ward updates are accessed electronically and serve as important communication tools between the kitchen and wider hospital (O). The daily hospital status indicates hospital capacity allowing managers to adjust production accordingly. Menu processors have access to ward lists with the number and type of meals required (O, F). Ward lists are updated before every meal to help ensure production matches demand. Other materials required during menu processing include colour coded menus according to diet code as well as diet summaries from clinical dietitians and speech and language therapists (D, O).

Conflicting results were obtained for training materials on food waste (F). Two out of 22 focus group participants stated that the topic of food waste was included in their training whereas seven agreed it was not (F). Similarly, contrasting findings were obtained from interviewees at various sites. Whilst two managers reported that there is no official training in food waste, another stated "yes there is a training session on food waste" (I). An Environmental Awareness training session contained a small component on food waste (I). An upcoming session is on waste resource management, however the content was not yet known (I).

**People**

All staff have a position description that outlines their responsibilities, tasks and a recommended time frame for the shift (D). Involvement of foodservice personnel in waste-related practices varied, depending on the nature of the position and time of shift (D, O).

### Facilities

Key areas of the kitchen where food waste generation occurs included: sandwich preparation, nutritional drink preparation or diet kitchen, main production, sweet production, meals on wheels and the special diet preparation area (O). Within each of these areas, rubbish bins and multi-cycle bins were provided. At all sites, an insinkerator was used to dispose of food waste (O). Previously, pig bins were used to redistribute food scraps however these are no longer available. No site had composting facilities (O, I).

## 5.1.2 Images (as Inputs)

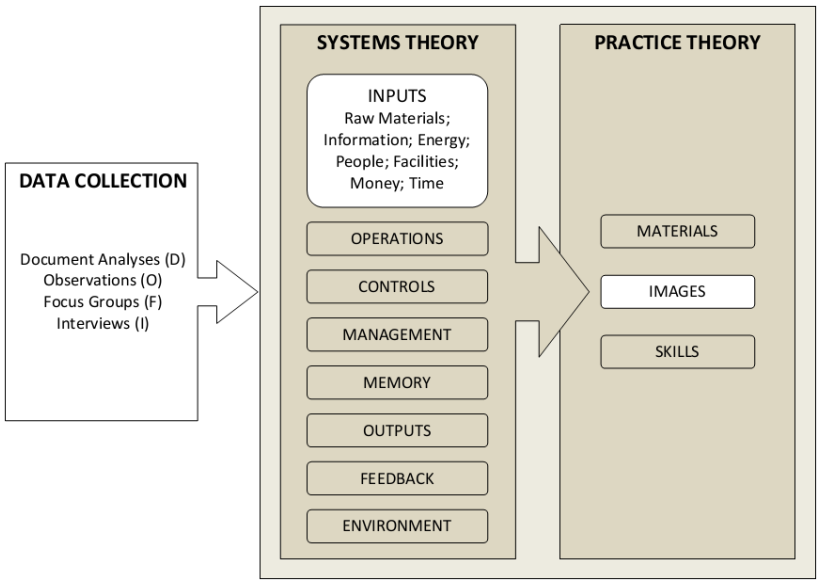


Figure 7. Integrated model of inputs and images

### Raw Materials

Perceptions of usefulness of pre-prepared ingredients differed between focus group participants and interviewees. Focus group participants discussed the use of pre-prepared ingredients only in regards to waste minimisation: "...you don't have to chop it all up, so no

waste during the preparation". In addition to waste minimisation, managers discussed use of pre-prepared ingredients in relation to purchasing and labour cost reductions: "It's huge time-saving and also it means there is a huge saving here in waste which is a fabulous thing...you can buy a lot of these pre-prepared products for only a few cents a kilo more than it cost to buy the raw product and have to prepare it yourself" (I). No discussion focused on waste produced from fresh produce during the preparation of sandwiches. This waste was reported by three managers to be minimal (I) (figures 8 & 9).

Figure 8. Discarded fresh produce waste Hospital 2

Figure 9. Discarded fresh produce waste Hospital 3

**Information**

Participants of all three focus groups agreed that food waste training was more about food safety and portion control than from an environmental perspective. Four managers believed that training was less focused on environment and more on cost (I). A link was made between the location of the facility and the effectiveness of food waste training:

> I know one of the sites [a rural satellite site] is really good, they collect all their waste and give it to the pig farmers out there. So essentially that waste is being used in the community which is really good, and they've always done that and they're really proactive like that. But then you get other satellite sites that have never done it, probably never thought about it, those are the sites where training would really improve I think...because most of the procedures we've got in place are all to do with

paperwork and ticking boxes, but there's an actual reason for this, and if we tell them the reason for that then I think it would help (I).

In contrast, another manager asked: "Does it really matter how reduction is targeted? Does it really matter what the drivers are? Do you just choose relevant drivers to the group you are trying to educate as long as you get the same result in the end?" (I).

**People**

Consensus among all focus group participants was that food waste is a challenging topic as it involves many people. Staff attitudes and habits were mentioned as a challenge associated with minimising food waste (I). Whilst some foodservice personnel are proactive around food waste minimisation, others have been working in their roles for many years and are "used to doing what they always do" (I). One manager said most of the cooks have been cooking for more than 30 years, and therefore have their own routines, for example, making the same amount of food despite a change in production numbers (I).

A link between higher levels of involvement in waste-related practices by staff and their attitudes towards food waste was made (O, I). Foodservice personnel who are more actively involved in the generation and management of waste, such as supervisors and cooks, were reported to be more conscious of waste than those with less input, such as tray line servers (I). For example, following a lunch tray line, the supervisor documented the number of leftover portions and explained to a tray line server that there is a "new system for dealing with food waste and working towards zero wastage" (O). However, when kitchen assistants were asked whether wastage should be weighed, it was reported: "Na we just put it straight in [the garbage disposal]" and "Sometimes it does [get weighed], but tonight it is not." (O).

The point was raised that "perhaps some of them [foodservice staff] don't pay as much importance of food waste...whereas we, from a management point of view, we can see that food waste has a dollar value, whereas to them they are perhaps not as concerned about the waste" (I). Contrasting this, at least six foodservice staff expressed their concern of food waste in regards to financial implications, with one participant referring to it as "money down the drain" (O, F). The social implications of food waste were only brought up through comments such as "...and that [pointing to food waste] is all chucked out! Think of all the starving African children". One participant draws on the social implication of food waste by relating it to malnutrition both in New Zealand and his Asian home country:

> …a group of people in the morning that prepare food for these kids. They go to the Manurewa, Mangere area. And these children, early in the morning, they are already on the streets and waiting for the van to give them some food [in reference to a television documentary] (F).

### 5.1.3 Skills (as Inputs)

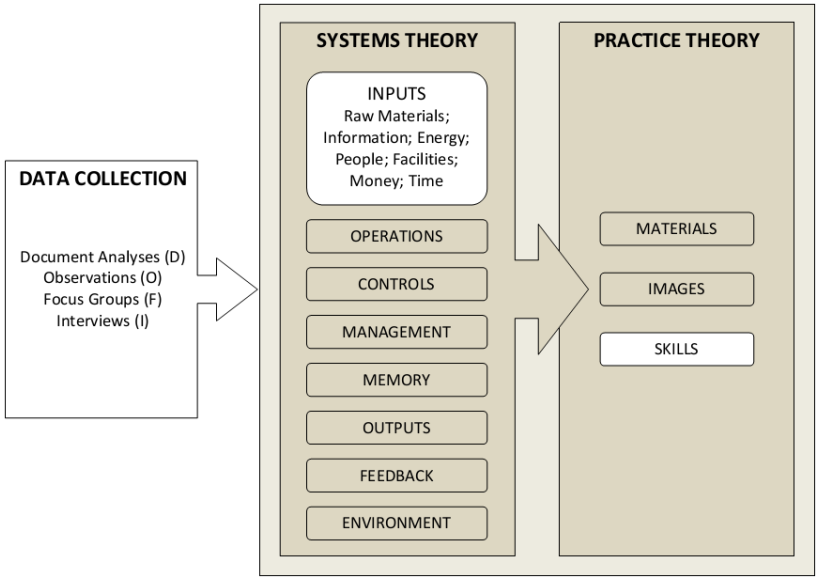


Figure 10. Integrated model of inputs and skills

#### Raw Materials

Manual preparation of raw ingredients is minimal as the majority are bought pre-prepared (F, O, I).

#### Information

Technological skills are required by managers and menu processors to access the hospital and ward updates and predict trends in meal numbers (O). Numeracy skills and an understanding in forecasting systems are required by menu processors to ensure an accurate quantity of food is ordered: "The menu processors count how many we need instead of just guessing, we try to get it as close to the information we have" (I). There was a general consensus among all focus group participants that there is a lack of staff training around the issue of food waste. One

manager reported that training around environmental issues needs to be gradual process to avoid overloading staff with information (I).

**People**

Two focus group participants mentioned that their knowledge and skills around food waste minimisation came from previous work experiences in other foodservice settings. Accuracy during preparation, production and service was mentioned as important skills to reduce the amount of waste generated (F, I). Practice and habit were also brought up as influential factors in food waste generation: "Lots of people have been have been doing it for a long time [in reference to tray line service]. But when a new person was there, all [food] was run out." (F).

**Facilities**

Levels of knowledge and confidence on food waste disposal practices varied among foodservice personnel (O, F).

## 5.2 Operations (Transformations)

**Definitions of Operations and Transformations:** Operations is the work performed to transform inputs into outputs. Transformations are the processes required to change inputs to outputs (30)**.**

### 5.2.1 Materials (as Operations)

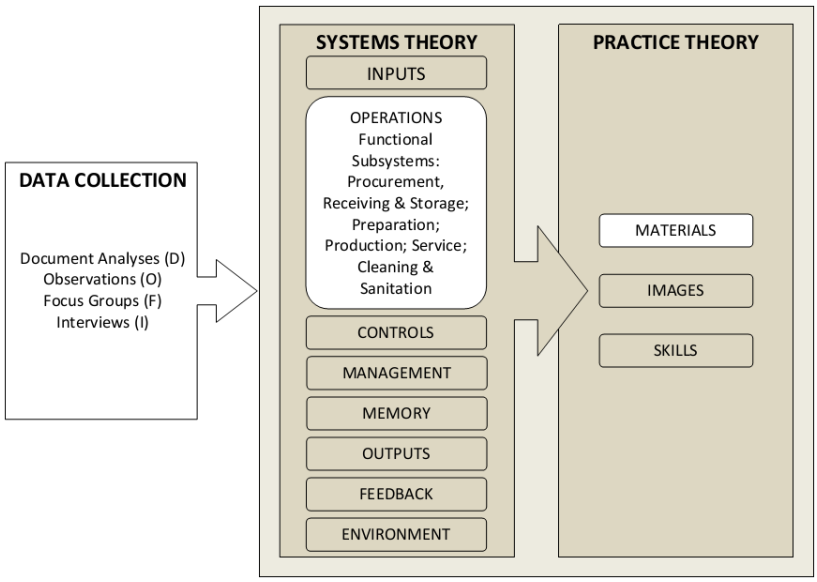


Figure 11. Integrated model of operations and materials

**Functional Subsystems: Procurement, Receiving and Storage**

All food is purchased from an approved list of suppliers (I). At receipt, stock is inspected using an inwards goods checklist and then placed in designated storage (D, O). Temperature was monitored at receipt and in chilled and frozen storage to maximise the quality and safety of products (D, O). Acceptable temperature ranges were referenced on the records (D). Two focus group participants stated that in order to reduce wastage there has been a recent reduction in the amount of food being ordered or ingredients are being substituted with other

available stock. However, participants perceived this practice as inefficient: “I think it is just the ordering at the moment, they are cutting it down. I’ll give you an example, like in the weekend, we had no potatoes and I had potato frittata for lunch, but there was not potato!” (F).

**Functional Subsystems: Preparation**

Forecasting sheets outline the weekday, date and quantity of menu items required per day (D). At one sites a staff member was responsible for weighing out all ingredients for the following day’s menu. Measured ingredients were then stored in plastic tubs for cooks to access (O). Cooks were responsible for measuring their own ingredients at the other sites (O). Materials used during the preparation of sandwiches and salads which assist with food safety and portion control included portioning utensils, gloves and used-by stickers (O).

**Functional Subsystems: Production**

Each cook had a clipboard that lists production numbers and recipes (D). Recipes are standardised, company approved and contain: recipe name, portion size, serving utensil, ingredients, method and cooking time (D, I). Portioning materials observed during production included scoops (dippers), hands and knives (O) (Figure 12). Throughout production and prior to service, temperatures were monitored and recorded (O). Equipment and production techniques were used to optimise the quality of food, for example, batch cooking of vegetables in a steam oven throughout service (O). Some food was reused such as over-ripe bananas in baking products. Collection of bread crusts into a plastic bag was observed at two sites (O).

Figure 12. Portioning of a main menu item

**Functional Subsystems: Service**

At each site, meals were served for hospital patients, Meals on Wheels clients and satellite kitchens. Standardised portioning tools such as scoops and ladles were used throughout service (O). At one site, 'dummy meals' were served before service to illustrate portion accuracy. Prior to delivery, a supervisor was responsible for ensuring that the food served matched the patient's order (O). Small food items such as bread, food scraps and custards and portioned desserts were discarded either during or at the end of tray line (O) (Figures 13 & 14). Other materials during service which could influence waste generation from a food safety perspective included meal delivery time schedules and temperature monitoring forms (D).

Figure 13. Discarded food scraps generated during service

Figure 14. Discarded food items following service

**Functional Subsystems: Cleaning and Sanitation**

All sites displayed posters outlining correct hand washing techniques. Cleaning schedules were observed for all preparation, production, service and storage areas (O). These materials play a role in food waste prevention from a food safety perspective. Plastic waste containers are used to measure the leftover production waste in litres (O, F, I). The practice of measuring and recording leftover wastage was inconsistent within and between sites (O). Numerous leftover items and food scraps, in particular soups, vegetables and desserts were discarded without being accounted for in the waste record (O) (Figures 15, 16 & 17).

Figure 15. Unmeasured leftover main item

Figure 16. Unmeasured leftover soups

Figure 17. Unmeasured leftover vegetables

### 5.2.2 Images (as Operations)

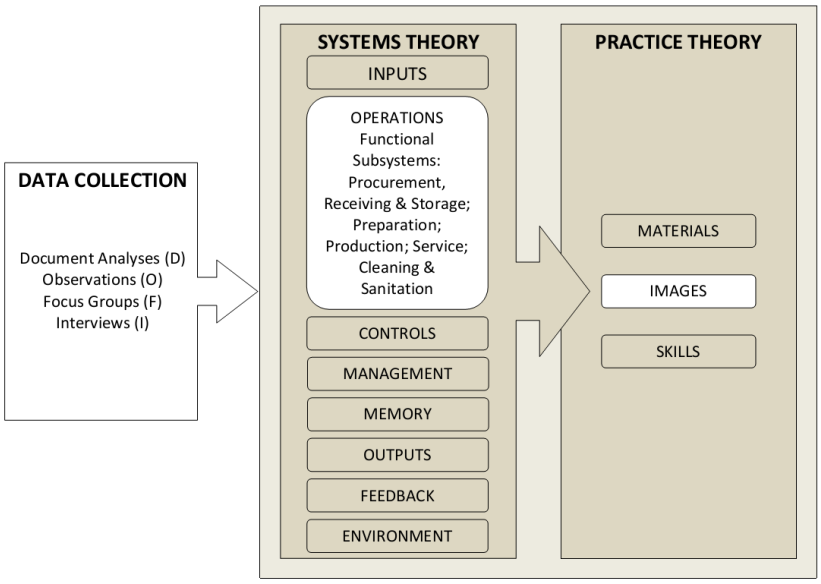


Figure 18. Integrated model of operations and images

**Functional Subsystems: Procurement, Receiving and Storage**

Most interview participants were unsure whether environmental considerations are taken into account when choosing suppliers (I). In Australia, where all company purchasing is based, a strong environmental focus on purchasing decisions was reported (I). One manager stated that suppliers are asked to have environmental certifications of which compliance is externally audited (I). However, along with two other managers, it was agreed that "...in the end, cost is often the bottom line in businesses" (I). Understanding the entire waste chain, including how suppliers impact the environment, was identified as an area for improvement (I). Ability to supply nationally was noted as another factor to consider when choosing suppliers (I).

To assist in waste prevention there are a number of rules and regulations around stock rotation and efforts are made to keep stock levels as low as possible. For example: "...I try really hard

to order in just what we need so that the cooks don't cook it just because it's there then we have wastage. Or um, they don't cook it because they need it and then it sits in the fridge, expires, and needs to chuck it out" (I). Another example is the label and dating system used for stored products. In other foodservice settings, stock orders are usually larger, placed less frequently and therefore have more potential to expire. For the hospitals however, a challenge associated with keeping stock levels low is getting suppliers to visit more frequently (I). One manager drew on the financial benefit of good stock control: "I have to do stock take because if your holding a stock it's money that you have already spent, so I would rather that it was in our suppliers warehouse rather than here not doing anything".

**Functional Subsystems: Preparation and Production**

Minimal food waste is produced during the preparation and production of meals due to quality controls and use of pre-prepared ingredient (O, F, I): "During cooking, I think there would be really small amounts, nothing major. Just like at home, left in the bowl and that sort of thing". Cooks felt recipes were accurate for the intended number of portions and actual amount produced. Variation between daily production numbers was reported to be minimal (F). One manager suggested that some food waste may occur as a result of foodservice personnel rounding up production numbers (I).

Focus group participants reflected on alternative foodservice production systems in relation to food waste volumes. For example, one participant suggested that zero wastage is more achievable when using a cook-freeze production system as food can be stored safely for longer periods of time (F). Based on previous work experience, another participant felt that a

cook-chill system can reduce the amount of food waste, so long as the cancelled meals of discharged patients are recycled for new admissions (F).

**Functional Subsystems: Service**

The majority of food waste occurs during service (O, F, I). Reasons behind this included: too much food made during production, hospital discharges prior to service and inconsistent portion control. Despite having portioning guidelines, discrepancy between what is considered a portion was raised as a challenge during service. One participant felt that portion size weights are not related in a sensible way: "…at the moment, I have noticed that we are going by weight instead of giving a small, large, medium... I always fighting it...If they order a small, give them a small!" (F).

### 5.2.3 Skills (as Operations)

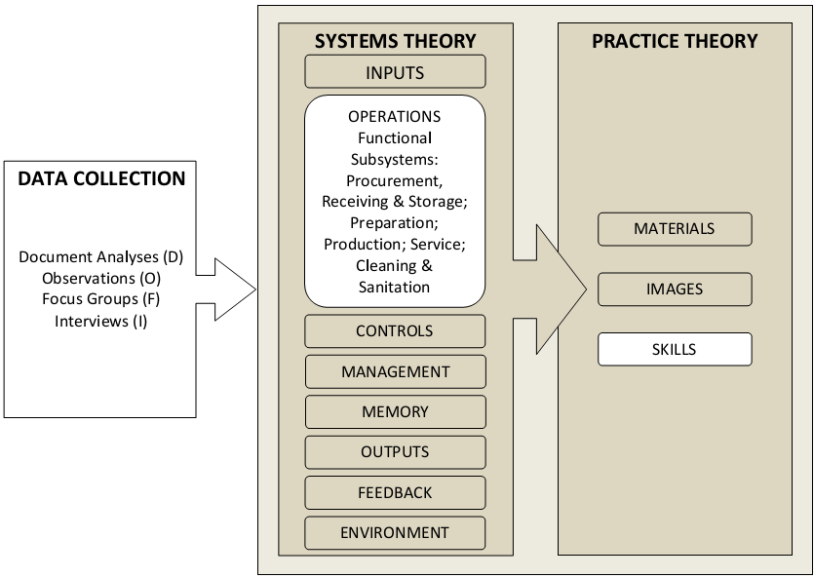


Figure 19. Integrated model of operations and skills

**Functional Subsystems: Procurement, Receiving and Storage**

Knowledge in stock rotation and food safety regulations is necessary to prevent spoilage or expiration of stored goods (I). For example, a tray of custards, dessert and a sandwich were discarded as they were past their use by date (figure 20). The menu processor commented that she doesn't understand why so many are ordered in the first place (O). One manager reported daily visual checks are made to monitor quality and stock levels. Communication skills are important when consulting suppliers as orders will be cancelled if stock levels get too high (I).

Figure 20. Discarded items as shelf life had expired

**Functional Subsystems: Preparation and production**

Accuracy and numeracy skills are required to ensure the correct amount of ingredients are measured and recipes are being followed (O, F, I). Knowledge in the various menu codes and specialty dietary items is necessary for all foodservice personnel involved in the preparation, production and service of food (O). Time management skills are required to prepare and

present food acceptably within time constraints. Only one participant commented on the occasional human error that produces waste. One group agreed that feeling under time pressure increased the amount of waste generated (F).

**Functional Subsystems: Service**

Food must be served according to the meal service and delivery time schedule. Therefore, accuracy, efficiency and an understanding in portion control is necessary for foodservice personnel working on tray line (F). One manager expressed the importance of explaining to staff the number of required portions prior to service using the container and scoop as visual aids (I). Approximately five accounts of food waste generation were due to the incorrect serving of food items at tray line. This however differed between sites and meal services depending on the skills and experience of staff involved (O).

**Functional Subsystems: Cleaning & Sanitation**

Among kitchen staff, conflict was noted around what leftover items should or should not be measured during tray line cleanup. This indicated a gap in waste management training (O). The reuse of leftovers differed between sites. For example, at one site, roast vegetable were saved to reuse in the following day's soup, whereas at another, they were discarded (O). Previously, tray line staff were responsible for recording leftover portions, a task which is now carried out by supervisors. One manager reported "hopefully that means there is a bit more importance placed on it" (I).

## 5.3 Controls

**Definition of Controls:** The self-imposed plans and legal documents that affect the organisation's function (30).

### 5.3.1 Materials (as Controls)

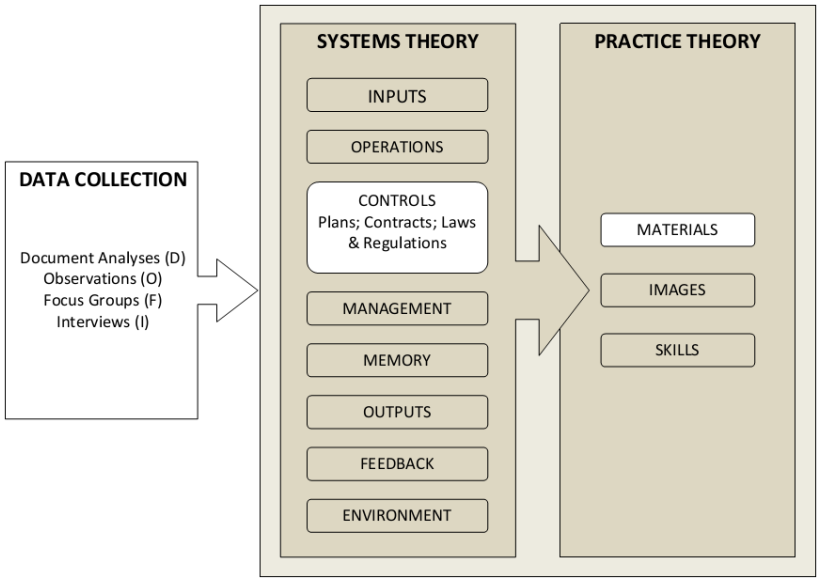


Figure 21. Integrated model of controls and materials

#### Plans

The company's visions, missions, values and guiding principles are outlined using a variety of materials. For example, employee handbook, kitchen wall posters and company website. Within the guiding principles, responsibility around the business' environmental impact is stated (D).

Decisions around organisational policies and procedures are influenced by the Pacific Health, Safety, Environment and Quality team (I). Written policies on environmental and waste-

related issues were identified including an 'Environmental Policy', 'Waste Resource Management Policy' and a 'Food Cost and Inventory Control Policy' (D). Food waste reduction is integrated into these policies, for example, "...we all play a part in protecting the environment by...making sure we don't waste food, water or other resources" (D). Employees' roles and the company's commitments towards sustainability are outlined, an example of this being "to provide information to employees...that inform them of environmental issues" (D). Ultimately, the company is working towards managing at zero percent wastage (D, O, I). Benefits of sustainable practice are highlighted such as a good reputation and strong financial performance. Access to policies differed between sites. While one site had all documents on display in the kitchen, another kept them filed in a manager's office. Policies are also available in the employee handbook and included in monthly training sessions (D, O).

The 'waste record and analysis' form is used to measure and manage production waste. Two waste management systems were being implemented at each of the sites (D, O, F, I). The original system is a company-wide policy which involves measuring, categorising and recording food waste according to pre-production, production and leftover. The intent of this system is that leftover food is transferred into a standardised plastic tub and the volume is recorded in litres (O) (figure 22).


Figure 22. Food waste measurement system using a company-wide policy

Each site has recently developed an additional waste recording and analysis form which breaks down production waste into individual menu items and number of portions leftover. The new recording document allows a reason for wastage to be reported and the monetary equivalent to be calculated.

Plans and procedures around food safety were noted. For example, temperature monitoring forms and meal delivery time schedules (D, O). Portion size guidelines were on display at all sites indicating the weight of each menu item and serving utensil required. Photos for portion control were displayed at two of the sites (O).

**Laws and Regulations**

In previous years, production waste was collected and donated to local farmers to use as pig food however this practice is no longer allowed (I). This change in regulation was likely to be due to food safety risk, as leftovers were being collected warm with minimal controls in place

(I). Discrepancy on where food scraps were actually going and how they were being used once they had left the hospital site was another possible reason for change (I).

### 5.3.2 Images (as Controls)

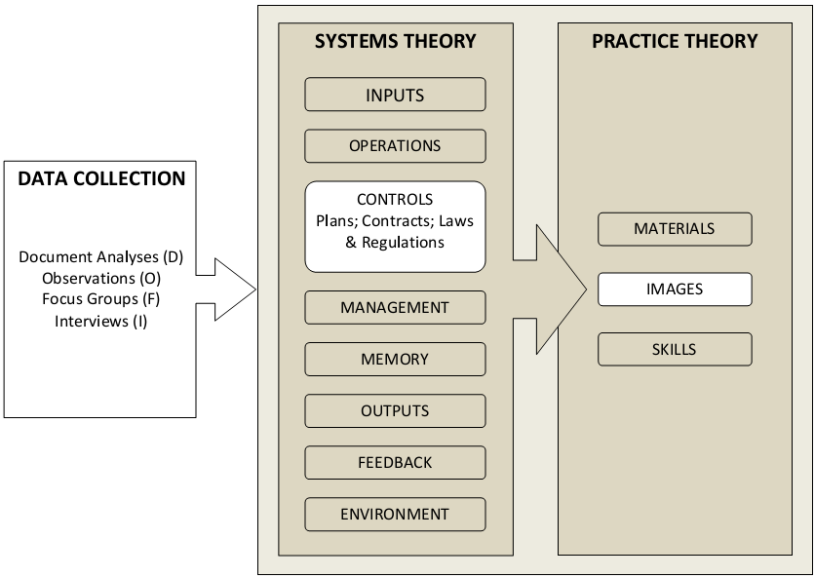


Figure 23. Integrated model of controls and images

#### Plans

No discussion occurred around the company's visions, missions, values and guiding principles (F, I). When asked about rules and guidelines to help reduce the amount of food waste, four focus group participants were confident in discussing the issue in relation to portion control. Examples provided were following production numbers and using standardised serving utensils (F). Likewise, all the managers placed emphasis on the importance of portion control. For example, "I monitor portion sizes through audits and just randomly checking it while I'm walking around the kitchen" (I).

Minimal discussion was raised about the environmental implications of food waste, with only three managers drawing on the positive impact of waste reduction environmentally (F, I). No specific reference was made to the company's environmental or waste management policies (F, I). Based on previous work experience, one manager mentioned that in the United Kingdom, targets around production waste must be achieved as part of the National Health Service and that compared to New Zealand, there is a lot more information available on how to reduce wastage within foodservice organisations (I).

Conflicting information was obtained around the reuse of leftovers (O, F, I). One participant stated that leftovers from lunch can be saved and used during the dinner service. On the other hand, three others agreed that the hospital's food safety regulations limited the reuse of leftover food (F). For example, "We have been trained to throw it out. Anything that is not used within 24 hours of being cooked must be thrown out. That is what we have learnt" and "I think with this kind of company, if the food is not safe, we throw it away. So in terms of cutting the waste, it is out of their hands" (F). One participant admitted to reusing leftovers to avoid unnecessary waste: "...I sneak, to be honest. What I store away I make sure I go back and reuse it. I do it when I know I am going to use it the following day, but if they catch me, I am in trouble" (F). One focus group agreed that the practice of discarding leftover food differed between their work and home environment (F). Mangers stated that food can be reused in a safe way when possible, for example, by redistributing whole, leftover trays to the staff cafeteria or Meals on Wheels service (I). Quality, aesthetic appeal and safety are important considerations when making decisions around the reuse of food (I).

### Laws and Regulation

Differing opinions were raised around using production waste as animal feed (I). On one hand, a manager commented on the unpleasant smell it would create. On the contrary however, another interviewee stated:

> I don't see why production waste can't be given to pig farmers... because then the cooks might actually, think about it a little bit more, like this is actually going to be reused in a way, little piggies are going to eat it. I wonder if they would actually make more of a conscious effort to collect all the production waste (I).

### 5.3.3 Skills (as Controls)

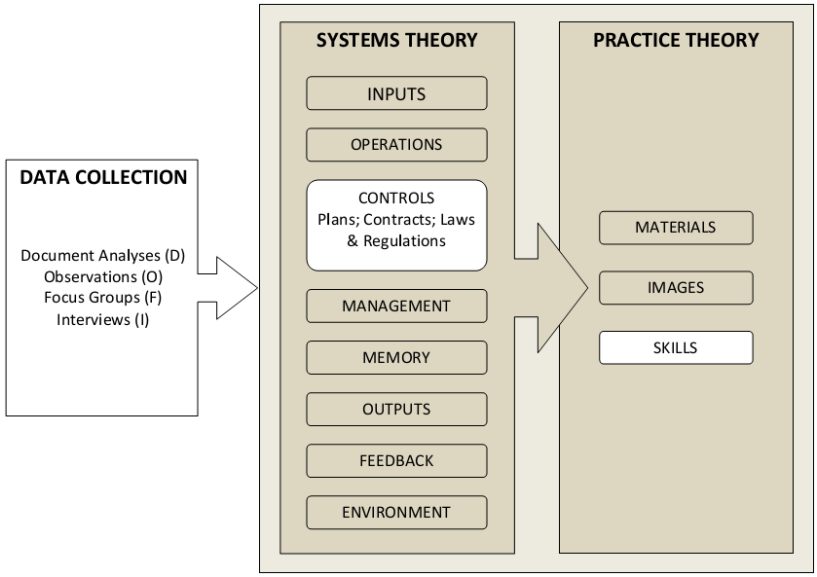


Figure 24. Integrated model of controls and skills

**Plans**

Literacy skills are required to ensure employees understand and comply with the company's visions, missions, values and guiding principles (O). As the roles and responsibilities of people vary, individual goals also differ, for example: "...my main focus is feeding the patients, simple as that. [name]'s main focus is food cost" (I). One manager reported that "environment is still a little 'e'" compared to the company's safety and food safety programmes for which there is high compliance (I). It was also mentioned that within the next year, more focus will be placed on the concepts and reasoning behind measuring and recording wastage (I).

Management skills are required to ensure company policies are implemented and complied with (D). Familiarity with menu items and knowledge on food safety practices is needed when making decisions around the reuse of leftover food (O). Visual estimates were made when measuring and recording food waste (O). Numeracy skills and precision are required to ensure the reported value is accurate. In regards to portion control, accuracy is also required to ensure the amount of food served is consistent with both production numbers and the portioning guidelines (D, O). This particular skill poses an area for improvement: "There have been inconsistencies with cooks portioning versus the recipe, so just encouraging them to really follow the recipes. If it says portion it 6x4, then portion it 6x4...There's a lot of discrepancy with who it is serving the food". A total of eight focus group participant felt that more training in the issue of food waste would be helpful to minimise the amount produced (F). All six managers also discussed the importance of staff training to reinforce portion control (I).

## 5.4 Management

**Definition of Management:** The integration and coordination of resources to achieve the desired objectives of the organisation (30).

### 5.4.1 Materials (for Management)

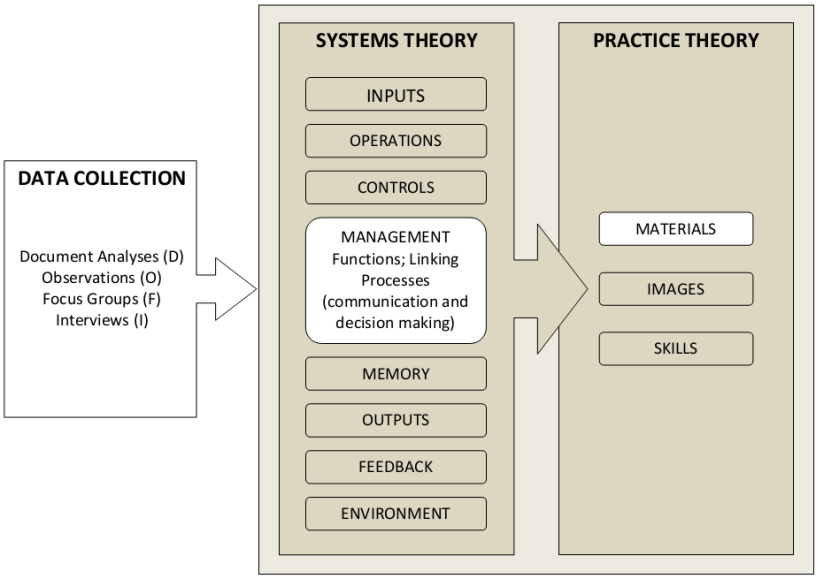


Figure 25. Integrated model of management and materials

### Management Functions

Materials associated with the planning and controlling of the organisation included: staff rosters, meeting outlines and training schedules. The staff roster highlighted the people involved in the organisation and positions they carry out (D). Communication between managers and staff was documented in minutes of monthly meetings (D).

**Linking Processes (decision making, communication and balance)**

Managers and foodservice personnel use information obtained from the forecasting, production and leftover numbers when making food waste-related decisions (O, F, I). For example, the number of leftover nutritional supplements determined the forecasted quantity for the following day (O).

The menu itself is a key document which allows patients to communicate their meal order and portion size options with the foodservice department (D, O). Diet and texture summaries are completed by clinical dietitians and speech and language therapists and allow communication about specialised dietary orders (O). Food records are sent weekly to the company's head office and are incorporated into the organisation-wide food waste trend data. However, concern was expressed that there was no constructive feedback from this current system (I). Only one educational resource was identified in the kitchens which outlined the process of waste management: "1) Collect food waste, 2) Record volume, 3) Empty into waste bin" (O). One site had an environmental awareness wall where information on issues such as climate changes, water usage and food waste was displayed (O).

### 5.4.2 Images (for Management)

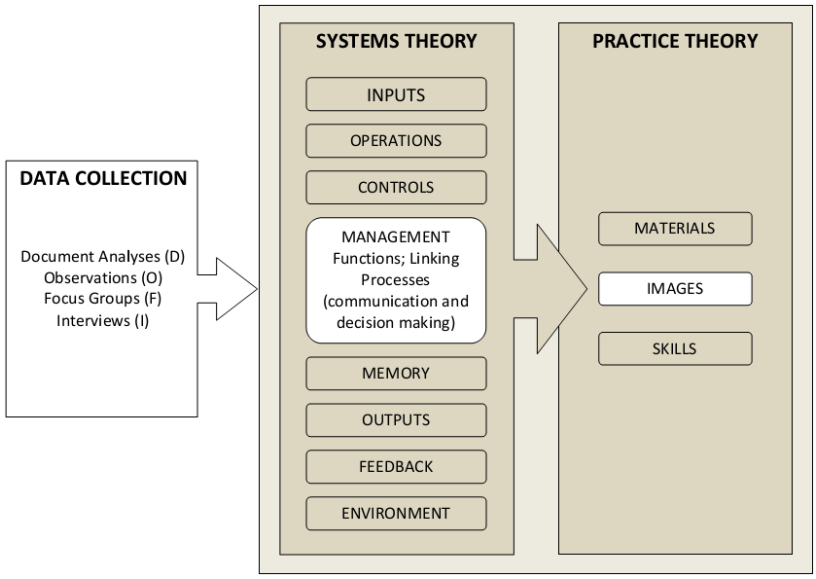


Figure 26. Integrated model of management and images

**Linking Processes (decision making, communication and balance)**

At each site, food waste-related decisions are generally made through informal, verbal communication between managers and staff (I). However, two focus group participants agreed that rules and guidelines around waste depend on managerial decisions (F). This was observed when a kitchen assistant reported that leftovers "can be reused, but need to check with [supervisor's name]".

Communication was often identified as a food waste challenge. Barriers to communication included language barriers and differing perceptions or attitudes of foodservice personnel. An example of the latter was:

> It's different with different people...We do have some cooks that are really on to it and they're great and they're keen on reducing food waste and they will come and have a

chat to us about it. And then you get cooks that don't really care, it's not part of their job description, why should they bother? (I)

### 5.4.3 Skills (for Management)

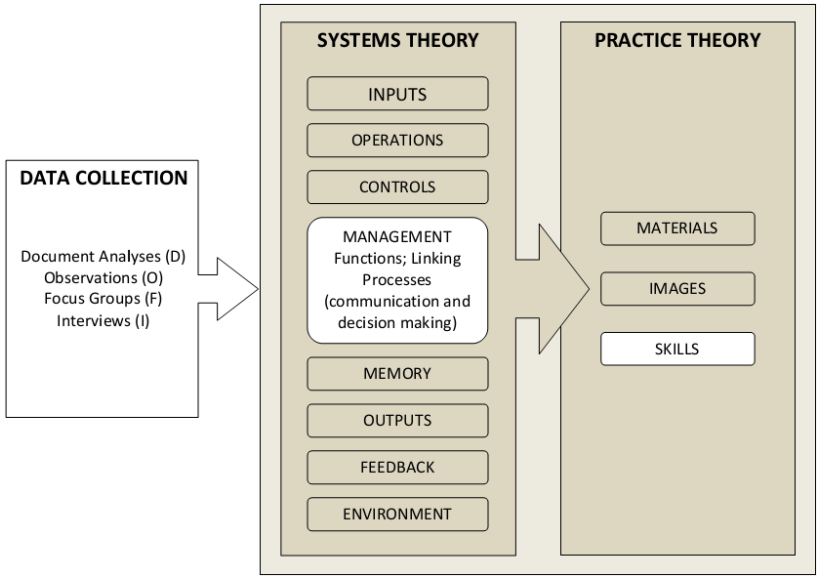


Figure 27. Integrated model of management and skills

#### Management Functions

Organisational and conceptual skills are required by managers when employing, organising and training staff to ensure they are confident in performing their role. Problem solving skills are required to assist with food waste prevention and management. At all three sites, managers were in the process of developing a new forecasting model which will eventually replace manual counting (I). Recipe and portion adjustment are important management tasks to help assist with production control whilst adhering to contractual portion standards. For example, the following quote explains a manager's reaction to high levels of over production:

> There are two areas I have to look at: were the numbers correct of ordering? If they were correct, is that recipe correct. Is the actual production of that recipe correct, so I then need to check with production, did they actually follow it according to the recipes on the recipe card to the letter? If they didn't, I need to find out why they didn't. If they did, I then need to look at the recipe, to see is that producing too much. The quick way to finding it is or isn't, is I then look two weeks back prior to see if I had any leftover two weeks before. Because if it's then forming a pattern, I can see probably the recipe needs adjusting (I).

**Linking Processes (decision making, communication and balance)**

Literacy and technical skills are required to understand and follow communication tools such as menus and production sheets (I). Menu processors require strong communication skills as they frequently consult staff within the wider hospital about patient menu selections (O). Four focus group participants felt that improved communication could help prevent food waste, within the kitchen: "We really need to keep in touch with each other. From the manager, to the menu processor, and us from the floor and even the girls that go upstairs" and within the wider hospital: "Nurses need to get involved. I have always thought that they should, because they have more contact with patients, and they know exactly how this patient is going to react" (F). One participant believed that improved communication would enable meals of discharged patients to be cancelled prior to service (F).

## 5.5 Memory

**Definition of Memory:** Records of past performance that assist in improving the future effectiveness (30).

### 5.5.1 Materials (as Memory)

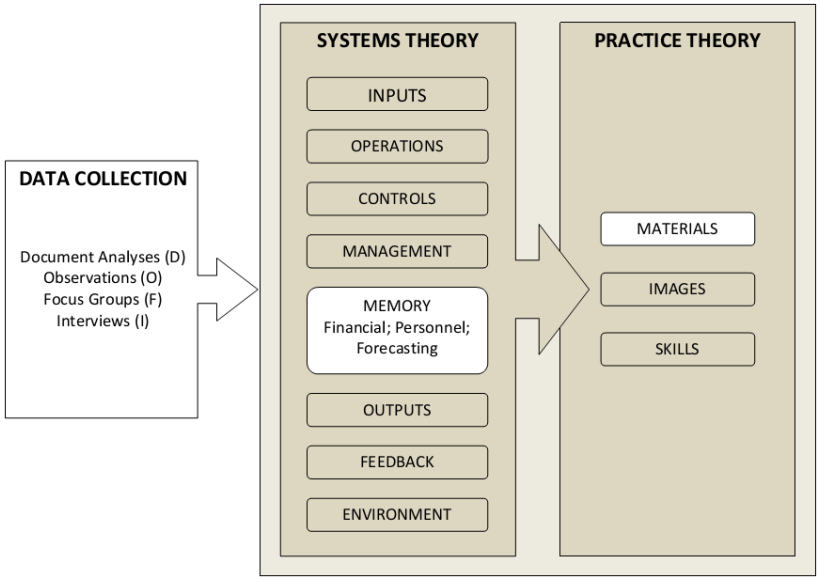


Figure 28. Integrated model of memory and materials

**Financial and Forecasting:**

The actual number of meals sent per ward, including late orders, is recorded after each service. This information is used for both charging purposes and to identify trends in total meal numbers (D, O). At one site, total meal numbers from the preceding year are displayed in the kitchen and updated daily (D, O). Forecasting, production and leftover records are used to identify trends in food waste generation and make decisions to avoid overproduction (I). Forecasting sheets, which are completed by menu processors, outline the required quantity for the lunch, dinner, snack and nutritional supplement orders (D, O). Hard copies of the

completed records are stored and often referred to when checking the accuracy of the forecasted numbers for the following day (O).

Over recent months, changes to the forecasting system at one of the sites has been initiated (D, O, F, I). For example, more menu items have been included in the manual counting process and production numbers are now updated prior to every service (F). Previous forecasting, production and leftover documents are used to develop new forecasting models at two of the sites (I). No site uses an electronic forecasting system (O, F, I).

At one site, an electronic system used to cost recipes and calculate the monetary equivalent of food waste was implemented in April 2012. The system is tailored to fit the specific site and uses up-to-date ingredient prices to cost main menu items (I). Special dietary items are not included in the analysis, as the financial implication of waste from these items is reported to be minimal:

> So all of the high volumes, the ones [menu items] which carry the highest financial value are the ones that I am more interested in. Any of the dietary requirement items, you're talking about anything from 2-10 portions, so what's leftover is leftover (I).

A reduction in the volume of food waste has been noted since this electronic costing system has been implemented (F). Focus group participants from this site also believe there has been an improvement in the generation of food waste since the early this year (F).

### 5.5.2 Images (as Memory)

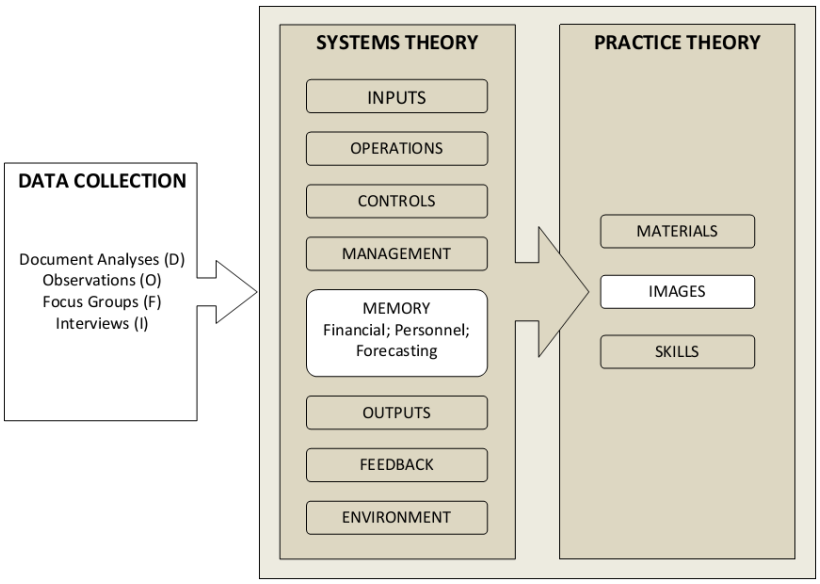


Figure 29. Integrated model of memory and images

**Financial and Forecasting:**

Two focus group participants discussed their perceived challenges with the forecasting process. While most of the menu items are manually counted, others are based on a conventional number that "has always been ordered and nobody actually knows where it comes from" (O, F). Supporting this statement, one manager commented: "I don't even know how much we make. Just tradition I suppose". One focus group reflected on a former forecasting system used by a previous foodservice provider, and believed that less waste was generated as all ordering was electronic (F). Likewise, one manager described the current process of manual counting to be a "tedious task" and suggested that an electronic forecasting system would provide information on exactly how many meals are required within a timely manner (I).

### 5.5.3 Skills (as Memory)

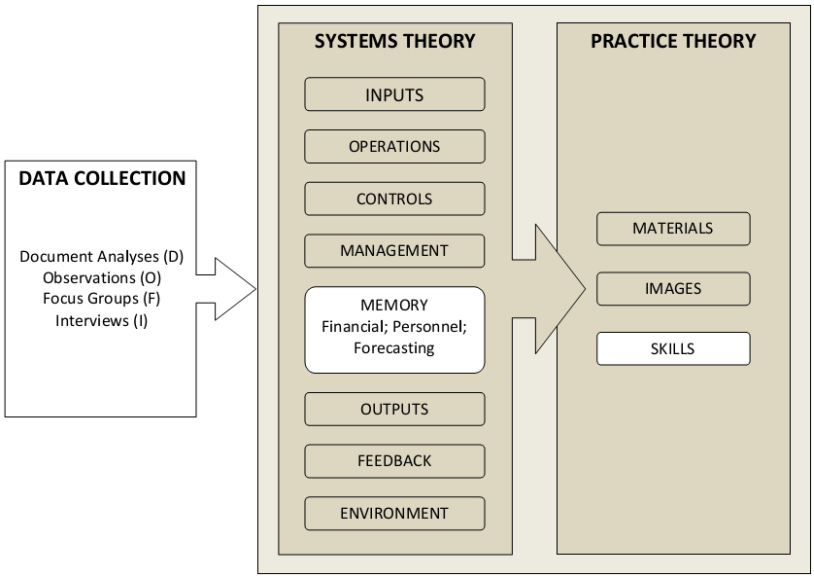


Figure 30. Integrated model of memory and skills

**Financial and Forecasting:**

Menu processors are each responsible for different hospital wards and therefore each play a different role in the forecasting process (O). Numeracy skills, time efficiency and accuracy are required to carry out the manual counting of menu items (O). A challenge of this system was forecasting for wards which do not order from menus, such as Short Stay or Emergency Department Unit: "We still have to do some kind of prediction for the wards we don't count for, and it's a bit of a guessing game for ordering" (F, I). At the largest site, only special dietary items are manually counted due to high total meal numbers and time constraints (I).

Lack of communication among foodservice staff during the forecasting process was discussed as an area for improvement: "I think the communication between the ordering and the production is not there. There is lots of guess work there" (F). One focus group identified a

discrepancy between the roles and responsibilities of menu processors, cooks and serving staff in forecasting (F). One menu processor believed it would be beneficial to obtain constructive feedback on accuracy of the previous day's forecasted numbers (F).

**Personnel:**

Experience of foodservice personnel and their familiarity with the menu influences decisions made around waste (O, F). One focus group participant for example, will adjust recipe quantity according to over- or underproduction from the previous cycle: "If you have half a tray of leftover pudding, then you can calculate...oh I have so much leftover, so next time I will minus so much" (F). Three interviewees discussed the importance of monitoring and controlling food waste by reflecting on their past work experiences. The following quote came from the manager responsible for implementing the new recipe costing system:

> Throughout my entire career, you have to look at your wastage and monitor it and try to control it, because at the end of the day, its money being thrown in the bin. So no matter where I have been, whether it has been a fine dining restaurant or cooking for bulk, you still need to have that factor under control (I).

## 5.6 Outputs

**Definition of Outputs:** Finished products and services of an organisation (30).

### 5.6.1 Materials (as Outputs)

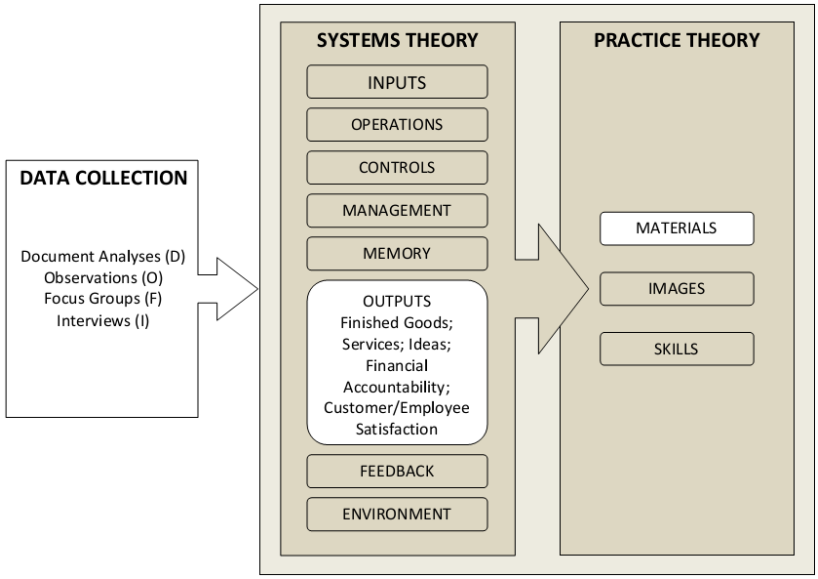


Figure 31. Integrated model of outputs and materials

**Finished Goods:**

The number of meals sent per ward and the total meal number are recorded following each service (D, O). An auditing form is used by managers to monitor the quality of meals (D). Audits are performed at least once monthly (O, I). The 'waste record and analysis' form monitors the type and amount of leftover food. When leftovers are recorded, a reason (for example "patient discharge") and corrective action (such as "sent to cafeteria") should also be provided (D, O). At all three sites, particular leftover items from lunch, such as mashed potato and rice, were reused for the dinner service (O).

Inconsistencies were noted in measuring and recording wastage both between sites and meal services. One manager reported that all production waste should be measured and recorded. However, the following quotes by foodservice personnel suggest that this policy is not always translated into practice: "...when we do the spares, that is not weighed up. It goes straight from the tray line to the bin. And the soup? Do we weigh the leftover soup?" "No" (O, F).

**Ideas:**

Adopting an electronic forecasting system was suggested by two focus group participants and three managers as a means to reduce food waste. One focus group participant, with previous foodservice experience in Switzerland, felt there is a need to adopt ordering systems and technology used in European hospitals to improve forecasting accuracy and hence wastage from overproduction. On a broader scale, one manager suggested looking into alternative packaging for pre-prepared fruit and vegetables to help achieve sustainability:

> The only thing I don't like about the pre-prepared products is that they all come in their little vacuum packed plastic package which we just chuck out. So, we're not creating food waste, but we're creating other pollution which is not good.

Some of the company's other foodservice sites are developing client gardens from which produce is fed back into the food chain (I). However, this initiative poses too many variables from a hospital point of view, particularly regarding quality and food safety (I). Two managers highlighted the importance of balancing environmental initiatives with food safety risk.

Establishing an 'Environmental Champion' initiative within each site was suggested as a means to drive environmental and sustainable processes.

**Financial Accountability:**

Costing of leftover food was only observed at one site. This only included the main menu items or items with high levels of overproduction. None of the sites have materials or documents which provide an accurate account on the total cost of food waste.

### 5.6.2 Images (as Outputs)

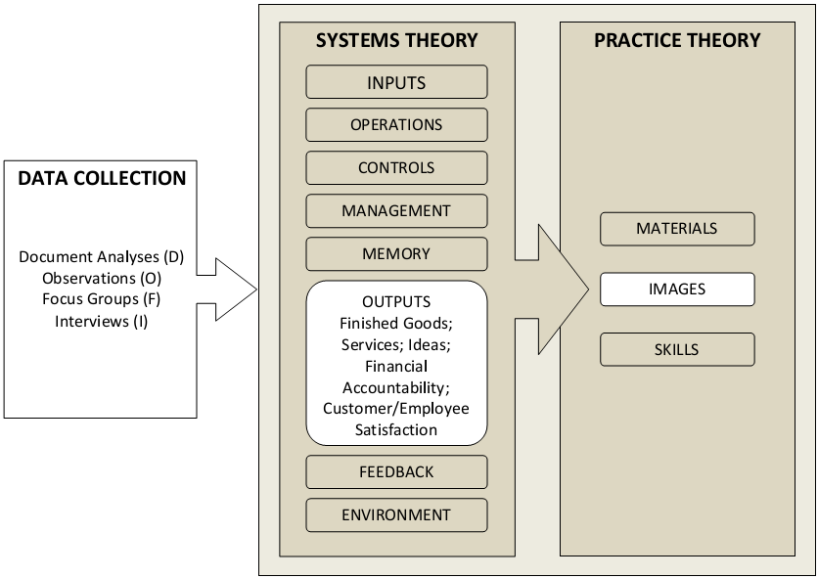


Figure 32. Integrated model of outputs and images

**Finished Goods:**

Two participants from the same site believed there has been an improvement in the amount of waste generated since around March this year (F). At another site, two managers felt there is not a lot of wastage when taking into account catering numbers and the unpredictable nature

of the hospital environment (I). For example: “Having been in food for 20 years, and having just walked into the kitchen, I actually don’t think it is too bad. For 2400 meals, were throwing out 24 litres of waste, 16 litres, 22, 23, 18 litres, that’s not a lot of waste, in a day. I am quite happy with that...” (I). It was mentioned that there needs to be some form of wastage, such as porridge, leftovers or potatoes as the organisation cannot under supply (I).

**Ideas:**

One manager felt that due to the policies, controls and dietary parameters in place, opportunities to further minimise food waste within the kitchen are limited: “Because everything is prepared outside, there is little chance of utilising off-cuts, we don’t need to, we don’t have a stock pot running...we tend to not vary from our menus or recipes too much” (I). Another manager however believed there are plenty of opportunities to further reduce the amount of production waste, for example, by developing a new forecasting tool which does not involve manual counting (I). In relation to the waste measurements and records, this manager felt that there is potential to use the waste data in a number of ways, such as comparing the summer and winter wastage, identifying waste-related behaviour of various foodservice personnel or converting it to dollar value (I).

**Customer & Employee Satisfaction:**

Generation of patient plate waste was not included as part of this thesis.

### 5.6.3 Skills (as Outputs)

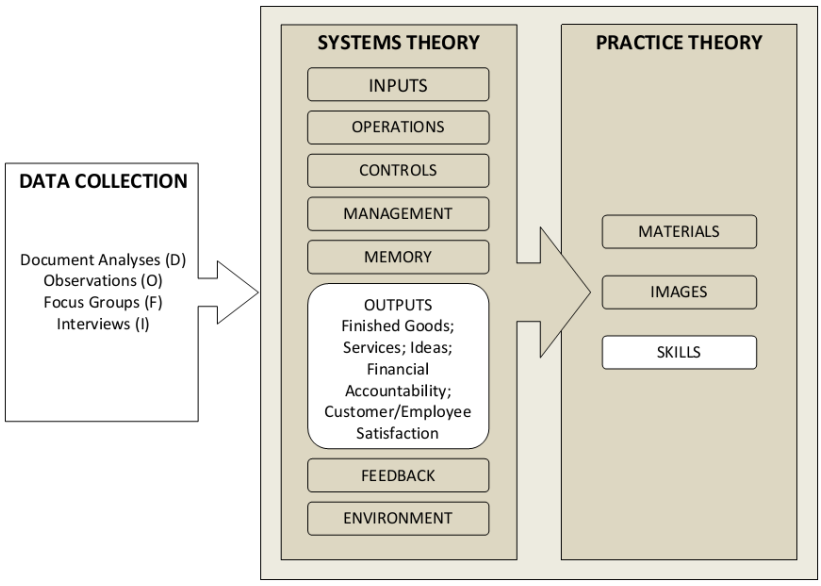


Figure 33. Integrated model of outputs and skills

**Finished Goods:**

An understanding in the meal number and waste management systems is required by foodservice personnel to obtain an accurate recording of meal output, leftovers and monetary value of wastage when calculated (O).

## 5.7 Feedback

**Definition of Feedback:** Information on how operations worked or failed, or how they should be changed or modified to restore equilibrium (30).

### 5.7.1 Materials (as Feedback)

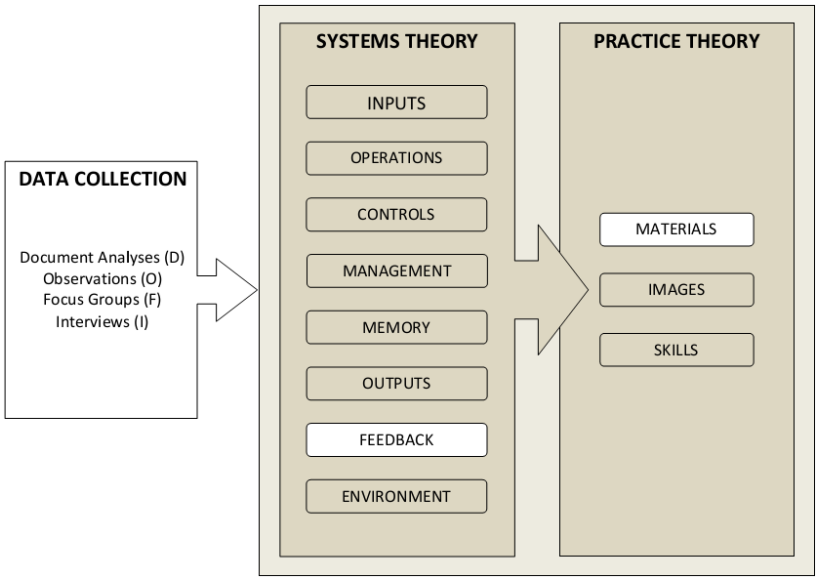


Figure 34. Integrated model of feedback and materials

Feedback forms are available at each site providing foodservice personnel the opportunity to raise issues or suggestions for improvement (D). At one site, the feedback document specifically addressed the topic of environmental performance and how it could be improved (D). If the suggestion is carried out, the feedback forms include space to record the date of implementation and report on its effectiveness (D).

### 5.7.2 Images (as Feedback)

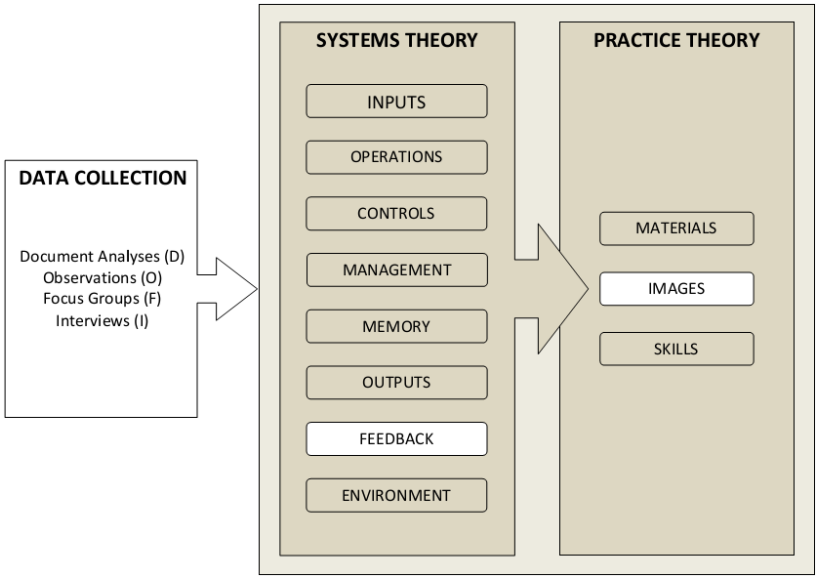


Figure 35. Integrated model of feedback and images

Most feedback between managers and foodservice personnel is provided verbally (O, I). For example, positive feedback was overheard between supervisor and tray line staff regarding portion control during a lunch service (O). When overproduction occurs, a manager reported to always discuss the issue with the cook involved and ask for an explanation (I). One focus group felt that more constructive feedback from managers on waste-related issues would help raise awareness in the kitchen (F). In particular, more feedback on forecasted numbers would be beneficial (F).

Information and advice on the waste management process is disseminated through the organisation's infrastructure from operations down to site level (I). However, regarding food waste statistics which are consolidated in Australia, three interview participants reported a gap in this feedback loop (I). Currently, data is being collected for "paper work purposes" with

minimal feedback being obtained from the company's head office (I). For example: "The whole idea was that those numbers would go to Australia, then they would come back in a graphed form so you could track your progress. But, for some reason that hasn't, that part of the system hasn't been maintained" (I). Establishing this feedback mechanism was reported to be the "next step in the evolution" (I).

### 5.7.3 Skills (as Feedback)

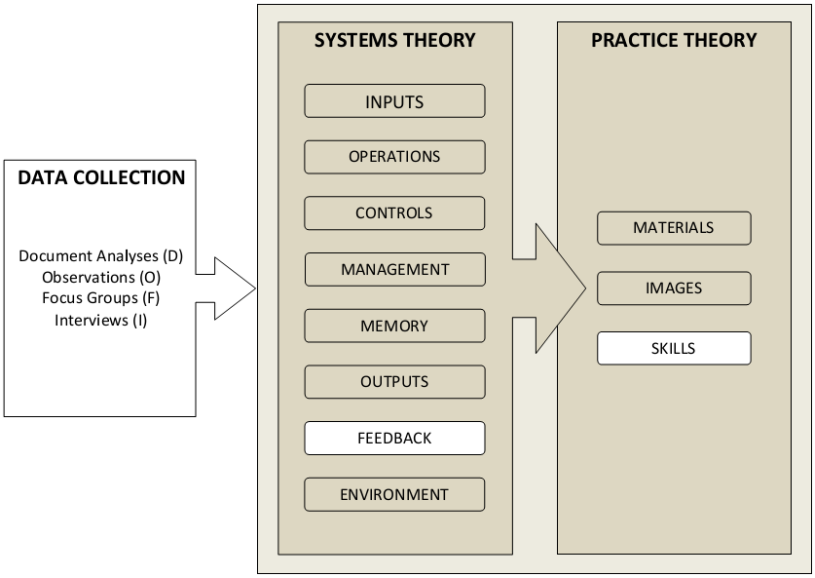


Figure 36. Integrated model of feedback and skills

Effective communication skills are required by managers to ensure feedback is provided on waste-related activities and to help raise awareness of food waste within the kitchen (O, F). One participant felt that managers could be more proactive in identifying and resolving issues around food waste: "At the moment, I don't get anything. There is no resolving what is happening. It would be nice if we do know what is happening, then we can focus on fixing the thing" (F).

From one manager's perspective, sites need to use information from the waste management system in a proactive way. For example, by making comparisons between daily and weekly waste volumes to identify peaks and troughs (I).

## 5.8 Environmental Factors

**Definition of Environment Factors:** External forces in the surrounding environment which may influence or interact with an system (30).

### 5.8.1 Materials (as Environmental Factors)

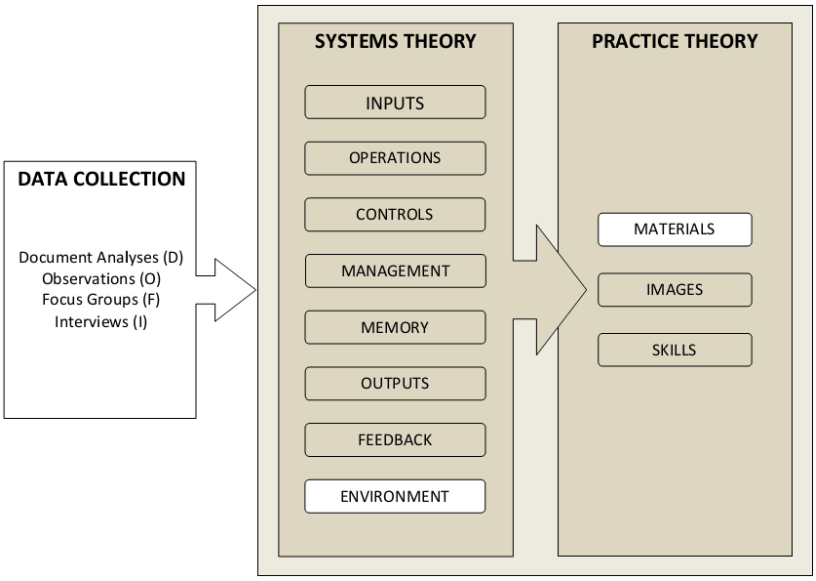


Figure 37. Integrated model of environmental factors and materials

Daily updates on the hospital's bed capacity are provided to managers via the intranet which is used to forecast production demand (I). During the winter months, bed capacity is higher in comparison to summer when people are generally healthier (F, I). Focus groups were conducted during midwinter when it was reported: 'Yea it is really full. Every bed is used... there are hardly any wastes now' (F).

### 5.8.2 Images (as Environmental Factors)

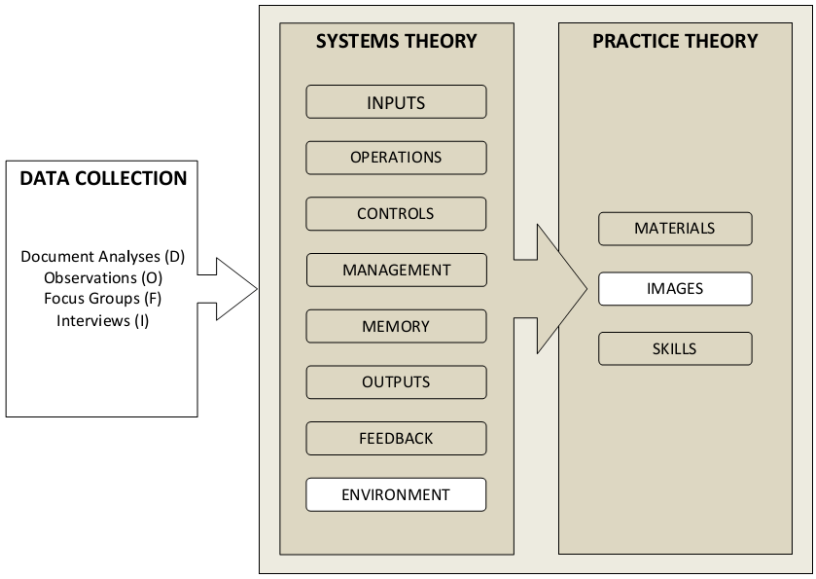


Figure 38. Integrated model of environmental factors and images

The unpredictable nature of the hospital environment was mentioned by seven participants as a challenge associated with food waste minimisation (F, I). Six out of seven times this was discussed in relation to unforeseen patient discharges. For example, "...if something is ordered and then it's not served at the end of the tray line, I will be yelling my head out 'What happened??' 'Sorry, it was a discharge'" (F). Change in diet code also contributed to the generation in waste if not communicated to the foodservice department prior to production: "It depends sometimes on the diet. Because sometimes their diets change some more to a soft, or low fibre, or low fat diet, it all depends" (F).

At one particular site, a number of changes have been implemented in regards to food waste prevention and waste management since data collection commenced in April 2012 (D, O, F, I). Additionally, during the past year, the menu cycle was condensed from a three week to a two week menu cycle (I). This change has enabled cooks to become more familiar with the

recipes and an improvement in stock control was reported (I). One manager reported that this research project, coupled with the new recipe costing system, has influenced changes within the organisation as it "highlights where the money is going, how it's being wasted and how we address it" (I).

### 5.8.3 Skills (as Environmental Factors)

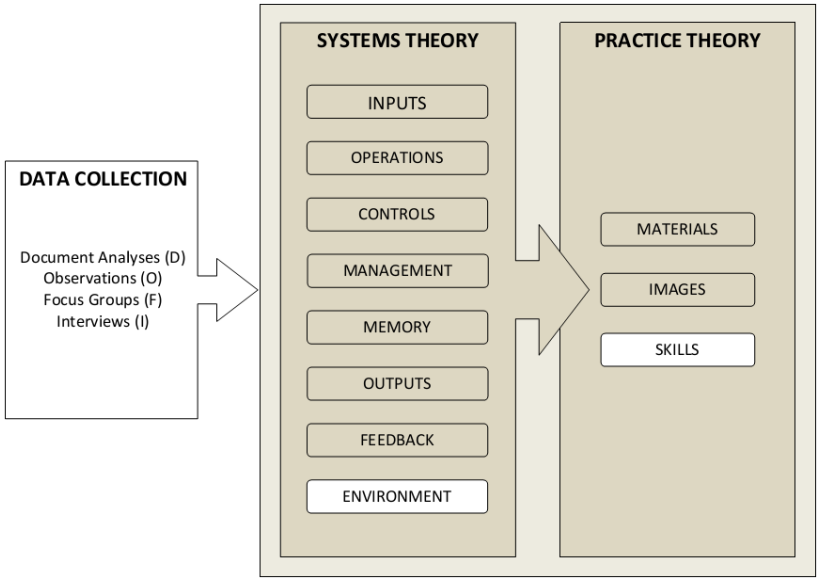


Figure 39. Integrated model of environmental factors and skills

Time management during the preparation and production of special dietary items was mentioned as a way to prevent wastage (F). One cook reported producing special meals such as omelettes or scrambled eggs at the time of service as these items are often cancelled last minute (F). Fluctuation in daily production numbers was reported by two managers to be minimal. However, seasonal fluctuations require close monitoring (I). The ability to understand and forecast production demand is required by managers, particularly when placing or adjusting stock orders (F, I):

> And sometimes, as we get into the summer months, the recipes these guys work to will start dropping down in numbers, so rather than me ordering 65 kilos of roast beef for the roast dinner, it will probably drop down to 45-50 kilos, but I don't know what date that is going to happen, I have to be proactive with regards to 'OK, last Wednesday we had 5 kilo beef leftover, so next week I am going to drop it 5 kilo'. So it's always been your reacting to an issue that's happened, but as long as you don't let it go on any further than last time it's happened, then that's how you work it out.

Foodservice personnel, particularly those involved in tray line service, also require an understanding in production demand and how this is influenced by seasonal variation. For example: "There are hardly any leftovers now. Hardly. Or what we do is just try and stretch it. What we would probably do is go a teeny weenie bit under the portion size" (F).

Better understanding in and communication about the characteristics of patient within different wards was suggested as a way to minimise overproduction waste (F). The Mental Health Unit was used as an example in which patients often go on leave throughout the lunch periods or over the weekends: "See today there is only 10 of them, usually, 35" (F).

## 5.9 Summary of Key Findings

The following section outlines key findings of the research. Refer to Table 1 on page 85 for a summary of these findings.

### 5.9.1 Food Waste Generation

To varying extents, the generation of food waste occurred throughout all phases of the foodservice system. At all sites, minimal food waste was produced during the procurement, receiving, storage, preparation and producing phases. Only small amounts of fresh produce waste were noted during sandwich and salad preparation. Most food wastage was identified during service and as a result of overproduction. Two managers agreed that there will always be some form of wastage as the company cannot under supply.

### 5.9.2 Reasons for Food Waste

Overproduction was a main cause for food waste at all sites. Challenges of the forecasting system were raised as reasons for overproduction. Examples included, doing manual counting within time constraints, forecasting for wards that do not order from menus and rounding forecasted numbers up or down. During service, the generation of food waste was mainly related to inconsistencies in portion control. The unpredictable nature of the hospital environment, such as high turnover of patients and seasonal variability was discussed as a reason for food waste. Regulations around food safety and quality control limit the redistribution of food waste in composting or animal feed programmes.

### 5.9.3 Attitudes and Perceptions of Foodservice Staff on Food Waste

Attitudes and perceptions around the issue of food waste varied. While some participants expressed concern over the volume of food waste, others considered the amount to be minimal

given the large catering numbers. Attitudes and habits of foodservice personnel were raised as influential factors of waste generation. Managers felt that while some foodservice personnel are proactive around the issue of food waste, others are comfortably set in their routines, particularly those who have been working in their roles for many years. Furthermore, staff who are more actively involved in the generation and management of waste, such as supervisors and cooks, were reported to be more conscious of waste. Previous work experience of kitchen staff and managers was often related to their thoughts and practices around food waste. Experiences were discussed both within the company (for example, familiarity with recipes and production numbers) and external to the company (for example, comparing waste levels and initiatives with previous foodservice settings).

### 5.9.4 Food Waste Prevention

Throughout the foodservice system, many plans, policies and quality controls were identified which assist in food waste prevention. Examples include stock monitoring and rotation policies, meal auditing, food safety plans and regulations as well as portioning tools and guidelines. The use of pre-prepared ingredients and standardised recipes reduced the amount of food waste during preparation and production.

### 5.9.5 Implications of Food Waste

Major focus was placed around the financial implications of food waste, particularly from a manager's perspective. For example, the financial benefit of waste reduction was discussed in regards to stock monitoring and control, the use of pre-prepared ingredients, and, the importance of accurate forecasting. Recently, systems have been implemented to calculate the monetary values of wastage and improve forecasting accuracy. However, feeding this

information back to staff was identified as an area for improvement. Focus group participants agreed that food waste meant "money down the drain".

The environmental implications of food waste were discussed by three managers. Currently, the focus on environment is small. However, an interviewee hopes for this concept to grow over the upcoming year. Environmental initiatives need to be carefully balanced with food safety risk, particularly in a hospital setting as patients may be immune-compromised. At present, training on wastage is focused from perspectives of food safety and quality control rather than environment. It was questioned whether it matters how training is targeted, as long as the end result of waste reduction is achieved. Focus group and interview participants believed that more specific training in food waste could help raise awareness of the issue.

Two focus group participants drew on the social implications of food waste by relating it to hunger and malnutrition both in New Zealand and developing countries.

### 5.9.6 Food Waste Management

Two waste management systems are currently in place, one being a company-wide policy, and the other being site specific. These involve measuring and recording food waste using a plastic bin, or, visually estimating and providing reason for leftover food. Compliance to these systems varied between meal service and sites. Foodservice personnel raised uncertainties around what should be included in this measurement process. Two managers believed there is a need to inform staff on the concept and purpose behind the waste management system to help increase interest and awareness. Not all food is accounted for as part of these waste management systems. A gap was identified in the company-wide system as information is being provided for "paperwork purposes" and no feedback on performance provided.

### 5.9.7 Communication and Food waste

In a hospital setting, food waste involves many people including suppliers, foodservice staff, hospital staff and patients. Therefore, communication was identified as a key factor in how and why food waste is produced. Both within the kitchen, and within the wider hospital, communication and feedback around meal orders, forecasting and production numbers were suggested areas for improvement. Language barriers were raised by one manager as a challenge associated with food waste prevention and management. At present, there are few visual resources displayed in the kitchen about food waste.

Table 1. Summary of Key Findings

| Key Concept | Key Findings | Link to Evidence within Results (page number reference) |
|---|---|---|
| Food Waste Generation | Minimal food waste produced during procurement, receiving, storage, preparation and production. | Inputs (materials p.31, images p.33)<br>Operations (images p.56) |
| | Most food waste occurred during service and forecasting. | Operations (images p.46)<br>Memory (image p.75, skills p.76) |
| Reasons for Food Waste | Overproduction of food which was related to challenges associated with the forecasting and ordering system. | Operations (images p.46)<br>Memory (images p.65, skills p.66) |
| | Inconsistencies in portion control during service. | Operations (images p.46) |
| | The unpredictable nature of the environment. | Operations (images p.46),<br>Environmental Factors (images p.78) |
| | Food safety and quality control regulations which limit the redistribution of food. | Controls (materials p.51) |
| Attitudes and Perceptions of Foodservice Staff | Many focus group members perceived food waste as a big issue in the kitchen where as managers agreed that the volume minimal given the large catering numbers. | Inputs (images p.33)<br>Outputs (images p.70) |
| | Managers felt that the production of food waste is influenced by attitudes and habits of kitchen staff. | Inputs (images p.33) |
| | Previous experience of foodservice personnel both within and external to the company influenced thoughts and practices food waste. | Inputs (skills p.38)<br>Controls (images p.54, skills p.56)<br>Memory (skills p.66) |
| Food Waste Prevention | Plans, policies and quality controls played an important role in food waste prevention. | Controls (materials p.51, images p.54, skills p.56) |
| | Pre-prepared ingredients and standardised recipes reduced wastage. | Inputs (materials p.31, images p.33)<br>Operations (materials p.40) |
| Implications of Food Waste | Financial implication of food waste was a main focus of discussions with managers. | Memory (materials p.63, skills p.66)<br>Operations (images p.46)<br>Environmental Factors (images p.78) |
| | Currently, little focus is being placed on the environment. | Controls (skills p.56)<br>Inputs (images p.33) |
| | Minimal discussion around the social implications of food waste. | Inputs (images p.33) |
| Food Waste Management | Two waste management systems are in place. These involve either measuring or visually estimating wastage. | Controls (materials p.51) |
| | Not all food waste is accounted for as part of these systems. | Operations (materials p.40)<br>Input (images p.33) |
| | Currently, site managers and foodservice personnel are not receiving feedback on the company-wide, waste management policy. | Feedback (images p.74) |
| Communication Around Food Waste | Food waste involves a number of people both within the kitchen and the wider hospital. | Inputs (images p.33)<br>Management (skills p.61) |
| | Language barriers associated as a challenge associate with food waste prevention and management. | Management (images p.60) |
| | Few visual resources on food waste displayed in kitchens. | Management (materials p.58) |

# 6.0 Discussion and Conclusion

A recent estimate found one-third of food produced for human consumption to be lost or wasted each year (2). Foodservice organisations, including those in hospitals, are large producers of food waste (30). Most research on hospital food waste has focused on quantifying and measuring plate waste. This study used an ethnographic approach in three hospital foodservices, all contracted to an external provider. Results focused on the following key concepts: generation of food waste and reasons behind it, attitudes and perceptions of foodservice staff, implications of food waste, and, food waste prevention and management.

## 6.1 Food Waste Generation and Reasons for Food Waste

Literature reports that food waste is generated throughout all stages of the food chain, so it was not surprising to see waste produced or influenced within every subsystem of the systems model. Results show high waste levels during forecasting and service. Useful insights were gained into reasons for food waste within each site and explanations were postulated for higher levels of waste reported in hospitals compared to other foodservice settings (13).

Lack of portion control has been determined as a contributor to plate waste (10, 18, 70), and parallels current findings for production waste. Managers believed food waste was related to inconsistent portioning at service by kitchen staff, an interesting finding given the quality controls of standardised recipes, contractual portion standards and portioning tools in place. Dissimilar perceptions of portion control between managers and kitchen staff were due to the differing levels of importance placed on compliance, or, individual opinions on the practicality of portion sizes (10). This suggests that whilst skills and materials of practice were firmly grounded, their meanings or purposes were not always accepted by practitioners (53).

Overproduction resulted from inaccurate forecasting, also a finding of previous hospital-based research (10, 20). Manual forecasting systems are subject to errors, requiring significant time and energy. Many healthcare facilities have adopted computerised menus and forecasting systems (71-73). Views of foodservice personnel parallel the reported benefits of such computerised systems; increased efficiency, accuracy and patient interaction (71, 73). This highlights the need for research on use of technology to reduce production waste. Fluctuation in production demand due to changes in hospital bed capacity and patient diet codes was also identified as a forecasting challenge. The unpredictable nature of hospital environment helps explain why higher levels of food waste have been reported in this sector (13). This thesis illustrates how waste-related practices are integrated and influenced by multiple practitioners within a hospital organisation. It also stresses the importance of effective communication amongst personnel involved in forecasting and production.

In contrast to a previous report (1), minimal food waste was documented during storage, preparation and production. This was unsurprising given the use of pre-prepared ingredients and high compliance with stock rotation. Previous researchers have argued however, that increased use of pre-prepared ingredients implies larger losses in the food system as a whole due to industrial peeling techniques (beyond the scope of this thesis) (12). Managers in this thesis acknowledged that the use of pre-prepared ingredients shifts responsibility of food waste generation further up the food chain. The thesis supports a recommendation of establishing a shared vision for sustainable development throughout interlinking stages of the food chain (10).

## 6.2 Attitudes and Behaviours of Foodservice Personnel

Multiple differences in attitudes and behaviours of foodservice personnel highlighted a challenge in achieving organisational sustainability. For example, most kitchen staff considered food waste was an issue, while managers perceived the volume to be minimal given the large catering numbers. Quested et al's (74) framework for understanding food waste prevention at a household level conceptualises links between influences, attitudes, awareness, behaviours and the retail environment. Factors identified relating to individual waste-related practices include: attitudes and values, motivation, habit, perceived social norms, knowledge and skills related to behaviour, awareness of the issue, facilities and resources (74). In the current study, values, motivations and perceived social norms were reflected amongst kitchen staff, suggesting that Quested et al's work also applies in foodservice organisations.

Managers identified attitudes and habits of kitchen staff, particularly those of longstanding employees, as influencers of waste generation. Stern et al's (75) theory that individuals are embedded in social structure that acts by shaping early experiences and thus an individual's values and beliefs, helps explain this finding. In Quested et al's (74) framework, influential factors which aligned with manager's perceptions include knowledge and skills, awareness of the issue, facilities and resources. Hargreaves (53) contended that this may relate to their increased responsibility and training in food waste and that these findings emphasise how practices are sustained through regular and repeated performance. Current findings show that for positive waste-related practices to be stabilised, the links of unsustainable practices such as staff habits need to be broken before being replaced in more sustainable ways (53).

Consistent with past research, the thesis identified external influences on waste-related behaviours including governmental, technological and economic factors (21, 74). Most significantly, it drew attention to balancing waste-related practices with food safety risk. Stern et al (75) commented that social structure acts by providing opportunities and constraints that shape behaviours and the perceived response of behaviours. The perceptions of foodservice personnel were often constrained or overruled by food safety legislation.

## 6.3 Implications of Food Waste

Food waste has different meanings or images for different levels of foodservice personnel. While kitchen staff focused on both social and financial implications of food waste, managers were more connected with the financial. Environmental sustainability is an emerging concept within their company, paralleling the 'greening' trend of the wider foodservice sector (8, 9). Therefore, the minimal focus on the environmental implications of food waste was unsurprising. This thesis supports the need to move beyond economic success, to incorporate social and ecological values as measures of sustainability (3, 5, 76). It highlights the importance of communication between all levels of foodservice staff about the values and drivers of sustainable practices. Understanding images that are important to staff (such as social implications of food waste) may help managers find effective ways to structure and deliver materials and skills (for example, visual resources and training sessions).

## 6.4 Food Waste Management

Waste management practices were inconsistent within and between sites, with numerous leftover items and food scraps not being accounted for. This may reflect a training gap amongst kitchen staff, affecting their images and skills around the handling of waste. This

finding is consistent with Sonnino & McWilliam, who found waste measurement systems in three Welsh hospitals to be unclear and food waste to be under-recorded by ward staff (10). The current study underlines the need for standardised and consistent waste measuring policies, procedures and feedback mechanisms to assure sustainable waste management practices. It highlights an opportunity to benchmark with effective waste management practitioners and apply best practice improvement.

## 6.5 Conclusion

Results support benefits of systems thinking in foodservice including more effective problem solving, planning and organisational development (30). Systems theory alone does not provide a framework to conceptualise practices performed by foodservice personnel. Integrating systems and practice theory revealed interesting links between materials, images and skills of waste-related practices throughout the system. It highlighted areas of sustainable consumption and those where more sustainable links between elements could be formed. The combined framework also emphasises the role of foodservice personnel in generating sustainable practices, offering a more people-based approach to foodservice management. Although these results derive from a single case study, the combined theoretical framework can be adopted by other foodservice settings to investigate waste-related or other sustainable practices.

Opportunities to minimise food waste before consumption include, increased training around the economic, social and environmental implications of food waste, and, development of standardised waste management. Of particular relevance in a hospital setting, the thesis stresses the importance of a strong forecasting system and enhanced communication between everyone involved in decisions around required food quantities. Since increased responsibility

in food waste was found to positively influence waste-related behaviours, an environmental champion initiative may encourage involvement in sustainable development at all levels of the organisation (53). Increasing the use of visual materials, such as food waste monitoring charts would help overcome language barriers with staff and provide continuous feedback on food waste volumes. Consistent with previous research, the thesis stresses the importance of collaborating with foodservice staff to develop innovative solutions to reduce food waste (12).

Arendt et al (77) claimed that qualitative information adds depth and breadth to foodservice studies, however limitations should also be addressed. During this study's observations, large-scale kitchens with many employees posed difficulties to capture the seeing and doings of waste-related practices. Use of a camera helped overcome this. Also, performance of practices was influenced by the presence of the observer. To help minimise this effect, staff being observed were not aware of the research focus.

Recruitment of and engagement with focus group participants was challenging. This may have been due to language barriers of kitchen staff affecting their understanding and confidence in the study (77). Many reported they were too busy to attend focus groups. As with previous studies (21), social desirability bias probably affected the reported beliefs or behaviours. For example, some participants asked whether they were "saying the right thing". In response, participants were informed that discussions remained anonymous and that there were no "right or wrong" answers. Ethnography may inhibit the ability of practice theory to make generalisations across different settings, however, it provides deeper insights which may be more valuable in the given context (53). Again, while findings are case-dependent, care has been taken to ensure that key findings do have broader implications. Most notably, the

theoretical framework can be employed to understand waste-related practices in a wide range of foodservice contexts.

This thesis offers many recommendations to extend or pursuit further research. Firstly, application of an integrated systems and practice theory model to diverse foodservice settings is desirable, for example, in facilities with different production and service styles. By doing so, current findings would be understood on a deeper level by making comparisons across foodservice contexts. Secondly, extension of this research by placing more emphasis on food waste during procurement may help establish a shared vision for sustainable development throughout the food chain (59). Thirdly, it may be argued that this study's in-depth analysis of a single practice overlooks the connections and conflicts between multiple practices. For example, although the use of pre-prepared ingredients reduced food waste, it contributed to increased levels of packaging waste. This highlights the need to consider system-wide practices that collectively help organisations shift towards sustainable development. Finally, the thesis provides grounding for a practice-based approach to investigate environmental behavioural change within foodservice systems. Hargreaves (53) methodology of a waste-reduction intervention, such as an environmental champion programme, may be a useful next step in understanding how and why waste is produced within foodservice organisations.

In conclusion, an array of factors contributes to food waste generation in hospital foodservice organisations. Most notably, it highlights that attitudes of foodservice personnel influence the performance of practices. Integrating systems and practice theory provides a new approach to foodservice management which places emphasis on both sustainable development and the perceptions of practitioners. This integrated model provides a foundation to lead further research on sustainable practices within the wider foodservice sector.

# 7.0 Application to Dietetic Practice

Increased attention is being drawn to the issue of sustainability within dietetic practice (6, 21). In New Zealand, accreditation standards for dietetic education include competency requirements for management and foodservice management (43). Sustainable foodservice management is included in foodservice courses as partial fulfilment of these competencies in the University of Otago's dietetic curriculum (44). Additionally, the systems model is the management tool used in all the University of Otago's foodservice courses (44, 78, 79). As discussed, the financial burden of food waste places additional responsibility on foodservice managers and dietitians to make ecologically sound, yet financially viable decisions around waste-related practices.

Although findings are case-specific, the current study provides useful insights into reasons for waste generation within a hospital foodservice setting. By combining both systems and practice theory, it offers an innovative approach to foodservice management which draws attention to sustainable development as well as the perceptions and behaviours of human inputs. These findings provide a foundation for foodservice managers or dietitians to develop materials and interventions which target waste reduction throughout various stages of the foodservice system.

Many opportunities exist to apply practice-based research in dietetics beyond the field of foodservice, for example, investigation into sustainable practices throughout public health dietary interventions. Ultimately, as food and nutrition experts, dietitians direct policy, education and changes in practice. Generation of sustainable practices in all areas of dietetics will contribute to the sustainability of the global food system both now and in years to come.

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# Appendices

# Appendix A: Ethical Approval Documents

University of Otago Ethical Approval

**D12/164**

Academic Services
Manager, Academic Committees, Mr Gary Witte

25 October 2012

Dr M Mirosa
Department of Human Nutrition
Division of Sciences

Dear Dr Mirosa,

I am writing to confirm for you the status of your proposal entitled "**Getting a Taste for Food Waste: The Generation of Food Waste during the Production and Service of Hospital Meals**", which was originally received on May 14, 2012. The Ethics Committee's reference number for this proposal is **D12/164**.

The above application was Category B and had therefore been considered within the Department or School and the outcome was subsequently reviewed by the University of Otago's Ethics Committee. The outcome of that consideration was that the proposal was approved.

The date of that decision was June 21, 2012.

Approval is for up to three years from the date outlined directly above. If this project has not been completed within three years of this date, re-approval must be requested. If the nature, consent, location, procedures or personnel of your approved application change, please advise me in writing.

Yours sincerely,

Mr Gary Witte
**Manager, Academic Committees**
Tel: 479 8256
Email: gary.witte@otago.ac.nz

Counties Manukau District Health Board Research Approval

COUNTIES MANUKAU DISTRICT HEALTH BOARD
A Community Partnership

Middlemore Hospital
Private Bag 93311, Otahuhu
Manukau 1640
Auckland, New Zealand
Telephone 64-9-276-0000

CMDHB Research Office
Ground Floor, Room 56
Clinical Support Building
Middlemore Hospital

22-Mar-12

Dear Sarah Goonan

Thank you for the information you supplied to the Research Committee regarding your research proposal:

Research Registration Number: 1257

Research Project Title: "GETTING A TASTE FOR FOOD WASTE: The generation of food waste during the production and service of hospital meals"

I am pleased to inform you that the Counties Manukau District Health Board Research Committee has approved this research with you as CMDHB investigator.

We wish you well in your project and require an update on how it is progressing. A copy of the progress report that is required by the Ethics Committee is sufficient, and should be submitted to the **Research Officer by** 22 March 2013

.

Please note failure to submit the progress report may result in the withdrawal of ethical approval.

Yours Sincerely,

Alison Robertson
Research Officer
Counties Manukau District Health Board
DDI: 09 276 0279 Ext: 8279
MB: 021 943 784
Email: amroberts@middlemore.co.nz

THE UNIVERSITY OF AUCKLAND
NEW ZEALAND
Te Whare Wānanga o Tāmaki Makaurau

A Tertiary Teaching Hospital and Integrated Health Care Service serving the community of Counties Manukau and beyond.

F009A

Waitemata District Health Board Research Approval

Waitemata District Health Board
Te Wai Awhina

## WDHB Approval of Audit/Observational Study

)980712236 **Getting A Taste For Food Waste: The generation of food waste during the production and service of hospital meals**

### Project Personnel

**WDHB contact** Katherine Olson

'roject type Audit or evaluation (clinical, service) **Status** PENDING

)ept Nutrition & Food Unit Mgt **Project duration** 28/02/2012 **to** 20/12/2012

;ervice Hospital Operations

'roject Description The proposed research will investigate; how and why does food become wasted during the production and service of hospital meals? Is generation of food waste during the production and service of hospital food influenced by the practices of food service personnel? And, what recommendations can be made to minimise the amount of waste generated in order to achieve a more sustainable food service system?
Medirest (Compass Group) has accepted to externally support the research. In brief, ethnographic case studies will be carried out at each of the hospital sites. This will involve the following activities; record analysis, observations, focus groups and interviews with foodservice personel.

### The undersigned all agree to the following statements:

**Study protocol**

- Appropriate confidentiality provisions have been planned for
- The study protocol or methodology has merit
- Cultural consultations have occured or will be undertaken (where required). Note that some audit (e.g. chart audit) does not require consultation.
- An expedited ethics application will be submitted if this study meets the criteria for this requirement
- There is a stated intent that the results of the study will be disseminated as widely as practical, and that all steps will be taken to implement the findings into clinical practice

**Study resource requirements**

- Resources and staff are available to conduct this study

**Note that the Knowledge Centre is able to assist in the determination of ethics approval requirements, budgets, contracts and study protocols**

| Dept/Service/Org | Role | Name | Signature | Date |
|---|---|---|---|---|
| Nutrition & Food Unit Mgt | Manager | Vicky Campbell | MCampbell | 31/5/2012 |
| Dept | Manager | Medirest Manager | | 1/6/12 |

<<END OF REPORT>>

# Appendix B: Site Visit Data Collection Tool

Use this table to identify areas of the systems model at which food waste may occur. How could this area be explored further? (document analyses, observation, focus group and/or interview)

| Systems Component | Sub-System | Food Waste Generation? | Comments |
|---|---|---|---|
| **Inputs** | Raw materials | Y/N | E.g. Food waste generated during salad preparation |
| | Information | | |
| | Energy | | |
| | People | | |
| | Facilities | | |
| | Money | | |
| | Time | | |
| **Operations** | Functional Subsystems: | | |
| | - Procurement, Receiving & Storage | | |
| | - Preparation | | |
| | - Production | | |
| | - Service | | |
| | - Cleaning and Sanitation | | |
| **Controls** | Plans | | |
| | Contracts | | |
| | Law/Regulations | | |
| **Management** | Functions | | |
| | Linking Processes: | | |
| | - Communication | | |
| | - Decision Making | | |
| **Memory** | Financial | | |
| | Personnel | | |
| | Forecasting | | |
| **Outputs** | Finished goods | | |
| | Services | | |
| | Ideas | | |
| | Financial Accountability | | |
| | Customer/Employee Satisfaction | | |
| **Feedback** | | | |
| **Environmental Factors** | | | |

# Appendix C: Record/Documentation Data Collection Tool

Using the systems model, identify points at which waste is generated at each of the three sites. Pay particular attention to those highlighted during the site visit checklist. When possible, categorise the generation of waste according to the elements of practice, i.e. images, materials and/or skills.

| **Systems Component** | **Sub-System** | **Elements of Practice Theory** | | |
|---|---|---|---|---|
| | | **Images** | **Materials** | **Skills** |
| **Inputs** | Raw materials | | | |
| | Information | | | |
| | Energy | | | |
| | People | | | |
| | Facilities | | | |
| | Money | | | |
| | Time | | | |
| **Operations** | Functional Subsystems: | | | |
| | - Procurement, Receiving & Storage | | | |
| | - Preparation | | | |
| | - Production | | | |
| | - Service | | | |
| | - Cleaning and Sanitation | | | |
| **Controls** | Plans | | | |
| | Contracts | | | |
| | Law/Regulations | | | |
| **Management** | Functions | | | |
| | Linking Processes: | | | |
| | - Communication | | | |
| | - Decision Making | | | |
| **Memory** | Financial | | | |
| | Personnel | | | |
| | Forecasting | | | |
| **Outputs** | Finished goods | | | |
| | Services | | | |
| | Ideas | | | |
| | Financial Accountability | | | |
| | Customer/Employee Satisfaction | | | |
| **Feedback** | | | | |
| **Environmental Factors** | | | | |

# Appendix D: Observation Data Collection Tool

Using the systems model, identify points at which waste is generated at each of the three sites. Pay particular attention to those highlighted during the site visit checklist. When possible, categorise the generation of waste according to the elements of practice, i.e. images, materials and/or skills.

| **Systems Component** | **Sub-System** | **Elements of Practice Theory** | | |
|---|---|---|---|---|
| | | **Images** | **Materials** | **Skills** |
| **Inputs** | Raw materials | | | |
| | Information | | | |
| | Energy | | | |
| | People | | | |
| | Facilities | | | |
| | Money | | | |
| | Time | | | |
| **Operations** | Functional Subsystems: | | | |
| | - Procurement, Receiving & Storage | | | |
| | - Preparation | | | |
| | - Production | | | |
| | - Service | | | |
| | - Cleaning and Sanitation | | | |
| **Controls** | Plans | | | |
| | Contracts | | | |
| | Law/Regulations | | | |
| **Management** | Functions | | | |
| | Linking Processes: | | | |
| | - Communication | | | |
| | - Decision Making | | | |
| **Memory** | Financial | | | |
| | Personnel | | | |
| | Forecasting | | | |
| **Outputs** | Finished goods | | | |
| | Services | | | |
| | Ideas | | | |
| | Financial Accountability | | | |
| | Customer/Employee Satisfaction | | | |
| **Feedback** | | | | |
| **Environmental Factors** | | | | |

# Appendix E: Focus Group Guide

# Focus Group Guide

Focus Group Checklist

On Arrival Checklist

Focus Group Outline

Vouchers Received Sheet

# Focus Group Checklist

Check I have the following before heading to the focus group:

- ☐ Focus group plan (questions and vouchers received sheet)
- ☐ University of Otago Name Badge
- ☐ Audio Recorder
- ☐ Spare Batteries
- ☐ Participant Information Packs (from Nutrition Manager and spares)
- ☐ Food
- ☐ Supermarket Vouchers
- ☐ Focus Group Data Collection Tool
- ☐ Watch/Timer

# On Arrival Checklist

Set up:

- ☐ Discussion area (tables and chairs)
- ☐ Audio Recorder
- ☐ Food

# Focus Group Outline

## Introduction (~ 2-3 minutes): **(1.00 – 1.02pm)**

I am Sarah Goonan, a University of Otago Student doing research for my Masters degree in Dietetics. As part of my research, I am looking at how and why food waste is produced during the preparation, production and service of hospital meals.

Firstly I would like to thank you all for coming to this group discussion. It shouldn't take any longer than 30 minutes and at the end you will receive a $10 supermarket voucher to reimburse your travel costs.

Throughout the discussion I will be asking a few questions and I would like you to just discuss the questions amongst yourselves. I would like to remind you that this discussion is confidential and nothing that you say during the course of the session will be repeated to any person outside of the group.

Are there any questions before we begin?

## Ice Breaker (~ 1-2 minutes): **(1.02 – 1.04pm)**

You all know each other, but I don't know you. So could we go around and each say your name and your favourite fruit. "My name is Sarah and my favourite fruit is raspberries"

## Focus Group Questions (~ 4-5 minutes per question):

Today we will be talking about food waste which is comes from the preparation, production and service of hospital meals **before the trolleys are sent to the ward**. So, this does not include the waste that returns from the ward.

1. **What do you think about food waste in the kitchen? (1.04 – 1.08pm)**

   (Is it important, Why/Why not?)

2. **Is it easy to cut down on food waste? (1.08 – 1.12pm)**
   (If so, how? If not, what are the challenges around doing so?)

3. **Are there any guidelines to cut down the amount of food waste produced? Do they work well? (1.12 – 1.16pm)**
   (Why/Why not?)

4. **During your training, has the topic of food waste come up? (1.16 – 1.20pm)**
   (If yes, what did it involve? How could it be improved?)

5. **Does forecasting affect the amount of food waste? If so, how? (1.20 – 1.24pm)**
   (How could the forecasting system be improved? Investigate thoughts on the idea that too much food is better than too little).

Wrapping up: We only have a few minutes left now, is there anything else people would like to say?

# Conclusion (~ 2-3 minutes):

Thanks everyone, for participating in this group discussion today. If you do have anything else you wish to discuss on the topic of food waste, please let me know as I will be running short individual interviews. Otherwise, here is my email address and you can email me anything else if you think of it.

(Hand out vouchers).

# Vouchers Received Sheet

Please fill out your details below before you have received your $10 supermarket voucher.

| Date | Hospital | Print Name | Signature |
|---|---|---|---|
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Using the systems model, identify points at which waste is generated at each of the three sites. Pay particular attention to those highlighted during the site visit checklist. When possible, categorise the generation of waste according to the elements of practice, i.e. images, materials and/or skills.

| **Systems Component** | **Sub-System** | **Elements of Practice Theory** | | |
|---|---|---|---|---|
| | | **Images** | **Materials** | **Skills** |
| **Inputs** | Raw materials | | | |
| | Information | | | |
| | Energy | | | |
| | People | | | |
| | Facilities | | | |
| | Money | | | |
| | Time | | | |
| **Operations** | Functional Subsystems: | | | |
| | - Procurement, Receiving & Storage | | | |
| | - Preparation | | | |
| | - Production | | | |
| | - Service | | | |
| | - Cleaning and Sanitation | | | |
| **Controls** | Plans | | | |
| | Contracts | | | |
| | Law/Regulations | | | |
| **Management** | Functions | | | |
| | Linking Processes: | | | |
| | - Communication | | | |
| | - Decision Making | | | |
| **Memory** | Financial | | | |
| | Personnel | | | |
| | Forecasting | | | |
| **Outputs** | Finished goods | | | |
| | Services | | | |
| | Ideas | | | |
| | Financial Accountability | | | |
| | Customer/Employee Satisfaction | | | |
| **Feedback** | | | | |
| **Environmental Factors** | | | | |

# Appendix F: Interview Guide

# Interview Guide

Interview Checklist

On Arrival Checklist

Interview Questions

Vouchers Received Sheet

# Interview Checklist

Check I have the following before heading to the interview:

- ☐ Interview plan (questions and vouchers received sheet)
- ☐ University of Otago Name Badge
- ☐ Audio Recorder
- ☐ Spare Batteries
- ☐ Participant Information Packs (spares)
- ☐ Supermarket Vouchers
- ☐ Watch/Timer

# On Arrival Checklist

Set up:

- ☐ Discussion area (tables and chairs)
- ☐ Audio Recorder

# Interview Outline

**Interview Questions**

- What are your thoughts on food waste in the hospital kitchens during the preparation, production and service of hospital meals?
    - When and how does food waste occur during these processes?
    - What role do you play in the prevention and/or management of food waste?
    - *Are environmental considerations taken into account when choosing suppliers (perhaps ask this question if the point is raised that there is little production waste due to pre-prepared ingredients).*
- What strategies are in place to reduce the amount of waste produced during the preparation, production and service of hospital meals?
    - Can you tell me about the TrimTrax Policy/Daily Wastage Record *(how effective are these? How is the data used? How are results communicated to staff? Is food waste ever expressed in a monetary value?)*
    - Do you experience challenges around minimising the amount of food waste?
    - Clarify the policy around reusing leftovers.
    - Do you see any opportunities for further minimising the amount food waste produced during the preparation, production and service of hospital meals? *(e.g. composting, redistributing production leftovers, previous experience in managing/dealing with food waste)*
- How are decisions around food waste made?
    - Who is responsible for making decisions around waste-related decisions? *(To what extent are foodservice personnel, e.g. cooks, allowed to make decisions around food waste - e.g. reusing leftover food in other recipes)*
    - To what extent are decisions around food waste influenced by international trends in foodservice sustainability?
- What training is provided for foodservice personnel in regards to the issue of food waste? *(Do you think it is effective? Are there any challenges around this?)*
- *Question for NSH:* During the focus group, and from my observation, I noted that there have been recent changes in regards to managing and dealing with food waste:
    - What changes have been made?
    - What were the driving factors behind these changes? *(Did this project and [another student's name] practicum play a role?)*
    - Have you noticed any results yet?

# Vouchers Received Sheet

Please fill out your details below before you have received your $10 supermarket voucher.

| Date | Hospital | Print Name | Signature |
|---|---|---|---|
| | | | |
| | | | |
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Using the systems model, identify points at which waste is generated at each of the three sites. Pay particular attention to those highlighted during the site visit checklist. When possible, categorise the generation of waste according to the elements of practice, i.e. images, materials and/or skills.

| **Systems Component** | **Sub-System** | **Elements of Practice Theory** | | |
|---|---|---|---|---|
| | | **Images** | **Materials** | **Skills** |
| **Inputs** | Raw materials | | | |
| | Information | | | |
| | Energy | | | |
| | People | | | |
| | Facilities | | | |
| | Money | | | |
| | Time | | | |
| **Operations** | Functional Subsystems: | | | |
| | - Procurement, Receiving & Storage | | | |
| | - Preparation | | | |
| | - Production | | | |
| | - Service | | | |
| | - Cleaning and Sanitation | | | |
| **Controls** | Plans | | | |
| | Contracts | | | |
| | Law/Regulations | | | |
| **Management** | Functions | | | |
| | Linking Processes: | | | |
| | - Communication | | | |
| | - Decision Making | | | |
| **Memory** | Financial | | | |
| | Personnel | | | |
| | Forecasting | | | |
| **Outputs** | Finished goods | | | |
| | Services | | | |
| | Ideas | | | |
| | Financial Accountability | | | |
| | Customer/Employee Satisfaction | | | |
| **Feedback** | | | | |
| **Environmental Factors** | | | | |

## Appendix G: Photos from Observations

**Hospital 1**

**Photo 1:** Fresh sandwich scraps

**Photo 2:** Lunch: leftover main item.

**Photo 3:** Lunch: leftover carbohydrate item.

**Photo 4:** Lunch: leftover special dietary items.

**Photo 5:** Lunch: leftover lunch items.

**Photo 6:** Dinner: leftover main item.

**Photo 7:** Dinner: leftover special dietary items.

**Photo 8:** Dinner: leftover dessert.

**Hospital 2:**

**Photo 9:** Waste disposal system.

**Photo 10:** Fresh food scraps from sandwich preparation.


**Photo 11:** Waste recorded following lunch service.

**Photo 12:** Dinner: leftover vegetarian item.

**Photo 13:** Dinner: leftover carbohydrate items.

**Photo 14:** Dinner: leftover vegetables and soup.

**Photo 15:** Dinner: leftover custard and puree dessert.


**Photo 16:** Dinner: waste measurement.

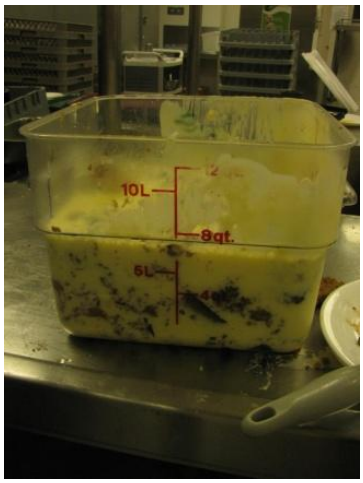



**Photo 17:** Dinner: waste measurement.

**Photo 18:** Dinner: waste disposal system.

**Hospital 3:**

**Photo 19:** Vegetarian item from Meals on Wheels discarded.

**Photo 20:** Lunch: leftover main item.

**Photo 21:** Lunch: leftover soups.

**Photo 22:** Dinner: over-production.

**Photo 23:** Dinner: over-production.

**Photo 24:** Dinner: leftover kumara saved to reuse in soups.

**Photo 25:** Dinner: only a small amount of waste generated from incorrectly plated items.

**Photo 26:** Dinner: leftover custards and desserts.

**Photo 27:** Dinner: portioned custards and desserts.

**Photo 28:** Waste disposal system.


**Photo 29:** Waste landfill bin.

## Appendix H: Poster for Focus Group Recruitment


## *ARE YOU A MEDIREST EMPLOYEE?*

***Are you interested in sharing your ideas and experiences for research looking at food waste in hospital kitchens?***

***Would you like free snacks and to be reimbursed with a $10 supermarket voucher?***

If you answered **YES** to all these questions, please read on:

The Department of Human Nutrition at The University of Otago is looking into how and why food waste is made during the preparation, production and service of hospital meals.

To do the research, I would like the help of [company name] staff, who are willing to join in a group discussion, which will be in [venue] during the 1pm lunch break on **[date]**. It will run for less than half an hour and snacks will be provided!

If you are a cook, kitchen assistant, menu processor or team leader and want to join the group discussion, please ask [Nutrition Manager's name]for an information pack. This includes details about the research, a consent form and a short questionnaire. You will then be told if you are eligible to join the group discussion.

**If you do come to the group discussion, you will receive a $10 supermarket voucher to reimburse your travel costs.**

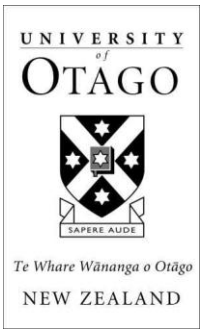
*This proposal has been reviewed and approved by the Department of Human Nutrition, University of Otago.*

If you have questions or concerns about this project, please feel free to contact either:


- Sarah Goonan, Department of Human Nutrition, goosa223@student.otago.ac.nz
- Dr. Miranda Mirosa, Department of Food Science, miranda.mirosa@otago.ac.nz, Phone: 03 479 7953


UNIVERSITY OF OTAGO
Te Whare Wānanga o Otāgo
NEW ZEALAND

# Appendix I: Information Pack for Focus Group Participants




**"GETTING A TASTE FOR FOOD WASTE:**
**The generation of food waste during the production and service of hospital meals"**

Dear Focus Group Participant,

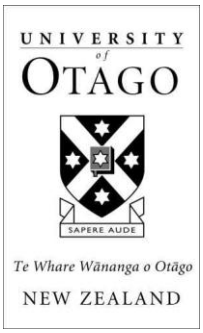
Thank you for showing an interest in this project. I am Sarah Goonan, a University of Otago Student doing research for my Masters degree in Dietetics. As part of my research, I am looking at how and why food waste is produced during the preparation, production and service of hospital meals. Therefore, I would greatly appreciate it if you take part in this study. It will involve attending a group discussion (lasting for approximately 30 minutes) which will be held in the [venue] during the 1pm lunch break on [date]. If you are interested in taking part, please make sure that you complete the following steps:

1. Read the information sheet provided.
2. Sign and date the consent form.
3. Fill out the short questionnaire.
4. Return the information pack to [Nutrition Manager].

At the end of the focus group, you will get a $10 supermarket voucher for reimbursement of costs involved in travelling to this focus group.

I am looking forward to meeting with you,

Sarah Goonan
Student Dietitian




**"GETTING A TASTE FOR FOOD WASTE:**
**The generation of food waste during the production and service of hospital meals"**

**INFORMATION SHEET FOR FOCUS GROUP PARTICIPANTS**

Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate, I thank you. If you decide not to take part there will be no disadvantage to you and I thank you for your consideration.

**What is the aim of the project?**

The aim of this research is to understand how and why food waste is produced during the preparation, production and service of hospital meals and whether it is influenced by the practices of foodservice staff. This project is being undertaken by a University of Otago student as part of the requirements for the Masters in Dietetics.

**What type of participants are being sought?**

[Company name] foodservice staff from selected hospital sites.

**What will participants be asked to do?**

Should you agree to take part in this project, you will attend a group discussion at your hospital. This will take approximately 30 minutes of your time. Please be aware that you may decide not to take part in the project without any disadvantage to yourself of any kind.

**What data or information will be collected and what use will be made of it?**

During the focus group, you will be asked to discuss your perceptions, attitudes and practices around food waste during the preparation, production and service of hospital meals. The focus group session will be audio and video recorded to allow the researcher to remember and transcribe what was said during the session. Neither audio and video recordings, nor the transcripts, will be shared with anyone outside the current research project.

Nothing that you say during the course of the session will be disclosed to any person outside of the group session. After the focus group session, the audio and video and video file will be transcribed and your real name will be removed from the data so that outsiders reading the final report cannot identify your real name.

Any personal information that you provide will only be used to assist in explaining the study results. Personal information will be published only as total numbers (e.g. the total number of kitchen assistants included). Responses will be collected and transferred onto a USB memory-stick that will be stored in a lockable filing cabinet in an office in the University of Otago Auckland Centre. The data will only be accessible to Sarah Goonan (researcher) as well as Dr. Heather Spence and Dr. Miranda Mirosa (academic supervisors), as required by the University's research policy. Any data on which the results of the project depend will be retained in secure storage for five years, after which time they will be destroyed.

The results of the project may be published in which case they will be available in the University of Otago Library (Dunedin, New Zealand). Every attempt will be made to preserve your anonymity.

You are most welcome to request a summary of the study results. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (phone 03 479 8256). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

**Can participants change their mind and withdraw from the project?**

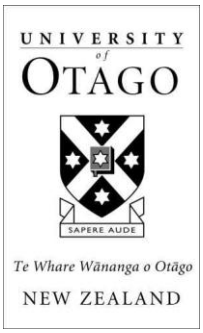
You may withdraw from participation in the project at any time and without any disadvantage to yourself of any kind.

**What if participants have any questions?**

If you have any questions about our project, either now or in the future, please feel free to contact either:


| | | |
|---|---|---|
| Sarah Goonan | and/or | Dr. Miranda Mirose |
| Department of Human Nutrition | | Department of Food Science |
| Email: goosa223@student.otago.ac.nz | | Email: miranda.mirosa@otago.ac.nz |
| | | Telephone: 03- 479 7953 |


This study has been approved by the Department stated above. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph 03 479-8256). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.




**"GETTING A TASTE FOR FOOD WASTE:**
**The generation of food waste during the production and service of hospital meals"**

**CONSENT FORM FOR PARTICIPANTS**

I have read the Information Sheet concerning this project and understand what it is about. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.

I know that:

1. My participation in the project is entirely voluntary;

2. I am free to withdraw from the project at any time without any disadvantage;

3. The data will be destroyed at the conclusion of the project but any raw data on which the results of the project depend will be retained in secure storage for at least five years;

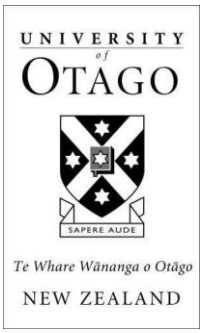
4. This project involves an open-questioning technique. The general line of questioning includes *'Do you think food waste is a problem in your work place and why/why not*? '. The precise nature of the questions which will be asked have not been determined in advance, but will depend on the way in which the interview develops and that in the event that the line of questioning develops in such a way that I feel hesitant or uncomfortable I may decline to answer any particular question(s) and/or may withdraw from the project without any disadvantage of any kind.

5. Only once I have completed the session will I receive a supermarket voucher to the value of $10 for reimbursement of costs involved in travelling to this focus group.

6. The results of the project may be published and available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve my anonymity.

I agree to take part in this project.

..... .....
(Signature of participant) (Date)




**"GETTING A TASTE FOR FOOD WASTE:**
**The generation of food waste during the production and service of hospital meals"**

**QUESTIONNAIRE FOR PARTICIPANTS**

Thank you for expressing your interest in this study. Please fill out the fields below so I can contact you regarding the next step in the study.

**Name:**

**Position:**

**Contact Details:**

Email:

Phone:

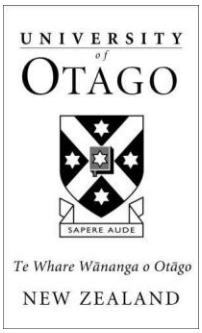
Preferred Method of Contact:

**Hospital Site:**

**Session Day/Time:**

**Once complete, please return this information pack to [Nutrition Manager].**

# Appendix J: Information Pack for Interview Participants




**"GETTING A TASTE FOR FOOD WASTE:**
**The generation of food waste during the production and service of hospital meals"**

Dear [name of manager],

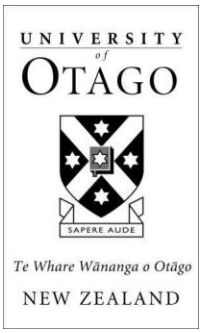
Thank you for showing an interest in this project. I am Sarah Goonan, a University of Otago Student doing research for my Masters degree in Dietetics. As part of my research, I am looking at how and why food waste is produced during the preparation, production and service of hospital meals. Therefore, I would greatly appreciate it if you take part in this study. It will involve attending a semi-structured interview (lasting for approximately 15 minutes). If you are interested in taking part, please complete the following steps:

1. Read the information sheet provided.
2. Sign and date the consent form.
3. Return the consent pack to Sarah.

At the end of the interview, you will get a $10 supermarket voucher for reimbursement of costs involved in travelling to this interview.

Many thanks,

Sarah Goonan
Student Dietitian




**"GETTING A TASTE FOR FOOD WASTE:**
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**INFORMATION SHEET FOR INTERVIEW PARTICIPANTS**

Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate, I thank you. If you decide not to take part there will be no disadvantage to you and I thank you for your consideration.

**What is the aim of the project?**

The aim of this research is to understand how and why food waste is produced during the preparation, production and service of hospital meals and whether it is influenced by the practices of foodservice staff. This project is being undertaken by a University of Otago student as part of the requirements for the Masters in Dietetics.

**What type of participants are being sought?**

[Company name] staff from selected hospital sites.

**What will participants be asked to do?**

Should you agree to take part in this project, you will attend a semi-structured interview at your hospital. This will take approximately 15 minutes of your time. Please be aware that you may decide not to take part in the project without any disadvantage to yourself of any kind.

**What data or information will be collected and what use will be made of it?**

During the interview, you will be asked to discuss your attitudes and practices around food waste during the preparation, production and service of hospital meals. The interview will be audio recorded to allow the researcher to remember and transcribe what was said during the session. Neither the audio recordings, nor the transcripts, will be shared with anyone outside the current research project.

Nothing that you say during the course of the session will be disclosed to any person outside of the interview. After the interview, the audio file will be transcribed and your real name will be removed from the data so that outsiders reading the final report cannot identify your real name.

Any personal information that you provide will only be used to assist in explaining the study results. Personal information will be published only as total numbers (e.g. the total number of kitchen assistants included). Responses will be collected and transferred onto a USB memory-stick that will be stored in a lockable filing cabinet in an office in the University of Otago Auckland Centre. The data will only be accessible to Sarah Goonan (researcher) as well as Dr. Heather Spence and Dr. Miranda Mirosa (academic supervisors), as required by the University's research policy. Any data on which the results of the project depend will be retained in secure storage for five years, after which time they will be destroyed.

The results of the project may be published in which case they will be available in the University of Otago Library (Dunedin, New Zealand). Every attempt will be made to preserve your anonymity.

You are most welcome to request a summary of the study results. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (phone 03 479 8256). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

**Can participants change their mind and withdraw from the project?**

You may withdraw from participation in the project at any time and without any disadvantage to yourself of any kind.

**What if participants have any questions?**

If you have any questions about our project, either now or in the future, please feel free to contact either:


Sarah Goonan

Department of Human Nutrition

Email: goosa223@student.otago.ac.nz

and/or

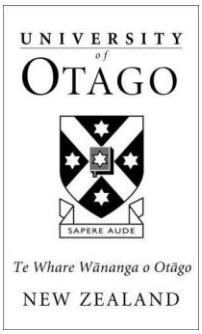
Dr. Miranda Mirose

Department of Food Science

Email: miranda.mirosa@otago.ac.nz

Telephone: 03- 479 7953


This study has been approved by the Department stated above. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph 03 479-8256). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.




**"GETTING A TASTE FOR FOOD WASTE:**
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**CONSENT FORM FOR PARTICIPANTS**

I have read the Information Sheet concerning this project and understand what it is about. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.

I know that:

1. My participation in the project is entirely voluntary;

2. I am free to withdraw from the project at any time without any disadvantage;

3. The data will be destroyed at the conclusion of the project but any raw data on which the results of the project depend will be retained in secure storage for at least five years;

4. This project involves an open-questioning technique. The general line of questioning includes *'What are your thoughts on food waste in the hospital kitchen*? '. The precise nature of the questions which will be asked have not been determined in advance, but will depend on the way in which the interview develops and that in the event that the line of questioning develops in such a way that I feel hesitant or uncomfortable I may decline to answer any particular question(s) and/or may withdraw from the project without any disadvantage of any kind.

5. Only once I have completed the session will I receive a supermarket voucher to the value of $10 for reimbursement of costs involved in travelling to this interview.

6. The results of the project may be published and available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve my anonymity.

I agree to take part in this project.

..... .....
(Signature of participant) (Date)