FOOD WASTE MANAGEMENT POLICIES AND PROCEDURES IN THE AIRLINE CATERING INDUSTRY: A STUDY OF AIR CHEFS SOUTH AFRICA

Dissertation presented for the degree of
MASTER of MANAGEMENT SCIENCES
(Hospitality and Tourism)

DURBAN UNIVERSITY OF TECHNOLOGY
NOMPUMELELO PRISCILLA SAMBO
10/3/2018

APPROVAL

SUPERVISOR: ----------

DR DC HLENGWA

Doctor of Technology in Business Administration (DUT); Master of Recreation and Tourism (UniZulu); Post Graduate Diploma in Tertiary Education (UNISA); BA Hons (Geography); Bachelor of Pedagogics (UniZulu).

DATE: ----------

DECLARATION

I declare that this study:

FOOD WASTE MANAGEMENT POLICIES AND PROCEDURES IN THE AIRLINE CATERING INDUSTRY: A STUDY OF AIR CHEFS SOUTH AFRICA

Unless specifically indicated to the contrary in the text, is my own work in both conception and execution. All the sources of information used or quoted have been duly acknowledged by means of complete references.

Nompumelelo Priscilla Sambo

DATE

ACKNOWLEDGEMENTS

I am greatly indebted to the following people and institutions for inspiring me to conduct this study, promoting my work, providing valuable information and urging me to work hard to complete this project:

- Firstly, the Lord my God for the strength and the courage.
- Thank you to my family, especially my beloved son Lusito Sambo and mother Ms EV Maluka who cheered me on during this time and understood the pressure I was under.
- Mr. Kurt Scholtz, General Manager Operations at Air Chefs who made it possible for me to conduct this study.
- The employees at Air Chefs who were willing participants in the data collection process.
- My supervisor Dr. Dumisile Hlengwa for believing in me, for her patience, her guidance and continuous grooming. Thank you so much Dr H.
- My statistician Mr. D Singh at DUT, who assisted with the data analysis.

I'm grateful to so many people for this achievement, my friends (Sbongile Kunene, Zine Sekhukhune, Busi Mathlokoane, Refilwe Ramaphala, and the late Sihle Lyrea), my colleagues, fellow students, I saw you all and you all made such an impact in my life during this time. Thank you.

DEDICATION

I would like to dedicate this Masters dissertation to my precious sons Lusito and Nkanyezi Sambo as well as my mother Ms. E.V. Maluka. I did this as a token of my appreciation to you for constantly believing in me. There is no doubt in my mind that without your support, encouragement, motivation and counsel, I would not have completed this work.

Thank you, may God bless you all.

ABSTRACT

Inflight catering is an old practice that has been in existence since the beginning of air travel. The ability for airlines to execute this practice has evolved over the years as airline travel becomes more common and accessible. This has created a lot of food waste especially post-flight. The processes and procedures of the handling of food waste within the airline catering industry in South Africa are to dispose of it into landfills. Food waste has been studied and seen to be unethical and to have negative effects to the environment.

The immediate objectives of this study was to measure the post-flight food waste and look for ways to improve the post-flight food waste procedures in the airline catering industry in consideration of the food waste hierarchy and corporate social responsibility (CSR).

This study used a mixed method approach. An interview was conducted with management to unpack the food waste management policy, a questionnaire to get employees perceptions as well as a waste audit to quantify and categorise the food waste by route. To complete the investigation, a costing exercise was conducted on the post-flight food waste. A coding method and descriptive analysis was used to analyse qualitative data. Statistical analysis was used for the quantitative data.

The regulations and policies governing the food industry were reported as the major stumbling blocks in changing catering companies' food waste policies. A high percentage of respondents perceived some of the food waste to still be edible and could be donated. Post-flight food waste amounts to an average of 2129592g (2129kg) and R484 337.63 in a four day period. The route with the most waste was found to be regional routes with 772668g and international flights yielded the least waste at 657014g in the four day period of data collection. The categories of food that yield the most waste

were found to be butter, dessert, starters, filled rolls, cheese, crackers, yoghurt, breads/croissants, jam and chocolates all yielded above 5 % of the total waste.

The study concluded that the best way to deal with the phenomenon of post-flight food was to prevent it through reconsidering the catering needs of passengers. Some steps such as food donations are not applicable because of the high risk of food poisoning. In consideration of corporate social responsibility, airline catering companies need invest money to update its technology and infrastructure in the interest of reducing land filling and maximising profits. Be that as it may there can be immediate changes to the handling of domestic post-flight food waste as this waste can be reused by channeling it towards donations, animal feeding, the creation of bio-fuel and or creating compost but subject to proper handling.

Keywords: Post-flight food waste, airline catering, food waste hierarchy, corporate social responsibility

KEY CONCEPTS

i. Food Waste
ii. Economy class
iii. Airline Catering
iv. The Food Waste Hierarchy
v. Corporate Social Responsibility

TABLE OF CONTENTS

00000O00000

LIST OF FIGURES

00000O00000

LIST OF TABLES

00000O00000

LIST OF ANNEXURES

CHAPTER 1

INTRODUCTION AND ORIENTATION TO THE STUDY

1.1 INTRODUCTION AND BACKGROUND

This chapter gives the background, the problem statement, the guiding research questions and objectives, defines main concepts and outlines the significance of the study. It also gives a brief introduction to airline catering and the airline catering company where the study was conducted. This chapter is important because it orientates the reader to what can be expected and creates an awareness of the main concepts the phenomenon and subject interest being investigated.

The subject of interest in this study is airline food waste management which has been a topic of interest in the airline catering industry for many years. Li, Poon, Lee, Chung and Luk (2002) noticed that passengers seldom eat all the food that they are served inflight, therefore economy class post-flight food waste generally forms a large part of cabin waste. Food and beverage departments of airlines are tasked to deliver and sustain high quality meals in aircraft cabins, this serves as a competitive business strategy and a differentiator between low cost airlines and full fare airlines as well as a differentiator in classes of travel (South African Airways service training manual, 2014). This sees airline catering companies inevitably produce a lot of food resulting in food waste.

Waste management strategies in most business sectors have been well researched and defined to an extent. Strategies such as: reduce, reuse, repair, reconstruct, recycle and extended producer responsibilities are in place in some departments of most institutions (King, Burgess, Ijomah and McMahon, 2004). Previous academic efforts that quantified food waste were to understand social behavior of specified groups (Evans, Campbell and Murcott, 2013) and some focused on portion sizes (Freedman and Brochado, 2010). There is no known study that has looked at airline catering food waste management alongside the corporate social responsibility (CSR) theory and the food

waste hierarchy tool. The World Bank (2013) describes CSR as an ethical corporate governance structure that considers the people, the planet and profits otherwise referred to as the triple bottom line. It is a voluntary integration by a company of social and environmental concerns into its management strategies, its business model and operations. Jones, Comfort and Hiller (2006) elaborate that CSR goes beyond the core business of an establishment into a philanthropic behaviour and the way in which a company shows social concerns by making charitable donations while it strives to operate in a way that minimises harm to the environment. The food waste hierarchy is a food waste management tool that concentrates on giving guidance on how food waste can be prevented, reused recycled, recovered before disposal (Papargyropoulou, Lazano, Steinberger, Wright and bin Ujang, 2014). The airline industry's food waste management systems in the light of these two concerns is currently not academically documented.

1.2 RATIONALE FOR THE STUDY

As much as the introduction and background gives some justification for this study, it was further informed by the researcher's observation of economy class post-flight food waste at South African Airways as a cabin crew member there. The observation is that passengers seldom eat all the food that is presented to them and other passengers do not eat at all in flight. The reasons for this behaviour are beyond the scope of this study. However, it was visible to the naked the that there was a lot of food not consumed, resulting in food waste.

The observation was that at South African Airways is complementary on all routes and destinations. Domestic flights and short regional flights have one meal service and international flights have 2 - 3 meal services and is served at meal times (SAA training manual, 2016). This catering practice may be the reason there is a lot of food waste because whether a passenger will require food, eat inflight or not, they are automatically catered for. This triggered the question: what happens to all the uneaten food from flights?

Interestingly, the South African Press Association (SAPA) reported in a news publication in 2013 that Air Chefs was disposing of large amounts of uneaten food. This publication revealed that, in one weekend during December 2013, Air Chefs dumped 840 lemon meringues, 250 cheese snack focaccias, 300 turkey croissants, almost 1000 bread rolls and 150 desserts. The news agency also reported that food used to be donated to charities, but this was stopped by management because of lack of transparency in the selection of the charity organisations. This news report together with the observation triggered curiosity to visit the catering unit to see if anything had changed since the reporting, if so, what and how can academic research assist in finding a solution to manage food waste in the establishment.

Jacobs and Hoeller of the business insider (2015) exposed that prepared meals for inflight services cannot sit for more than eight hours before being loaded on a flight. In an instance where a flight is to be delayed or cancelled meals are to be disposed of. This means that some food gets disposed of before it even gets to the intended customer.

This study is equally in response to Hediger (2000: 48) who challenged people to attempt to understand sustainability holistically and answer questions such as, “what should be sustained?” and “what kind of development do we prefer?” Hediger (2000:48) additionally highlights the importance of sustaining and developing of the food and catering industry to drive economic growth, increase employment and to create an environment that promotes social inclusion and social vibrancy. So, one wonders as to how a change in regulation and policy in consideration of the environment can impact the wellbeing of peopleby merely improving the management of post-flight food waste.

The Department for Environment, Food and Rural Affairs (2006:2) policy document on the food industry sustainability strategies clearly states that sustainability and development of this industry is achievable through the creation of ways and practices that enhance the physical and natural environment in which it exists. Interest in this study was also sparked by the broad use of words such as sustainability, blueprint strategies and CSR in the business world. Some business units within industries have

strategies in place whereby they encourage general awareness of waste management. This is seen through the recycling of steel, plastics, tires and paper to improve on matters of sustainability. However little is said about the food waste produced by the hospitality and mass catering industries in South Africa.

The food waste and yard waste plan for Hong Kong (2014) is in agreement that food waste is detrimental to the environment if it ends up in landfills. It further recommends for food waste to be minimized, donated, recycled or recovered as energy or nutrients instead of land filling. This study looks at the feasibility of using post-flight in ways that are recommended by the corporate social responsibility theory and the food waste hierarchy tool to manage airline post flight food waste.

In addition to the above, the study was equally set off by the everyday realities of drought and resultant food insecurity, food scarcity and poverty which are some of the growing concern in South Africa (Sihlobo and Kapuya, 2015) and the United Nations as expressed in Sustainable Development Goals (SDGs): 1 of ending poverty, 2 of ending hunger, 3 promoting good health and well-being, 8 of sustainable economic growth, and 12 aimed at the promotion of responsible consumption and production.

The researcher believes that the airline catering and hospitality industry in South Africa can play a role in curbing these social and economic problems (Rok and Mulej, 2014) and an ccontribute towards the attainment of some of the SDGs. Lindgreen and Hingley (2009) acknowledge that while the hospitality and tourism industry has created a lot of jobs, it also accounts for big amounts of food waste. They blame multi-culturism which has resulted in a broader food variety on menus due to wider food preferences thus creating more and more food waste as caterers try to meet the needs of their broad clienteles and diverse needs.

The Environmental Bureau (2014) states that large contributors to food waste are households and the food industry at large. The researcher believes that there is something the airline catering industry do differently to manage economy class post-flight food waste through the use of CSR and the waste hierarchy. Bates and Phillips (1998) called for the food and drink industry to find ways to reduce food waste through

alternative and creative uses for uneaten foods before disposal and dumping. They also advised that doing so would not only be good for the finances of a company, but will gain the company favour with the public as it would be viewed as socially responsible and environmentally friendly. Based on the above said, It is evident that the topic of economy class post-flight food waste management needs thorough investigation.

This study therefore aims to address some of the concerns tabled above. As much as there are many ways CSR is defined, this study is guided by the World Bank's (2005) definition of CSR as a voluntary integration of social and environmental concerns into the company's business model and operations.

1.3 SIGNIFICANCE OF THE STUDY

This study was conducted at one of the largest airline catering companies in South Africa, Air Chefs. This company caters for South African Airways flights on their domestic, regional and international flights out of Johannesburg, Cape Town and Durban. It is equally responsible for the off-loading of all catering waste (Airport corporate research program (ACRP), 2014).

The outcome of this study can be beneficial to firstly, the airline catering industry policy makers. It can trigger an interest to give attention to the inadequacies of the current food waste and surplus food management practices. This may help to improve process flows and assist in developing improved the future approaches to this matter.

Secondly, the study can bring about attention to the food waste phenomenon to the broader catering sector in South Africa. This can make other companies reconsider their food waste management policies and possibly add a step in their process flows that include surplus food management.

Thirdly, this study can contribute to the improvement of left-over food management in the airline catering sector of the catering industry at large by putting figures to the amount of food that goes to waste in this sector. This knowledge may improve the

management of left-over food, as per the famous quotation by Drucker (1959:247) that what gets measured gets managed.

1.4 STATEMENT OF THE PROBLEM

There is currently no economy class post-flight food waste and surplus food rescue policy in place at Air Chefs South Africa. Such a policy would govern the responsible reuse or recycle of post-flight food. In South Africa where there are challenges of food insecurity and poverty (Schwabe; Albiac-Murillo; Connor; Hassan and Meza González, 2013) and where one in every five South Africans is not sure where their next meal would come from (FoodBank SA, 2009) food waste of any form is concerning. Such a situation is regarded as unsustainable and irresponsible, when looking at it from the environmental, social and economic points of view (Nahman; de Lange and Oelofse, 2012).

Ignoring the need for better management of food waste in this the mass catering sector such as the airline catering industry, is concerning and detrimental to long-term sustainability of the country. Babalola (2013) describes food waste as part of a resource management problem, an economic problem as well as a moral problem. Other companies such as Woolworths have through "Woolworth's good business journey" programs addressed issues of CSR and sustainability. This was done through prioritizing issues such as increasing donation programs, responding to climate change through the revision of packaging materials, ethical trade, operational efficiencies, livestock farming, animal feeding and other uses of surplus food (Smith, 2009).

The lack of attention to economy class post-flight surplus food management and the lack of reuse strategies have led to the actual amounts of food that goes to waste being unknown, thus the magnitude of the problem not understood. The possibility of what economy class post-flight food waste can be used for has not been thoroughly investigated in this establishment.

1.5 RESEARCH AIM

A research aim is the purpose and envisaged outcome of the study that directs and controls the actions of the researcher. Just like a vision, a research aim is future oriented and forward looking, it is a statement of the purpose of a study. The study was aimed at determining the relationship between post-flight food waste and waste management policies and procedures whith-in the airline catering industry using Air Chefs South Africa as a case study and focusing on economy class food waste. The research was also aimed at categorizing and quantifying the food that returns uneaten from flights. It was equally aimed at looking at CSR and the food waste hierarchy guiding theories to draw out recommendations to assist in the evolution and improvement of the management of the phenomenons. In order to fulfill these aims, the study was guided by the following research questions and objectives.

1.5.1 Research Questions

Research questions provide research themes that give a clear direction to the study (Coldwell and Herbst, 2004; Pellissier, 2007). This study was therefore driven to provide answers to the following research questions:

- What are the policies that inform economy class post-flight food waste management procedures in the airline catering industry?
- What are the categories of food that mostly end up as economy class post-flight food waste at Air Chefs South Africa?
- What are the quantities of economy class post-flight food that goes to waste at Air Chefs South Africa?
- What are employee and management perceptions on economy class post-flight food waste management at Air Chefs SA?
- What could be done to improve the management of post-flight food waste through the use of the waste hierarchy and CSR principles in the airline catering industry?

1.5.2 Research Objectives

This study was driven by the following research objectives that gave it focus and helped to narrow it down to essential details. These research objectives were instrumental in determining the literature to read and kind of data to be collected (Varkevisser, Pathmanathan and Brownlee, 2003).

Objective 1

To identify the policies and industry specific challenges that the airline catering industry faces that prohibits the reuse of economy class post-flight food waste at Air Chefs South Africa.

Objective 2

To identify the categories of food that account for the biggest amount of food waste at Air Chefs South Africa that return on trays and in oven racks after flights.

Objective 3

To quantify the amount of economy class post-flight food waste at Air Chefs South Africa.

Objective 4

To draw employees and management views and perceptions on processes used to manage food waste in the company at Air Chefs SA.

Objective 5

To make recommendations about what can be done with surplus food and food waste in the airline catering industry to make the industry more environmentally, socially and economically responsible.

1.6 SETTING AND DELIMITATION OF THE STUDY

This study focuses on food waste management processes and procedures within the airline catering industry, incorporating the food waste hierarchy and CSR in the case of Air Chefs South Africa. Air Chefs is a chosen airline catering company because, according to Air Chefs South Africa (2014), the company is the market leader in the Southern Africa airline food services. It has three central kitchens namely Johannesburg, Cape Town as well as Durban, producing over 30 000 meals per day for all of South African Airways' (SAA's) domestic, regional and international flights. SAA is South Africa's national carrier which covers over 40 destinations worldwide (SAA time table, 2015). This study looks at food waste from all the inbound flights on domestic, regional and international routes. Although waste can happen at any point of production, this study does not focus on any food waste due to production management, but rather the "end-of-life" management of surplus food.

1.6.1 Introduction to Airline Catering

Inflight catering and the birth of airline catering companies was a long and experimental journey. In a book by Foss (2015), the first champagne toast in the sky dates back to 1 December 1783 on a hot air balloon and it has become culture to date. On a hot air balloon the only foods that could be enjoyed were cold foods because the technology of heating food without fire had not been developed until 1835.

In 1919, airships operating from hydrogen air were invented with their own kitchens. In 1929 the first onboard chef was introduced in flight serving cold meal delicacies such as German sausages, veal bourgeoisie, canapés, fresh fruits and vegetables. In the late 1920s to 1930 after the First World War inspired aircraft development, engine aircrafts became commercially functional. Fighter jet pilots consumed onboard meals for sustenance such as bread and soup from flasks, tea from thermos bottles and other military meals packed in hampers. This inspired the feasibility of such meals on passenger jets after the war (Foss, 2015).

In April 1928 Lufthansa passenger airplanes introduced culinary hot meals on board. These meals were loaded in warm sealed thermos bottles. The culinary professionals were to concentrate only on food and its services. Other airlines had only potters who assisted passengers with bags and professional nurses who assisted with air sickness. They would make transit stops and serve passengers meals on the ground in fear of exceeding weight limitations of the airplane. These meals were sourced from nearby hotels and restaurants at each transit stop. In 1936 airline catering evolved to the creation of standard serving trays. For the first time in airline history Don Magarell, a professional chef was hired to design onboard meals and design aircraft galleys.

The development and use of airline catering companies instead hotels and restaurants was Don Magarell idea. Airlines started saving money and time through this initiative. As a result of this history associating flying with luxury, there is often higher than normal expectations of onboard service, expectations of high levels of hospitality and inflight dining experience (Nilsson, 2011). In a paper that aimed to understand the relationship between hospitality in aviation, the development of technology, airline business models and institutional conditions, Nilsson (2011) outlined the importance of understanding the history of hospitality in aviation prior to any study on inflight service delivery.

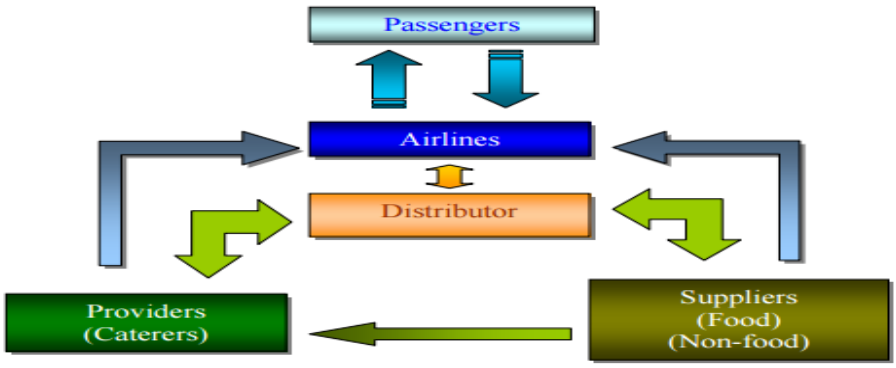


Figure 1-1: Major stakeholders in inflight catering

Source: Jones (2007)

According to Jones (2012) there are four major stakeholders in inflight catering, caterers, suppliers of food and catering equipment suppliers, distributors and the

airlines. In the case of South African Airways food comes from suppliers to caterers (Air Chefs) to the distribution trucks then to the airline for onboard passengers. The inflight catering industry caters for over 1 billion passengers per annum as air travel has become more accessible (Jones, 2007). It is a complex industry such the President of KLM Catering once said that “flight catering is 70 per cent logistics and 30 per cent cooking.” Figure 1-1 is an illustration of the major stakeholders in inflight catering as it is known in modern day.

1.6.2 Air Chefs South Africa

As stated in the South African Airways group integrated annual report (2014) Air Chefs is an airline catering company which falls under the SAA group. The SAA group is a state owned enterprise under the Department of Public Enterprises. Air Chefs was developed in 1986, it is in the same level of dependency as the SAA technical department, SA travel center, SAA cargo, SAA voyager and in recent years as joined by the low cost sister airline Mango. Figure1-2 is an illustration of the structure of SA Public Enterprises featuring Air Chefs.

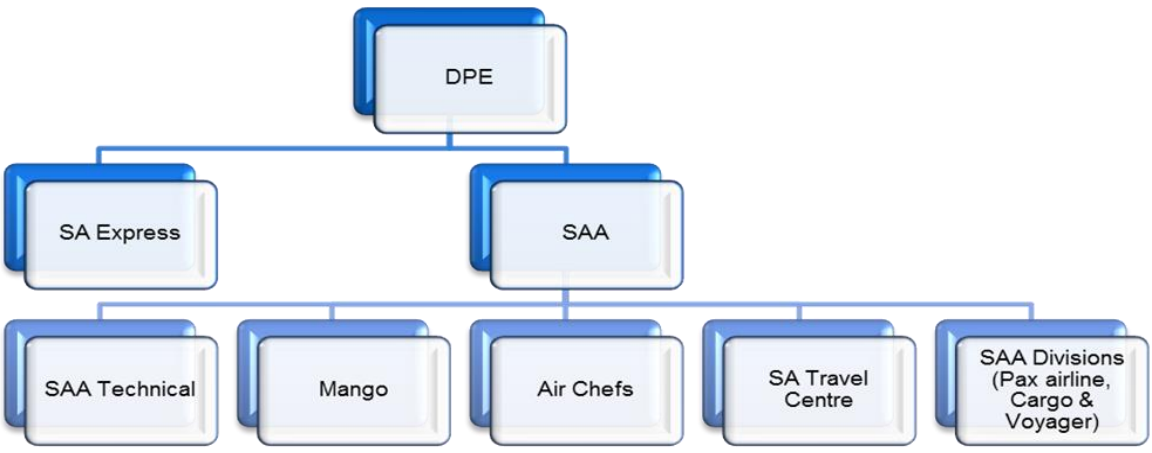


Figure 1-2: Public enterprises structure

Source: South African Airways group integrated annual report (2014:62)

Air Chefs has three central kitchens in South Africa in Johannesburg, Cape Town and Durban. It has the catering capacity to over 30 000 meals per day. It is a catering company which provides food services primarily to South African airlines which are South African Airways, South African Air Express, South African Airlink as well as the low cost sister airline Mango Airlines. Much as airline catering is the company's primary business, Air Chefs also does catering for events and functions, airport lounges, staff restaurant catering, readymade meals and laundry services.

Air Chefs core business is to see to all logistics and operations of inflight catering. They prepare food in bulk, blast chilling, assembling and plating. The food is then placed onto trolleys and transported through catering trucks for aircraft consumption. Air Chefs also has the responsibility to oversee all inflight catering, logistics and operations of its contract airlines as well. Air Chefs is equally responsible for the collection and de-planement of inflight leftover food as well as other galley waste after a flight reaches its destination airport in Johannesburg, Cape Town and Durban (ACRP, 2014).

Air Chefs employs over 1500 people with a range of skills within the hospitality industry. It is an establishment guided by the following values: Accountability, Integrity, Respect, Customer-centricity, Honesty, People, Food that delights and Safety (Air Chefs website). According to flysaa.com, in 2015, Air Chefs, was certified as an establishment that meets the requirements of the International Organization for Standardisation 22000 (ISO 22000) at all three of their catering kitchens. ISO 22000 is an international food safety management system that audits and certifies an establishments' hygiene and housekeeping management processes, management of pest control, control of visitors and contractors, management of cleaning, dispatch and distribution, maintenance, waste management, hygiene policy, glass policy, ingredients foreign body control policy, metal detection, nut handling procedure, control of knives, control of brittle materials, glass and brittle material breakage procedure, types of allergen, storage, allergen control procedures, food defense system, control of first aid dressings and HACCP prerequisites (Færgemand and Jespersen, 2005). ISO 22000 also informs the way in

which a food organizations ought to operate in term so food safety management. It certifies that an organization has met all Hazard Analysis and Critical Control Points (HACCP) requirements and respects all food safety policies in its policies and operations (SABS, 2007)

Air Chefs currently declares itself a market leader in the Southern Africa airline catering industry. This is because it has the inflight largest catering capacity facilities and caters for the largest number of flights on a daily basis (Air Chefs website). This provides justification for the selection of the company as a case of study.

1.7 DEFINITION OF KEY CONCEPTS

It is important for the main concepts to be defined because they give the reader an understanding of the core concepts and the main concerns of a study (Bidyarthi, Krishnapada and Sen, 2008). The following key concepts are important in this study and they warrant definition:

1.7.1 Food Waste

Business for Social Responsibility (BSR) (2013) defines food waste as any food that can include organic residues (such as vegetable peels) or cooked food products that were intended for consumer consumption but ended up discarded. Garrone, Melacini and Perego (2014) on the other hand define the concept from two perspectives of food waste from a social perspective: as surplus food that is not used for feeding people, and food waste from an environmental perspective: which is seen as surplus food that is not re-used or recovered in any form and is discarded.

1.7.2 Economy Class

Economy class is the lower class of travel at SAA. It has more seats than business class thus more passengers. This class of travel takes the largest numbers of passengers and has a lower product offering in relation to business class (SAA service training manual 2016).

1.7.3 Airline Catering

Airline catering is defined as the process of providing meal services whilst in motion. Airlines are catered for, mainly, by flight kitchens defined as catering companies on the ground that prepare and pack food into an aircraft to be consumed in the sky (Jones, 2004).

1.7.4 The Food Waste Hierarchy

The food waste hierarchy is one of the main guiding models in this study. It is a major food waste management tool that recommends the procedures to follow to manage food waste. It gives steps that can be used by food manufacturers, catering companies and homes to increase sustainability by finding ways to reduce the landfilling of food (Papargyropoulou *et al*, 2014).

1.7.5 Corporate Social Responsibility

Corporate Social Responsibility is another guiding principle in this study. The World Bank (2013) describes CSR as an ethical corporate governance structure that considers the people, the planet and profits otherwise referred to as the triple bottom line. It is a voluntary commitment that a company makes in its management strategies, business model and operations towards curbing social and environmental challenges. This commitment goes beyond the core business, legal and other contractual obligations. Jones, Comfort and Hiller (2006) viewed CSR to be more a philanthropy, than a company's core business, it is a way in which a company strives to operate in a socially, environmentally and economically responsible way.

1.8 RESEARCH STRUCTURE

This study is structured in an academically accepted way, starting with the orientation to the study, followed by the theoretical framework and literature review, research methodology, data presentation, analysis and interpretation and ends with the

conclusion and recommendations. The following structure is used to present the research report:

Chapter 1: Introduction and orientation to the study

This chapter was aimed at introducing and orientating the reader to the study by explaining the background, rationale for the study, research problem and outlining the research aim, questions and objectives. In this chapter the researcher explores the significance of the study and the contribution that the study makes to knowledge in the field.

Chapter 2: Theoretical framework and literature review

To show awareness of currently existing studies, the theoretical framework and literature review section of a dissertation is of vital importance because it enables the researcher to explain how things connect and also locate contradictions and gaps in the main concepts of the phenomenon under investigation.

Chapter 3: Research methodology

This chapter presents the research paradigm, research methodology, research design and related data collection tools, and analysis techniques. The chapter is important as it introduces the research genre, character and tone, and it is also used to justify the choices made on methodology. The researcher uses this chapter to expound the research design, explain the tools that were be used to collect primary and secondary data as well as the reasons why the tools were deemed the most appropriate to best answer the research questions.

Chapter 4: Data presentation, analysis and interpretation

Qualitative and quantitative data gathered from the research process is presented, analysed and interpreted in this chapter. This chapter translates data into thematic statements that can be translated into the language of intervention and implementation. This chapter lays the foundation for the all the recommendations and conclusion in the final chapter.

Chapter 5: Recommendations and conclusion

This is the final chapter of this research report. Conclusions were drawn from the discussion of findings in chapter four and literature as reviewed in chapter 2. After comparing literature and findings, gaps were identified and recommendations were forwarded. This chapter was also used to identify areas for further research.

1.9 DISCUSSION

Understanding the background of the phenomenon and the problem under investigation assists in understanding the future thereof (Nilsson, 2011). In this chapter the reader was introduced to the background of the study in detail. The research problem was conceptualised and insight given into the rationale, aim, research objectives, main concepts as well as the structure of the study. The reader was introduced to the history and background of inflight catering and the luxury attached to flying. The chapter also gave a background on the evolution of the inflight catering industry to assist in predetermining its future. It is clear that each time the airline industry improved, inflight catering had to follow suit and evolve at the same pace. This further justifies the need to move with the times in terms of how food waste is handled now in airline catering and table ways on how it needs to be handled in the future.

The background of airline catering indicated that the type of people that airlines used to service has changed tremendously over the years. From being hot air balloon leisure to serve in wars and to service only the wealthy, to modern day air travel that has evolved and grown to transport billions of people per annum.

Through past research and innovation of airline technology, this industry has boomed and grown to what it is today and new challenges in food services have emerged. With the attempt to up keep the luxury that originally came with flying, there have been catering glitches such as food waste as is being explored in this study.

1.10 CONCLUSION

In summary the main concern brought about by this study is whether the waste hierarchy and social responsibility consciousness when dealing with food waste at Air Chefs can help curb the phenomenon of food waste. This chapter also gave a detailed outline to be followed in chapters to come, as well as how the following chapters would be executed. In the next chapter the researcher allows the experts in the relevant field as well as policies to enrich the study through the provision of theoretical and conceptual knowledge on the issue under investigation.

CHAPTER 2

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1 INTRODUCTION

A theoretical framework is a collection of interconnected theories and models that come together in a sensible way because of their relevance to a phenomenon being studied (Polit and Hungler, 1995). According to Rockinson-Szapkiw (n.d.:1) a theoretical framework and literature review form solid foundations for a study. This chapter is important because it points at the connections that exist between the current and previous studies while also influencing the methodological choices. Ennis (1999:129) view the theoretical framework as a structure and foundation that is used to identify and describe major elements, building blocks and relationships that hold the study together. This chapter was thus used by the researcher to locate the study within a relevant field of knowledge, enrich the study by allowing the voices of experts and also determine the research methodologies, research design, research tools and techniques that would facilitate attainment of the research objectives.

Food waste is closely linked to environmental problems such as gas emissions and socio-economic problems such as poverty that may cause starvation. Gas emissions

from food waste contribute towards global warming and the resultant climate change. The United Nations and social scientists on the other are concerned about inequality, poverty and food scarcity while at the same time so much food goes to waste.

This chapter identifies the links between these frameworks and the food waste phenomenon. Theoretical framework and literature review together serve to create a snap shot view of the context within which the study was conducted (Rowley and Slack, 2004).

2.2 THEORETICAL FRAMEWORK

Theoretical frameworks are defined as building blocks relevant to all the components of a study. They contain discussions and examples of the main theories that a study is centered on. They create an understanding on where and in what way theories connect to the study (Anfara and Mertz, 2015).

The study is deductive, it therefore assumes that the best way to deal with post-flight food waste is through following the guidelines of CSR and the food waste hierachy. According to the food waste hierarchy, the food waste management steps are prevention of food waste, reuse, recycling, recovery and then as a last resort, disposal. The implementation of these policies is guided by the waste hierarchy, prevention being the most preferred and disposal the least. CSR as an important part of this study and it speaks of a company's business model, principles and practices to promote the wellbeing of the people, planet, and profits. This study sought to intertwine CSR and the food waste hierarchy into the airline food waste management structure.

2.2.1 The Food Waste Hierarchy

The food waste hierarchy is a major food waste management tool that recommends the procedures to follow to manage food waste. It gives steps that can be used by food manufacturers, catering companies and homes to increase sustainability by finding ways to reduce the landfilling of food (Papargyropoulou *et al.* 2014). A study by Papargyropoulou *et al* (2014), on applying the food waste hierarchy as a framework for surplus food waste management, confirmed and validated it as a critical guiding tool to

apply in the development of food waste management strategies. The building blocks of the food waste hierarchy are food waste preservation, food reuse, food recycle, energy recovery and as a last resort food disposal as already stated and illustrated in figure 2-1.

The creation of surplus food can be prevented using methods such as careful calculation of portion sizes and careful calculation of the number of people to be catered for, one might add, after finding out what their catering requirements are. Secondly, it recommends the reuse of surplus food. Surplus food can be reused for human consumption especially if it is not contaminated. This food can be donated to poverty stricken individuals, charity organizations or food banks, thus addressing SDG 2: to end hunger, achieve food security and improve nutrition. Thirdly, it recommends that surplus food be recycled for animal feeding or composting but must be put back on the food chain, thus promoting sustainable agriculture. Fourthly, the food waste hierarchy suggests that food waste be used for energy recovery through its use in fuel and other industrial uses. Then lastly, as a very last resort being disposal and ideally this must be for unavoidable food waste that could not be reused or recycled.

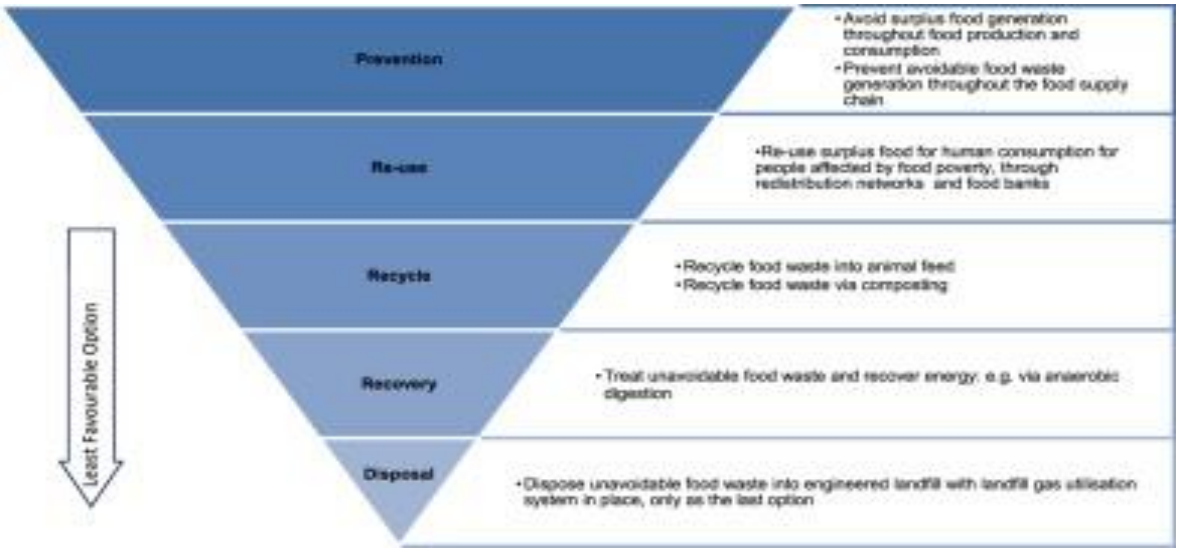


Figure 2-1: Waste hierarchy

Source: Papargyropoulou, *et al* (2014)

Using the food waste hierarchy Papargyropoulou *et al* (2014), found that to drastically reduce and manage food waste there always needs to be a consideration on sustainability. They recommended the understanding of sustainability in all levels of the food chain. Understanding pre-production, during production, post-production and post-consumer food waste will create a clear understanding of extent of the problem and how to effectively it.

According to Mejía, Mejía, Rangel, Garcia-Diaz, Montoyo and Agudelo (2014), fresh food products are often rejected by supermarkets and customers because they do not meet “set quality standards”. These standards could be in the shape of a fruit or veg, a bruise, or the perfect size. This is often irrespective of whether it is still consumable or not. In big commercial food establishments, the image, the brand and the customer perceptions are put forth before the main purpose of food which is to provide nutrition and nourishment. Food products that are viewed as detrimental to corporate image are often rejected and discarded.

In the food waste hierarchy, food donations and food banks are recommended as a means to reuse food that is still edible. Be that as it may, according to Bird (2014) and Barker (2013), the establishment of food banks is a complex issue because it exposes failed states and a poor societal value systems. Food banks can expose poverty and are used as a way to measure failure of a government in job creation for people to feed themselves. To some extent food banks can even be viewed as establishments that are in the business of poverty perpetuation (Powers, 2016:1). Therefore in most cases food banks are run by private institutions and non-profit organisations but are not in the agenda or of priority to a state. Therefore such institutions are often charity organizations or institutions of religious background.

According to Warshawsky (2011) South Africa is one of the most food insecure regions in the world, which has been exacerbated by urban growth and burgeoning unemployment, poverty and the spread of informal settlements, therefore redistribution

of surplus or unused food from private sectors should not remain a challenge to be resolved solely by food banks.

2.2.2 Corporate Social Responsibility

When looking at academic studies on food waste such as those by Sonnino and Mc Williams (2011), Whitehair, Shanklin and Brannon (2013) as well as Vandermeersch, Alvarenga, Ragaert and Dewull (2014), one realises that it is almost impossible to research on food waste independently of motives to improve sustainability. When reading on sustainability in the context of business management, the term "CSR" becomes a base theory in a business setting. CSR is built up of three major principles. These principles are collectively called the "triple bottom line" or "3 P's" (see figure 2-2).

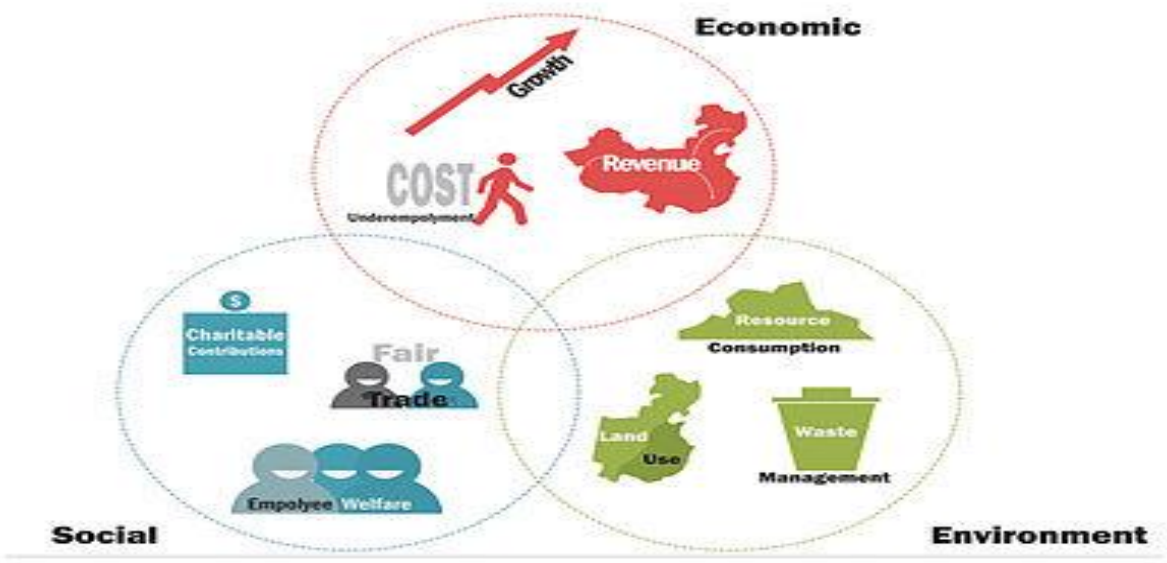


Figure 2-2: Triple bottom line

Source: Slaper and Hall (2011)

As mentioned by Slaper and Hall (2011), the triple bottom line is an accounting framework that demands for corporations to look beyond just profits or return on investments (single bottom line), but attend to the environmental and social effects of a

business. These principles gave birth to green waste management practices. Green waste management practices are often incorporated in organizations' corporate strategy, values, mission statements, and policies on practice and operation procedures (Garret and Heal, 2004; Babiak and Trendafilova, 2011). It is through the use of the triple bottom line framework that the private sector has identified the need to align itself with non-profit organisations that prioritize the wellbeing of the planet and its people (Slaper and Hall, 2011). The need for sustainability reporting led to the realisation that there is a direct connection between the food waste and CSR. This outlines the importance of incorporating the two theories to get a holistic overview of the food waste phenomenon in the context of a catering industry with specific attention given to the airline catering segment.

The study looks at the relevance of the food waste hierarchy and CSR in the context of economy class post-flight food waste. From the definitions in chapter one, we can see that the above mentioned theories have common themes of sustainability, improving the wellbeing of people, and taking care of the environment whilst sustaining economic growth. However, there are gaps that create challenges when it comes to the implementation of strategies that are supported by the principles of these theories. The study therefore explores the possibility of improved incorporation of these theories and their principles. The study seeks to outline issues pertinent to the unique airline catering food waste management system and bring forward recommendations for the problem using the above mentioned theories.

Figure 2-3: Types of food waste

Source: Kansas City (2012)

The section that follows looks into the academic debate on the food waste phenomenon. It starts from a global perspectives then narrows down to the particular case of the company in question. The aim of this section is mainly to establish what is already known about the phenomenon, what is contradictory and where there are gaps in knowledge. Post-consumer food waste, under which economy class post-flight food waste is categorised, is directly controlled by the consumer yet can be studied to ensure that consumer needs are accurately with minimum waste.

Post-consumer food waste or plate waste is where consumers do not eat what is prepared for them as shown in the types of food waste diagram (Kansas City, 2012) (see figure 2-3). Food waste from the kitchen or other sources does not apply in this instance.

2.3 LITERATURE REVIEW

Literature review is described by Pautasso (2013:1) as a summary of recent literary work that leads to new insights in a field of study. The foundation of this study is post-flight food waste management. The literature in this section concentrates on the food waste management in the following order:

- Food waste from a global perspective
- Food waste from a South African perspective
- Food waste within mass catering and food production industry
- Food waste in the airline industry a case of Air Chefs South Africa.

2.3.1 Food Waste: A Global Perspective

As indicated by Bond, Meacham, Bhunnoo and Benton (2013), the world population was above seven billion people in 2011 and it is constantly on the rise. It is estimated to potentially reach 9.3 billion by 2050. The rise in population causes increased food demand by between 50-70%. Population growth, rising global warming and resultant climate change lead to food scarcity and starvation. It is estimated that about 868 – 900 million people worldwide go to bed hungry (Kings, 2013), in the same world where an

estimated $750 billion goes to food waste. Kind further translates this figure to about 1.4 billion hectares of agricultural land being wasted on food that ends up in landfill sites. In support Lipinski, Hanson, Lomax, Kitinoja, Waite and Searchinger (2013) converts these figures to about one in every eight people being under-nourished in the same world where an estimated one third of global food supply goes to waste (da Silva, 2013).

While Garrone, *et al* (2014) describe food waste from two major perspectives which are social - as surplus food that is not used for feeding people, and environmental perspective - as surplus food that is not re-used or recovered in any form and is disposed of. Babalola (2013) explains food waste from resource management and moral perspectives. Tielens and Candel (2014) support the stance of it as a moral problem and further decry food waste as "shameful". Schneider (2013) criticises food waste as unethical because it has negative social, environmental as well as economic impacts.

Parfitt, Barthel and Macnaughton (2010) posit that food waste is caused by many different factors depending on the economic standing of a nation. Evans *et al* (2013:6) are against the very use of the word "waste" when referring to food, because it carries the connotations that it must be disposed of. In BRIC countries (Brazil, Russia, India, China and South Africa) food waste is prevalent during post-harvest whilst in developed countries it is mostly as a result of plate waste (Parfitt *et al*, 2010). They recommend that food waste be attended to by finding easily implementable practical solutions and teachings to shift consumer behaviour such as finding ways to feed it back to the value chain, investing in infrastructure and technology, improving policies, reducing a wasteful culture, and proper education on food labeling. However, they realise that these steps of waste management can only be feasible after a detailed quantified analysis of food waste to bring about evidence of its existence.

Mangena (2016) predicts that in the near future food will be like oil, wars may break out because of food scarcity. The more the world cities become concrete and the more people migrate to cities, the more food becomes scarce and the more food prices

increase. In Mangena's view, urbarnisation is on the increase resulting in escalating amount of poverty in cities. Dubbeling, Zeeuw and Veenhuizen (2010) concur when stating that farming and food production has become less fashionable to the youth who then migrate to cities thus compounding the problem of food insecurity and poverty.

The Waste and Resources Action Programme's (WRAP) report (2009), Melikoglu, Lin and Webb (2013) as well as the Food Bank SA (2009) are all in consensus that at least one of every three foods that are prepared gets disposed whilst more than half of it would still be edible. Nahman *et al* (2012) quantify the amount of food that goes to waste to R32.5 billion each year in South Africa alone.

Interestingly in some literature the food waste phenomenon is written about in comparison to the concept of feasting, buffets, unlimited choices, abundance, and deliberate over production (Schneider, 2013). In a study aimed at unpacking the history of feasting, the author realised that as much as there are cultural, economic, social and often political reasons for feasting, this culture creates high amounts of food waste. It is a culture that is difficult to totally eradicate because in this instance food is used as a demonstration of power and wealth (Schneider, 2013). Kiran, Trzcinski and Liu (2014) on the other hand look at food waste from an environmental point of view paying attention to breads, savory foods, waste cakes, cafeteria food waste, fruits, and vegetables. They conclude that food waste has rich nutrient composition and it is a valuable resource for fuel and fermentation. In agreement Blengini (2008:533) argues that food waste as biodegradable waste which has been proven to be successful in composting. While the subjects of sustainability and food security in communities gain momentum, Samoei (2015) found that communication, education and awareness on agriculture and food reuse can be created in the home through the use of vernacular community radio stations or using a language that is understood by food handlers. In Samoei's view attitudes towards food waste are a responsibility of the society starting from awareness in the home.

In a study by Kummu, de Moel, Porkka, Siebert, Varis and Ward (2012) the estimation of wasted resources due to food waste were 24% of fresh water used for watering, 23%

of cropland area, 23% of fertilizers, worldwide. Environmentally, food waste could account to 22% of global green gas emissions. Therefore, the importance of food waste reduction cannot be over emphasised as an attempt to save the planet and to help alleviate some of the concerns of the United Nations especially regarding poverty, hunger, resilience and social injustices. Assessing the actual food waste through waste audits is important, however food waste has a bigger impact than that. Weight and mass do not include the hidden costs of wasted resources, economic values of all loss and impact on the environment. Mason; Boyle; Fyfe; Smith and Cordell (2011) illustrate the hidden costs of food waste (see figure 2-4). They display the hidden costs of food waste during food preparation in terms of food items being damaged; stock reaching expiry date, and mistakes when ordering. During food preparation energy is used for transportation and storage. Labour is lost during all stages of food handling, materials such as ingredients, cut offs, water and other overheads are all used and wasted if food is landfilled.

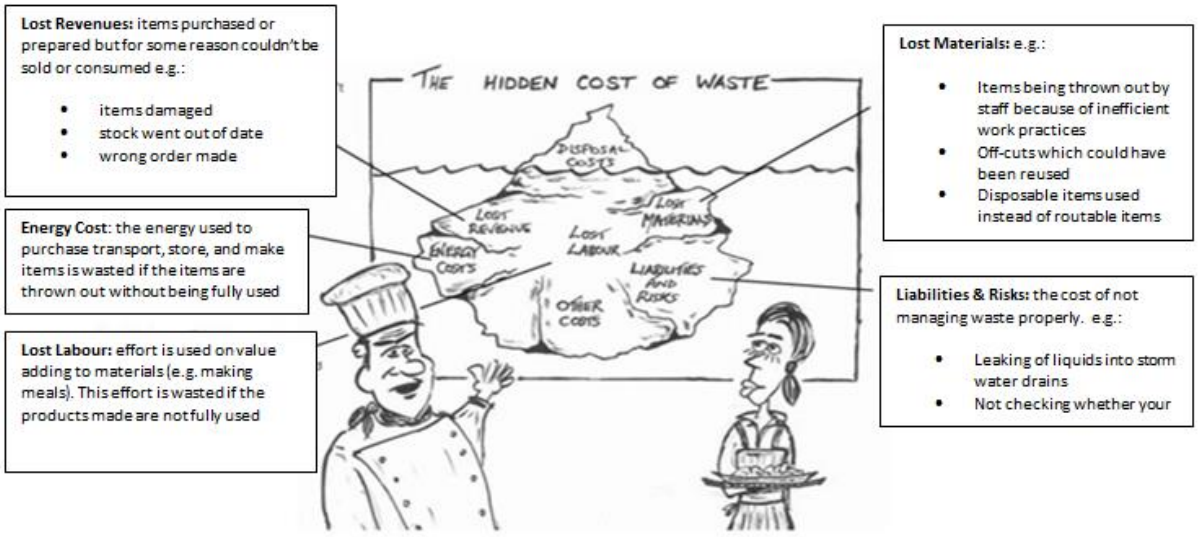


Figure 2-4: The hidden costs of food waste

Source: Mason, Boyle, Fyfe, Smith and Cordell (2011:2)

When quantifying food waste some of the hidden costs are: lost revenue, energy costs, labour costs, lost materials, time, as well as other liabilities and risks costs. All these

are never included when quantifying food waste. Sloan, Legrand and Chan (2012) observe that as much as the hospitality industry is becoming more aware of the need to better manage food waste, the implementation of food waste initiatives is slow. They also contend that sustainability initiatives in the hospitality industry are often met with some resistance because of the infrastructural costs of sustainable choices in comparison to unsustainable familiar ones.

The food waste hierarchy and CSR suggest that surplus food can be donated, and Garrone, Melacini and Perego (2014) agree that donating surplus food to food banks can be a good management practice. They also outline the need for equal participation and responsibility between food companies, food banks and the beneficiary organisations. Food bank need to improve on logistics, transparency, and ability to respond efficiently to donors and correctly store donated food.

CSR has been portrayed to have positive corporate benefits, however, Assiouras, Ozge and Skourtis (2013) investigated the relationship between “product harm crisis” (PHC) and CSR and uncovered that food donation can have a negative impact on brand perception. It is therefore important for the food industry to assess the kinds and quality of foods that they donate to food banks and charities to ensure that it does not damage the brand of the donor and donated food brand. This has led to the practice of removing labels on donated foods. Mohapatra (2014) is of the idea that the biggest fear that possible food donors have when it comes to donating food is being held responsible for food poisoning. The USA government’s efforts to encourage food donations led to the development of the “Bill Emerson Good Samaritan Food Donation Act of 1996” (Mohapatra, 2014). This Act was created with the aim to reduce donor liability and to encourage food recovery through the protection of the food donor. The act aimed to establish a national law that protects food establishments, charity organisations and individuals from donor liability when donating food in good faith. This act was also to improve interest in philanthropism by the catering industry and grocery stores, so that they could be involved in alleviating the food security and food scarcity problem.

In spite of this catering companies are still reluctant to donate to the poor because the fear to donate seems stronger that the invitation by the act. According to (Haley, 2013) statistics have it that in the United States there are about 48 million foodborne illness outbreaks each year. Some cases are so severe that over 128 000 people get hospitalized while 3000 people die per annum as a result of food poisoning. This may explain why potential food donors are reluctant to donate food, because they fear being held liable for poisoning people. Having a company's name associated with food poisoning has in the past been very expensive and damaging to the image and brand. Haley (2013) cites the 1992 case where Taco Bell parted with $98 million dollars in damages and liability claims due to a food borne illness outbreak through food it sold to customers. These kinds of public liability claims have created fear for food establishments. It is now a norm for food establishments to purchase public liability insurance in the case of a possible foodborne illness outbreak.

Haley (2013) further argues that as much as the Good Samaritan law was passed to protect food donors from being sued if donating food in good faith, there are loopholes that potential food donors fear to be caught up in. The right to allow recipients to lodge an investigation for "gross negligence" or "intentional misconduct" of the donor is one of those loopholes. So this still leaves a bulk of the responsibility and liability with the donor. If the establishment is found guilty, the donor can be criminally or civilly charged. Acheson (2016) points to the following as the most common organisms that cause food borne illnesses:

Salmonella — *Salmonella* is the number one cause of food poisoning which lead to illnesses such as typhoid fever and gastroenteritis. Contamination with salmonella can happen during food processing, cross contamination, at a restaurant, during supply chain of food.

Escherichia coli — *Escherichia coli* is commonly known as travelers' diarrhea. Contamination can occur when food or water is contaminated with feaces. This can cause kidney failure or even death.

Hepatitis A virus — Hepatitis A virus is where food poisoning is caused by a food handler or from raw fish which can cause liver disease.

Norovirus — Norovirus infection is acquired through food handling especially in mass catering scenarios. Norovirus is very infectious and it causes nausea, vomiting, diarrhea and abdominal pains.

Listeria monocytogenes — *Listeria* is bacteria that grows in contaminated milk, soft cheese and other dairy products as well as in contaminated processed meats and smoked seafood.

Other microorganisms — there are over 200 microorganisms that can cause food poisoning.

One of the major factors that give breeding ground for microorganisms that cause food poisoning to breed is improper food handling and storage. Food should not be left at room temperature for more than two hours. Reheating procedures and temperatures must always be in check. Use by dates should be considered before food is eaten. Food storage and handling should be considered prior to eating it instead of just the appearance and smell of food (Acheson, 2016). King (2001:184) points out that the inflight catering industry is generally well established and boasts high food safety records with the practices of hazard analysis and critical control points (HACCP) well in place. The problem however is that it produces large amounts of food waste.

2.3.2 Food Waste: A South Africa Perspective

The Southern region of Africa has experienced severe drought in the past year leading to water restrictions in some parts of South Africa. This has caused problems in the farming and food production sector, making it a high risk business to go into. Drought is a complex issue that has created a situation whereby up to 70% of grain in South Africa is imported. This high import percentage is not only bad for the economy but calls for creative ways to make food go a longer way. This can be achieved by putting nature back into the soil through organic waste, recycling and water recycling (Mangena, 2016:46).

Nahman, *et al* (2012) point out that food disposal in landfill has been outlawed in some parts of the world. In South Africa as much as there has been an increased awareness of the disadvantages of landfilling food waste, little has been done to implement strategies for food waste reuse and recycling. The Waste Act No. 59 of 2008 came into effect to prevent pollution and ecological degradation, promote conservation and ensure ecological sustainability. The waste separation at source model (see figure 2-5) which was created in 2015 is one of the strategies designed to re-channel waste. This model identifies and categorizes waste management processes in the City of Johannesburg.

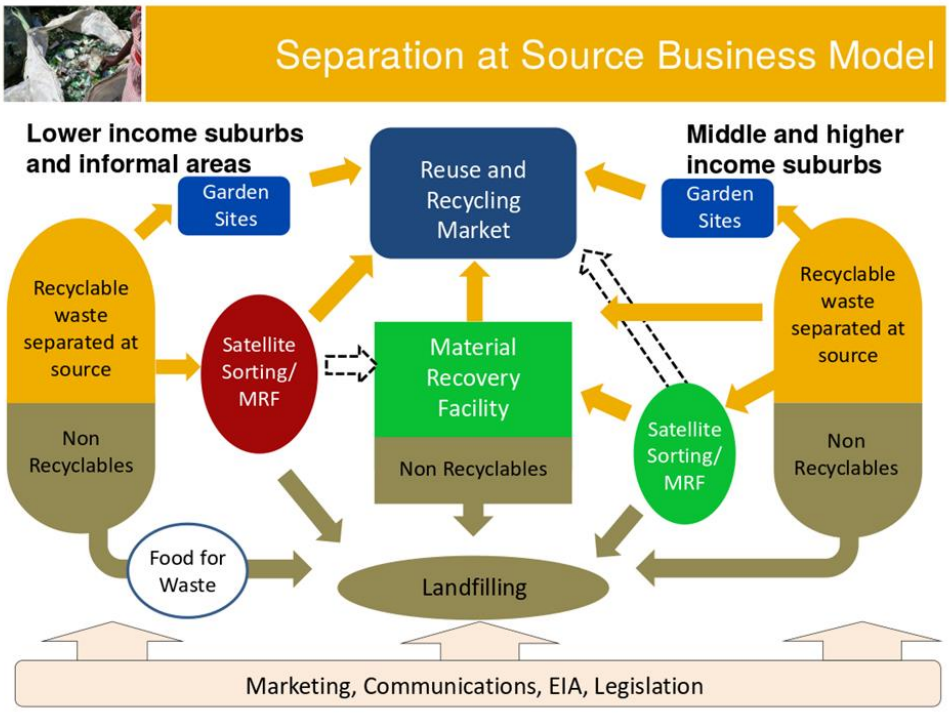


Figure 2-5: City of Johannesburg Separation at Source Business Model

Source: de Beer (2015)

This model which was created following the Waste Act No 59 of 2008, but it does not recognize food waste as recyclable waste. The model categorises food as non-recyclables which are directed straight to the landfills. This is whilst it encourages other waste to be separated at source for later material recovery, reuse and recycle (de Beer 2015). This model therefore discourages food recovery, reuse and recycling and encourages dumping. Unfortunately this model does not seem to consider the high

levels of food scarcity and poverty in the country as well as the compounding problem of pollution and environmental degradation.

Furthermore, in the Randburg sun newspaper article June 2015, Pikitup recommends that food waste be disposed of in its general nonhazardous non-recyclable waste bins. This is also labeled on the refuse bins (see figure 2-6). Food waste is to be disposed of together with charcoal, batteries, light bulbs, broken crockery, small broken appliances, milk and juice cartons which are all sent to landfill sites.

Figure 2-6: Pikitup waste bin marking (2015)

Source: Randburg Sun, June 2015

Nahman *et al* (2012), categorized post-consumer food waste as hazardous waste and it is seldom prioritized for attention by government in South Africa and other developing countries where food security is a big issue. This may be due to limited resources and more pressing socio-economic issues leaving very little resources to invest in environmental management. Nahman *et al* (2012) concluded that the only way to elevate food waste management to the priority list is if there were economic benefits attached to it or if economists could quantify the costs associated with this social and environmental neglect. Ruston (2003) argues that hazardous waste is waste that is

potentially harmful to humans and the environment, therefore all waste is in essence hazardous.

2.3.3 Food Waste: Mass Catering and Restaurant Segment

In a study about the awareness of climate change and food waste in the restaurant industry, Rowe (2015) found that within the catering industry there is not enough concern and awareness on its contribution to climate change. Some of the suggestions for the catering industry are to improve on employer education thus employee education. Rowe therefore suggests that education on food waste could be addressed through the use of company websites, employee and employer tutorials and info graphics in the work place. In a presentation on waste reduction in the food industry Fenton (2001) recommended that the food industry works together with local farmers to use food waste for livestock feeding and composting. In 1998 Bates and Phillips concluded that food waste solution programmes that highly benefit food service establishments financially and environmentally can be enforced with little to no cost. These could enhance the social standing of these companies as corporate citizens. Mena, Adenso-Diaz and Yurt (2011) on the other hand caution that food appearance and short expiry dates were some of the root causes of good food going to waste in the food manufacturing and food service industries.

Rowe (2015) further expresses concern on the major inconsistencies in the practices of food waste handling in the catering industry pointing out that this was highly dependent on the level of awareness of the owner or the manager. The lack of regulation and laws dictating the processes to be followed when handling food waste, makes the practice of scraping left over food into a waste bins common in the catering industry. This is despite the fact that Sloan, Legrand and Chan (2012) saw a rise in communication and awareness about food waste in food establishments. The industry seems to be getting more aware of issues of sustainability, however, the implementation of sustainability initiatives seems to be sluggish. They also seem to think that sustainability initiatives in the hospitality industry are often met with resistance due to the fear of costs associated with sustainable practices.

Murray, Haynes and Hudson (2010) highlight the importance of collaboration and alliances between organisations and industries when dealing with food waste. In support Ramlagan, Peltzer and Matseke (2010) further add that some of the possible circumstances that lead to drug abuse in South Africa are poverty, idleness, living in an area surrounded by substance users, long working hours and living a stressful life. According to the United Nations Office on Drugs and Crime (UNODC) (2008), substance abuse is fueled by a number of socio-economic factors which are joblessness, poverty and crime in general. Drug dealers are aware of these challenges and prey on young people. By addressing the said issues, which can be addressed through food donations, the issue of substance abused can be reduced.

2.3.4 Food waste in the Airline industry

While Beretta, Stoessel, Baier and Hellweg (2013) identify the food industry as the third largest contributor of waste, Romli, Rahman and Ishak (2016) state in their study on in-flight food delivery and waste collection service from a passengers' perspective that passengers prefer a shorter service time and see an efficient in-flight service as better than having too much in-flight meal options. According to this study, passengers prefer an improved quality of service and food more than the amount. Romli *et al* (2016:1) further state that passengers tend to prefer airlines that provide the best meals. Their study also found that for short haul flights, 82% of the surveyed respondents were satisfied with light meals or snacks.

Jones (2012) posits that the airline industry forms a large part of the food service and hospitality industry which quality food enjoyed by over one billion people worldwide. Airline food services are used for airline marketing and competitive differentiation. The food service, onboard entertainment, seats comfort and leg room are some of the major selling points for airlines. Jones further states that for long haul flights, a Boeing gets loaded with over 40 000 items for comfort, catering and safety on-board. With that said, Jacobs and Hoeller (2015) point out that the airline industry’s food waste is shocking especially during flight delays. On long haul flights there are often two to three meals served onboard. In economy class meals are served on a standard tray however

business and first class enjoy six to seven high quality gourmet meals. Therefore, leftover food is inevitable in this catering segment.

Jacobs and Hoeller (2015) further estimate that in 2013 alone that about 6.3 billion passengers traveled by air, producing more than 3.15 million tons of waste. Some solutions to curb food waste have been suggested such as reducing the amount of food loaded for passengers, instead of 100% there must be a 95% food load of the passenger load. This should be done in assumption that not all passengers will eat every meal onboard. However, this works in low-cost airlines where meals are sold onboard. Other airlines have opted to totally go the low cost route, to reduce food waste and the cost of airfare. In that way a lot less meals are loaded in an aircraft thus reducing the aircraft weight and waste.

In a scientific study aimed to quantify the energy value of inflight waste on Egypt air the researchers discovered that food waste in economy class amounted to 41% of the food served per annum. This was equated to 2,410,227,000 kj of energy which is the equivalent of 669,561.1 kW-hr of electricity (El-Mobaidh, Razek and Lassheen, 2006). Jacobs and Hoeller (2015) observed that the airline catering sector in the United States is highly regulated especially on international arrival flights. To prevent spread of disease from country to country, all food that returns from international flights is treated as potentially contaminated. Upon arrival at a port of entry, food immediately gets burnt in large ovens to avoid it from entering the country any further. This is done as a form of prevention of food borne diseases. The Animal and Plant Health Agency and Department for Environment as well as Food and Rural Affairs in the United Kingdom (2014), classified food waste from:

- international flights,
- cruise ships,
- private and commercial yachts,
- boats,
- armed forces,
- submarines and

- ferries

as international waste. Such waste is to be treated carefully and disposed of with care. Human, livestock and plant contact is to be avoided for control of disease outbreak. On arrival to the country it must be stored carefully, covered, leak-proofed and labeled clearly. This waste must be transported carefully on its own immediately after arrival with vehicles disinfected after every use. International waste is the responsibility of the airline owner. If a contract caterer is used, the airline must give instructions on how food waste is to be handled to ensure compliance with the regulations of the port of arrival. All waste must be separated onboard because that prevent cross contamination. Strict as the international waste handling procedure is, there are exceptions that allow for some international food waste to be recycled. Foods such as:

- Confectionery (candy bars, chocolate bars, gelatin candies, lollies, jelly babies, jelly beans, breads, cakes, pastries, etc.)
- crisps and nuts
- drinks not containing milk

If they are not mixed with other food waste, are within the expiry date and are individually wrapped.

In this industry there can also be domestic catering waste, this is defined as any food that comes from the same country and returns to the same country. This waste is reusable if it is handled in a hygienic manner. This can be achieved through:

- cleaning and disinfecting all areas on your vessel that come into contact with food (e.g. galleys and store rooms)
- any restocking is done after return (no reloading of any food items at international outstations)
- all stock in and stock out must be clearly declared (Animal and Plant Health Agency and Department for Environment as well as Food and Rural Affairs in the United Kingdom, 2014),

In the United Kingdom, airlines such as British Airways have introduced food waste management systems that reduce the amount of food that goes to landfills. They use a

food waste drier. This is a new technology that removes all moisture from food and reduces it to dry powder that gets mixed into compost or burned for fuel to avoid landfilling. Brown (2012) points out that on Singapore Airlines food preparation and flight delays are part of the airline industry and are completely inevitable. Flight delays are a nightmare for airline catering companies because, depending on the length of the delay, onboard meals may have to be discarded. It is costly to do so, but because of a break in the cold chain to prevent food poisoning it is necessary to discard of this food.

However, if a delay is known in advance, food is kept in chillers with the caterer and can only be loaded into the aircraft after the delay is cleared. According to Rodrigue and Notteboom (2013) maintaining a temperature controlled environment when transporting food is scientifically, technologically and logistically demanding. They further describe it as the cold chain which Rodrigue and Notteboom (2013) see as a science, a technology and a process. It is a science because it requires the understanding of the chemical and biological processes linked with perishability. It is a technology because it relies on physical means to insure appropriate temperature conditions along the supply chain. It is a process since it is a series of tasks must be performed to prepare, store, transport and monitor temperature sensitive products.

Temperature control in general is important for food safety during transportation. Food must therefore always be kept in specified temperature ranges to ensure consumption safety (see table 2-1). The transportation of food is not a new phenomenon because food is exported on a daily basis to other parts of the world. Such as the exportation of tangerines from South Africa, apples from New Zealand, bananas from Costa Rica and asparagus from Mexico. The airline industry is governed by strict HACCP laws that require cold foods to be always below 10 $°C$ and hot foods maintained at 63$°C$ or blast chilled to below 5$°C$. This food can then be transported through thermal trucks to the aircraft where it will be kept cold in the aircraft chillers or by the use of dry ice to avoid breaking the cold chain. This food ought to be kept at those temperatures until it is heated to temperatures above 72$°C$ before it is served passengers (Arnott, 2006). Food transportation from country to country by air, ship and rail is common and highly regulated as shown in table 2-1 (Rodrigue and Notteboom, 2013).

Table 2-1: Shelf life and recommended temperatures of some perishable food products

Product	Shelf Life (Days)	Optimum Temperature (Celsius)
Apple	90-240	0
Bananas	7-28	13.5
Bell Peppers	21-35	7
Cabbage	14-20	1
Eggs	180	1.1
Onions	30-180	1
Lettuce	12-14	0.6
Fresh Meat (beef, lamb, pork, poultry)	14-65	-2
Oranges	21-90	7
Pears	120-180	-0.6
Potatoes	30-50	10
Seafood (shrimp, lobster, crab)	120-360	-17.8
Strawberries	5-10	0.6
Tomatoes	7-14	12

Bond *et al* (2013) argues that in developing countries such as India and Africa, less than 1% of food is sold in controlled environments. The majority of the population sources food from markets and street vendors which are outside the cold chain as shown in figures 2-7. Rodrigue and Notteboom (2013) state that it is easier to implement food

chain regulations in first world countries, but may pose challenging in third world countries as cold chain sustainability is highly dependent on the level of development.

Figure 2-7: Fruit stall (outside the cold chain)

2.3.5 Food waste: Air Chefs South Africa

For a better understanding of the phenomenon in context, it is important to look into the menu development process of airline food. This will assist in the understanding of the kinds of food waste that is in question. SAA Domestic, regional and international meal specifications Cycle 1 2016 (Annexure F) reveal that contract caterers cater for meals onboard all South African Airways follow a selected menu by the airline.

This menu selection process is a long consultative tendering process. It involves the caterer presenting recommended meals and allowing the airline food and beverage representatives to sample and chose meal items (see figure 2-8).

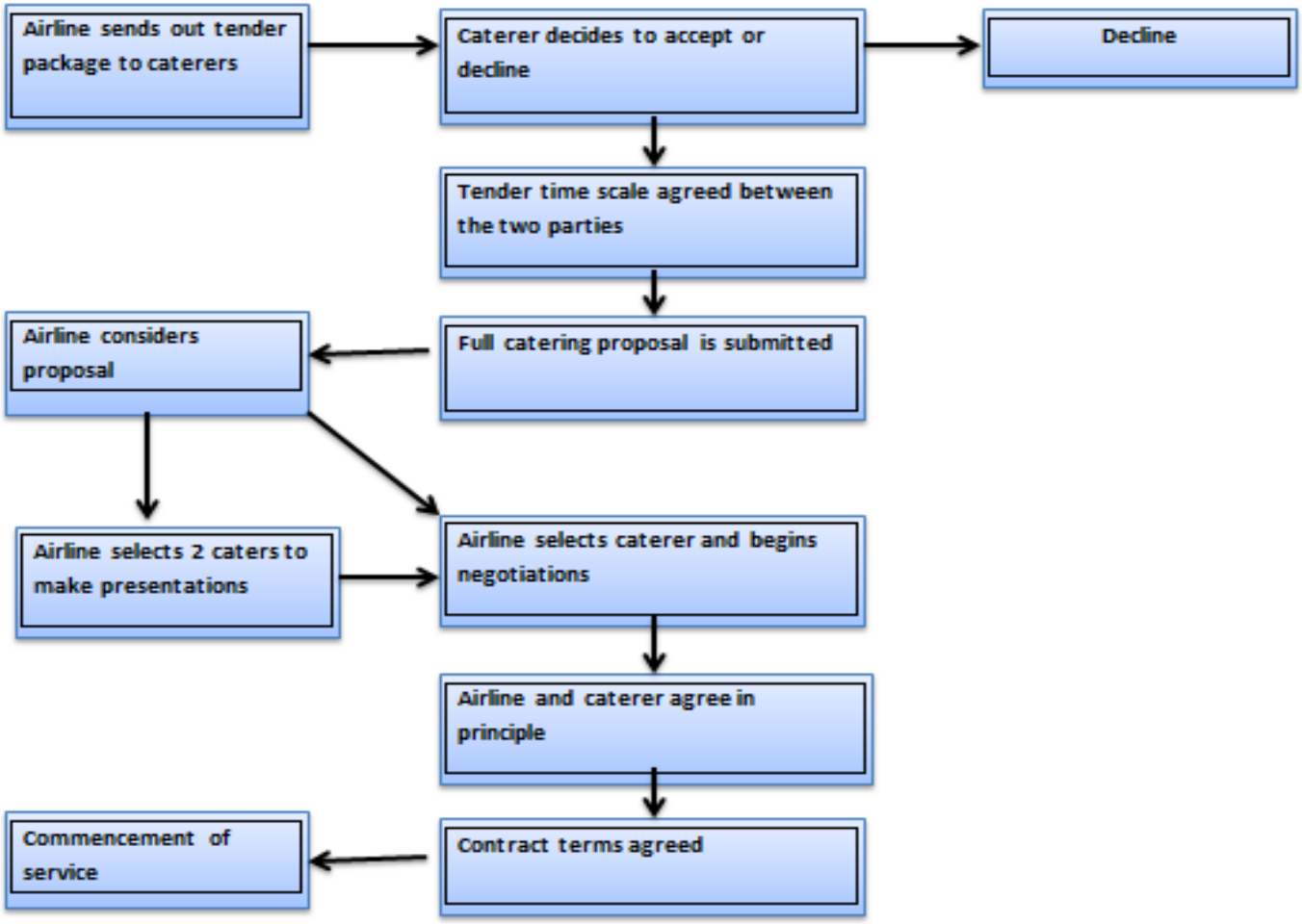


Figure 2-8: The airline contract tendering process

Source: Jones (2012)

2.3.5.1 *Meal service catering structures and waste composition on SAA flights*

One of the challenges in the airline catering industry is that catering companies have the responsibility to cater for meals without knowing the exact number of passengers onboard each aircraft until the last minute. On board menus are designed in advanced and the cooking process begins long before departure time but the number of

passengers onboard is only finalised only minutes before departure. This practice creates a lot of food waste (Hasachoo and Masuchun, 2015).

According to the SAA Service Standards Manual (2014), the meal choices are informed by the route, class of travel and time of day of each flight. Meal choices are considered in such a way that each customer enjoys the same meal standards onboard the aircraft. The contracted caterer (Air Chefs SA in this case) is responsible to communicate the menu items to the cabin crew through the SAA Domestic, regional and international meal specifications Cycle 1 2016 (Annexure F). This document details the menu items, a breakdown of ingredients, the class of travel catered for, the general layout of each tray and the presentation recommendations in a form of pictures. The galley brief is used as a form of communication to the cabin crew on the menu of the day and route. It also serves as a reference guide to inform passengers of the ingredients used in case of food allergies. A study conducted by Barnett, Botting, Gawland and Lucas (2012) aimed at understanding the strategies used by international travelers with allergies, the researchers found that there were inconsistencies in the way airline catered for the needs of this group of travelers and that in most cases there was a lack of information on ingredients. This resulted in most such travelers taking their own foods into flights to ensure safety. Consequently food prepared for such travelers accounted for a lot of cabin waste.

South African airways have three standard classes of travel (SAA Service Standards Manual, 2014). These are classified as premium class, business class and economy class. Domestic and regional flights are divided in to economy class and business class. International flights and some long regional flights are divided into economy class and premium class. The meals served on each class of travel are different and so are the menu items.

On different routes, different meals are catered following the same structure as in the tables that follow. The tables were extracted from the SAA meal specifications Cycle 1(2016) (Annexure F) and they illustrate only the food service structures in the airline and are exclusive of the drinks served. These structures give an indication of the waste

composition by breaking down what each class of travel caters onboard. Tables 2-2 to 2-7 give a summary of the menu selection standards in line with the SAA meal windo periods and specifications for domestic, regional and international flights.

Table 2-2: Domestic routes meal window periods

Destination	**Meal type**	**Time schedules**	**Menu specifications**
Short flights (Durban, East London, Port Elizabeth)			
Domestic flights		Times	Menu Structure
	Breakfast	6H00 to 10H00	Croissant and Yoghurt
	Am Snack	10H00 to 12H00	Sandwiches
	Afternoon snack	12H00 to end of day	Sandwiches
Cape Town	Breakfast	6H00 to 10H00	Croissant and Yoghurt
	Morning snack	10H00 to 12H00	Sandwiches
	Lunch	12H00 -14H00	Salad, Hot Lunch, Dessert
	PM snack	17H00 - end of day	Sandwiches
	Dinner		Salad, Hot Dinner and Dessert

Table 2-3: Regional routes meal window periods

Destination	Meal type	Time schedules	Menu specifications
Regional flights		Times	Menu Structure
Flights shorter than 1H15 minutes e.g. Maputo	Breakfast	6H00 to 10H00	Croissant and yoghurt
	AM Snack	10H00 to 12H00	Sandwiches
	PM snack	12H00 to end of day	Filled sandwiches, filled roti or filled pastries
Flights longer than 1:15 minutes eg Harare, Lilongwe	Dinner	Afternoon arrival flights	Semi- full tray
			Salad, bread, butter
			Hot meal, dessert
	Breakfast	Morning arrival flights	Full breakfast trays
			Fruit salad, yoghurt
			Bread/ Croissant, butter, jam
			Hot meal (2 Choices)
Flights longer than 3 hours e.g. Mauritius, Nairobi, Entebbe, Lagos, Accra	Dinner	Afternoon arrival flights	Full dinner trays
			Starter- Salad
			Bread, butter
			Hot meal (2 Choices)
			Dessert
			Chocolate bar
			Cheese and crackers

Table 2-4: International routes meal window periods

Destination	Meal type	Menu specifications
International flights (2-3 meal services- Dinner and Breakfast)	Meal type	Menu composition
On all international flights e.g. London, Frankfurt, Munich, Sao Paulo, Hong Kong, Australia		
	Dinner	Full dinner trays
		Starter- Salad
		Bread, butter
		Hot meal (2 Choices)
		Dessert
		Chocolate bar
		Cheese and crackers
Added meals only on Ultra long flights e.g. New York	Mid-flight snack	Sandwiches
		Dry snack
On all international flights e.g. Europe, South America, Asia and Australia	Breakfast	Full breakfast trays
		Fruit salad, yoghurt, butter, jam, bread/croissant
		Hot meal (2 choices)

2.3.6 Waste Collection Procedure at Air Chefs

Onboard food on South African airways aircrafts, food is stored in galley chillers which are mixed in most flights. In instances where there are no chillers it is standard operating procedure at SAA that dry ice is to be used. This is to maximize food safety by keeping all food items within the cold chain. This is necessary because inflight

catering is only done once at the departure station and foods must still be served safe for human consumption after hours on air.

The first point of food waste collection is done onboard the aircraft by cabin crew into meal trolleys and dustbins (SAA Service Standards Manual (2014). According to the Air Chefs Waste Policy and general waste policy (201), Air Chefs then collect the waste from the aircraft after landing. It then follows a waste collection and handling process as illustrated in the waste process flow diagram (see figure 2-9).

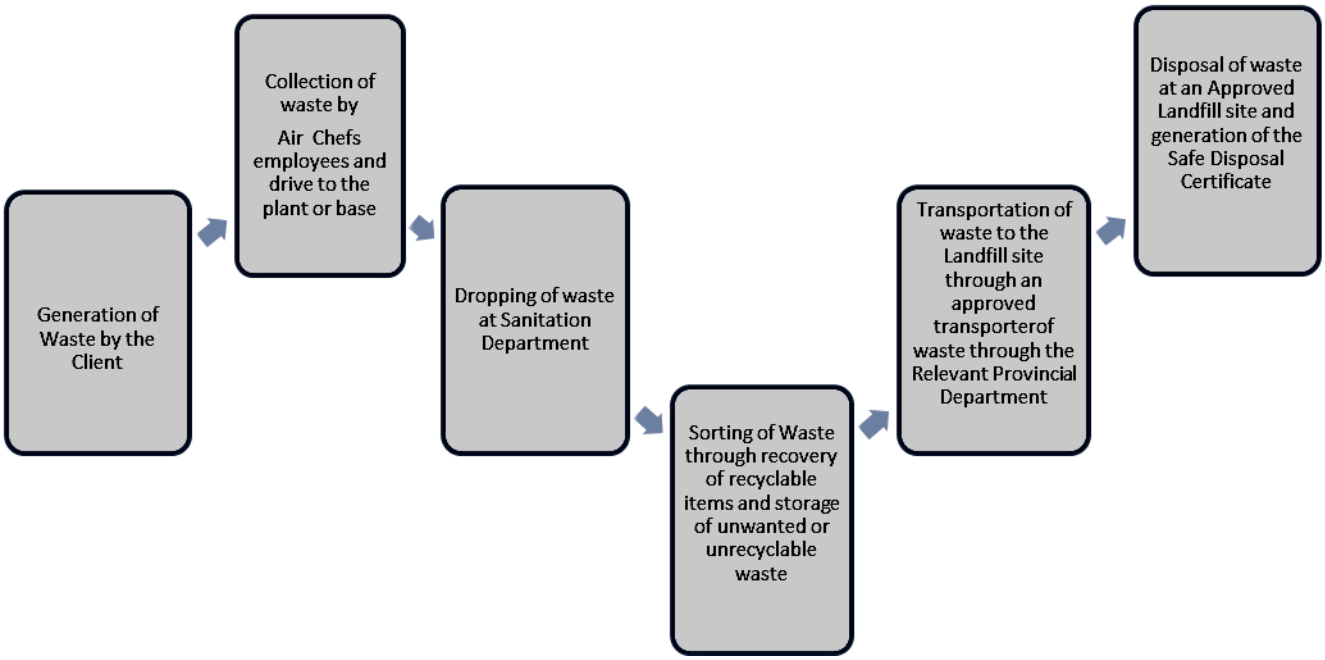


Figure 2-9: Waste process flow diagram (2016)

Source: Air Chefs waste and general waste policy (2014)

Figure 2-9 illustrates the waste flow process. The Air Chefs Waste Policy (2016), states that general waste (including food waste) from the aircraft is collected by Air Chefs to base where it is dropped off at the sanitation area. It is at this area that waste is separated and sorted for recovery of recyclable materials. None recyclable waste is thereafter transported by the authorized waste collector to landfill sites where it is disposed of. After disposal, a safe disposal certificate is generated at the approved landfill site.

Air Chefs South African (2016) contracts waste collection to one company which is Interwaste. Interwaste is a waste management solution company. It has material recovery facilities (MRF) for recycling purposes. Recently it introduced EEZEE bins which have different compartments for different materials so as to encourage the waste separation at source initiative (Interwaste, 2014).

In the Air Chefs Waste Management Policy document (2014), the following are stated as the standard operating procedures for waste collection and management.

(i) Collection and transportation of waste from the client to the base/plant

- Air Chefs employees will collect waste from the client
- All waste bins and carts must remain closed and sealed
- No waste should be opened before it gets to base
- During transportation all waste containers must be sealed and closed until the waste gets to the sanitation area

(ii) Offloading of waste

- Security verification is conducted that all waste was sealed upon arrival
- All waste that was from the client must only be offloaded at base, no other area
- Waste must be offloaded at the sanitation roller doors

(iii) Recycling of recyclables

- Waste bins must be delivered on the sorting table and not disposed on in the general waste compactor
- All items that are recyclable must be handled by the recycling contractor and not Air Chefs employees
- All items that are not recyclable must be disposed of in the compactor as part of general waste that goes to the landfill site
- All recyclable items must be taken to the containers and recorded before they leave site

- Monthly records of the recovered material must be given to the relevant person at Air Chefs.

(iv) Transportation of recycled material

- Waste will only be collected by a licensed vehicle from the Air Chefs premises
- The waste manifest documents must be made available to security so as to verify the quantities of waste that is collected
- The recyclable waste will only go to the recycling plant and not disposed of at the landfill site
- Safe disposal certificate must be generated and given to Air Chefs for documentation

(v) Transportation of general waste

- Waste will only be collected by a licensed vehicle from the Air Chefs premises
- Waste manifest documents must be made available to security so as to verify the quantities of waste collected
- General waste will only be disposed of at a licensed landfill site
- A safe disposal certificate must be generated and given to Air Chefs for documentation

The waste collection process starts as soon as waste enters the sanitation area of the establishment. This is all waste, which includes food waste from catering contract clients such as SAA. The waste collection process is outlined in detail in the diagram that follows (figure 2-10). The waste process flow diagram shows that it is the responsibility of the contract caterer to collect all catering waste from the client. Waste is transported to base using the caterer's vehicles to be dropped off at the sanitation area of the caterer's facilities. This is where waste is to be sorted to recyclable and non-recyclable waste. Waste then gets taken over by a certified waste disposal company for either recycling or safe disposal.

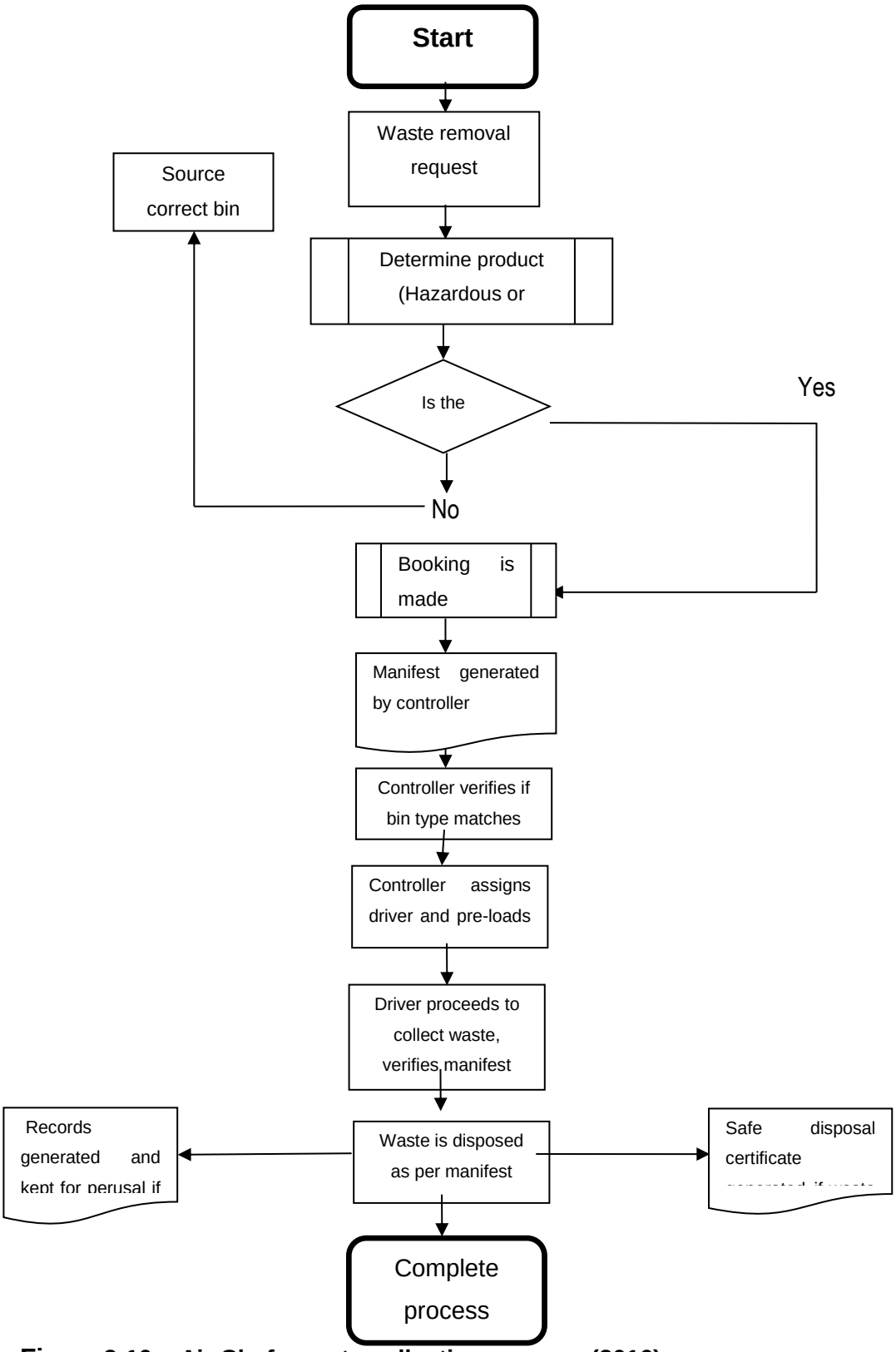


Figure 2-10: Air Chefs waste collection process (2016)

Source: Air Chefs Waste Management Policy document (2016)

2.4 DISCUSSION

This chapter was aimed at understanding the theoretical framework to underpin the study and the literature around the phenomenon in question, which is food waste. Looking at the waste hierarchy as well as CSR, it is clear that they both revolve around the moral obligations of running an establishment. They both put emphasis on the importance of not just producing and counting profits but also moral obligations on protection the planet and its inhabitants.

In the context of food waste, the literature in this chapter brought about interesting angles to the phenomenon of food waste. Some of the main concerns on the management of food waste are food scarcity, poverty, hunger, hidden cost of food waste, strict labeling as well as strict regulatory laws on food waste handling. The chapter also highlights laws such as the cold chain; food labeling and food donor responsibilities reduce the desire to reuse food.

Recommendations without infrastructure to support their successful execution seem to be standing in the way of progress in dealing with food waste. These realities discourage food donors and food banks from donating food. Some studies have referred to food waste as inhumane whilst others see the risk of food borne illnesses as more dangerous. Literature reviewed unpacked the actual processes followed by the airline catering industry when managing waste. It is evident through the above literature that food waste is not only a post-consumer phenomenon as waste also happens during harvesting as well as preparation. Although some first world countries have come with technology that powders food waste for fertilizer, these technologies are not yet in existence in South Africa.

The literature confirms that food waste is well identified as a problem, yet there are no one size fits all solutions. The majority of the studies are situation specific, country specific or industry specific. Each catering sector has unique challenges that cannot be implemented internationally and in all food sectors. Attitudes, politics and education play a role in food waste management strategic options. The literature in summary calls for both the food donor and the receiver to find middle ground and find working solutions

that are relevant to each situation. The main concerns with food waste are that there is too much food scarcity, poverty, drought and hunger in the world for food to be thrown into landfills.

2.5 CONCLUSION

Food waste management in its entirety has been well researched. It has been discussed in different contexts such as in physical science, in environmental studies, in health and nutrition studies, in social sciences as well as in mass catering. Some studies have focused on plate waste paying particular attention to portion size reductions (Freedman and Brochado, 2010), whilst others focused on the eating habits and social behavior of people (Evans *et al*, 2013).

This chapter provides a fusion of the food waste hierarchy, CSR and the phenomenon of food waste in the airline catering industry. Both aim at improving food waste management to curb social, environmental and economic challenges (Papargyropoulou *et al*, 2014). Literature further revealed that post-flight food waste in the airline industry is more regulated because it can be categorised as international waste. International food waste is highly regulated and monitored as it poses a danger of disease such as foot and mouth to animals. This classification of post-flight food waste makes the handling thereof complicated.

Sifting through the literature also revealed that there is a direct relationship between food safety and food waste as so much food qualified in terms of thousands of kilojoules of nutrients and billions of Rands being landfilled annually in the same country where thousands do not know where their next meal would come from. The catering industry literature revealed that food safety management takes precedence over post-consumer food waste management. Through the use of guidelines such as HACCP, ISO 22000 and the cold chain, food safety is strictly controlled; however food waste management guidelines such as the food waste hierarchy are not adhered to.

Literature reveals that there is reluctance from potential food donors even after the introduction of the “Good Samaritan act” that was aimed at eliminating donor

responsibility. This chapter also revealed that there is a gap in knowledge and an imbalance in attention to food waste and food safety in the context of inflight catering. Lastly, this chapter outlined the actual food waste handling procedures at Air Chefs.

In this literature it emerged that there are different views and recommendations on what can be implemented when dealing with food waste. Be that as it may, such recommendations are industry and case specific. This means there is no “one size fits all solution” to the handling of food waste. This makes this study even the more important because it gives an academic snap shot view of the situation in the airline catering industry in the South African context.

In the chapter 3, the research lays out the methodologies used in this study to best answer the research questions and fulfill the requirements of the research objectives. This chapter also provides justification for the methodological choices made and links them to the research objectives.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

In the previous chapter, there was significant literature that displayed the desire to prevent, reuse, recycle, and recover food, its energy and nutritional value in consideration of the triple bottom line (people, planet and profits). The literature review chapter also illustrated the hidden cost of food waste showing the superficiality of only considering what is obvious and visible to the naked eye about this phenomenon. Some literature outlined the challenges in implementation whilst others outlined the policies that limit the reuse of food waste in the airline catering industry.

This chapter focusses on how the study was conducted to achieve the research aims, fulfill research objectives and answer the guiding research questions. It presents the strategy of enquiry based on underlying assumptions and appropriate research paradigm, research design, research approach, data collection tools and methods (Denzin, Norman and Lincoln, 2003). Permission to conduct the study was granted by Air Chefs SA (Annexure A), the study would be conducted in consideration of academic research designs and methodologies, research ethics and in respect of what was agreed upon by the catering company. In this chapter the target population is identified, sampling techniques and sample sizes explained. Data collection tools, data collection process and analysis methods are also tabled.

3.2 RESEARCH METHODS

This study adopts a mixed method approach (quantitative and qualitative) to data collection and analysis. This approach to research is recommended by Hussein (2009) citing the fact that mixing research approaches neutralises the flaws of either and strengthen research outcomes. Newman and Benz (1998) puts forth the fact that this

approach tends not to be rigid, but allows the researcher to use the most appropriate methods to a study to satisfy the research aims and objectives as stated in chapter 1.

They further state that a mixed method approach can present data results on a different spectrum and wavelength. Mixed methods research approach is also strongly supported by Creswell (2013) who states that it allows for integration of theoretical frameworks, perceptions and statistical outcomes. Wright (1995) opines that mixed methods are aimed at answering different types of questions such as what, when, why, how, and so, (see figure 3-1). This combination is used in this study because it increases credibility of research findings by providing a holistic understanding of the problem under investigation and giving an all-inclusive analysis in reaching a conclusion (Wagner, Kawulich and Garner, 2012).

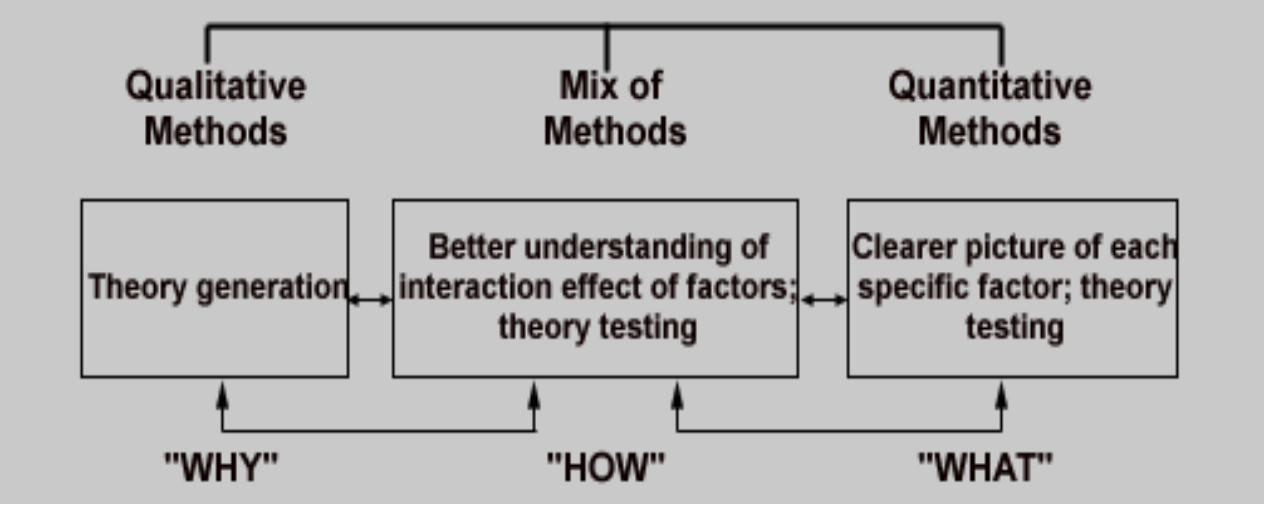


Figure 3-1: Appropriate use of qualitative and quantitative methods

Source: Wright (1995)

Plano-Clark, Huddleston-Casas, Churchill, O'Niel Green and Garrett (2008), subdivided mixed methods in the way that is illustrated in figure 3-2. In this context, this study adopts the triangulation design where both quantitative and qualitative data are collected prior to mixing, interrelation and comparison of both forms of data and interpretation with emphasis put on both data forms.

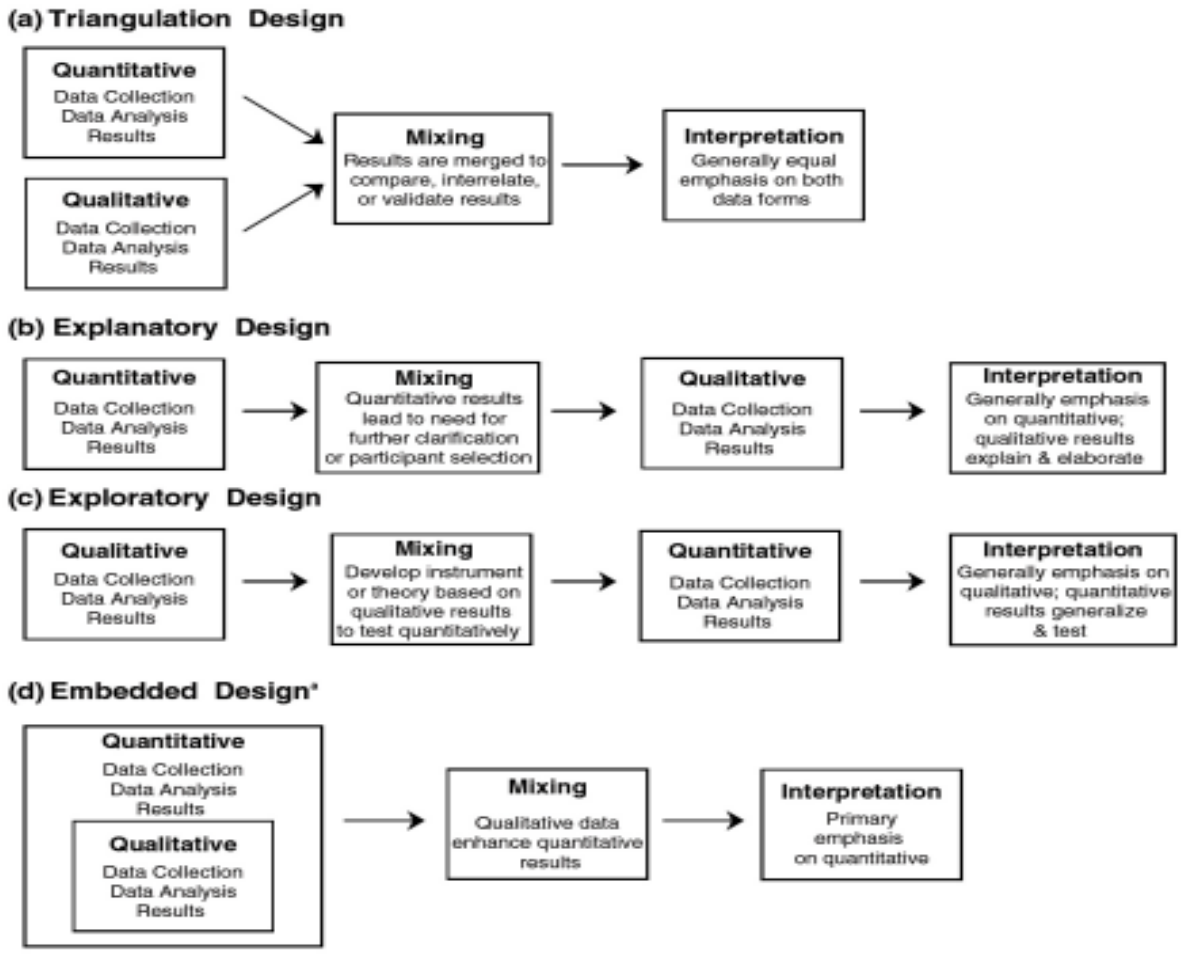


Figure 3-2: Four Major Mixed Methods Designs

Source: Creswell and Plano-Clark (2007)

There was a need to engage in theoretical exploration first (Creswell and Plano-Clark, 2007) as done in chapter 2 looking at the food waste phenomenon from other catering sectors as well as in the airline catering soctor. The study also used a deductive approach in addressing its questions, because it assumes that the way to solve the economy class post-flight food waste problem is through the implementation of the food waste hierarchy and corporate social responsibility theories. A deductive study has a general point of view as its starting point and then it cascades to the specifics of the problem being studied. These assumptions are then tested to address the issue of concern in the study (Soiferman, 2010).

3.2.1 Case Study Design

Tight (2010); Maree (2012) brought forth an understanding that a case study approach provides a setting where multiple sources of information are mixed in a bounded setting. Following a mixed method approach within a case study design creates a good setting for the development of a more comprehensive snapshot of the phenomenon of food waste within the airline catering industry in this case. This approach allows for the capturing of holistic and meaningful contextual characteristics of the phenomenon within an intrinsically bounded system.

This study uses Air Chefs South Africa as a case of study. The research was also aimed at investigating some of the industry specific challenges that affect the management of food waste, as well as the quantities of food that go to waste. This was done to assist the navigation and redirection of food waste handling processes in the field of inflight catering, using the food waste hierarchy and corporate social responsibility as tools to give direction. Based on the complexities of the aims and objectives and the nature of the investigation, this study therefore required a mixed method approach to be used, using the deductive approach within a case study design. The triangulation design (figure 3-2), guided the data collection and analysis process.

3.3 DATA COLLECTION METHODS AND TOOLS

This study adopted a mixed method following the triangulation design to data collection as stated above. The triangulation design is where both quantitative and qualitative data are collected at the same time. In other words the results from either do not feed into the data collection process of the other. Maree (2012:76) clarifies that a case study can be used to provide a setting where multiple sources of information, techniques and research methods can be used to create a more comprehensive and complete picture of the problem under investigation.

3.3.1 Interviews

Qualitative data in this study was collected through the use of face to face semi structured interviews. In this study a semi-structured interview with the operations manager was conducted using set interview questions (Annexure C). The dialogue in this instance was focused on management's views on the economy class post-flight food waste management policy, the role of the food waste hierarchy and corporate social responsibility and if they are considered in waste management policy development in the establishment.

Opdenakker (2006) posits that interviews are qualitative research techniques that aim to draw meaning, views and a deeper understanding of a phenomenon. The main function of a semi structured interview is to unpack views, experiences or motivations on particular matters (Gill, Stewart, Treasure and Chadwick, 2008). Most of the question items were probing to provoke the participant to add other perspectives to uncover new knowledge.

3.3.2 Questionnaires

The questionnaire (Annexure D) was used to collect both quantitative and qualitative data from the employees of Air Chefs South Africa. The question items were designed around the research questions stated in chapter 1. These questions were informed by the researchers' curiosity on the handling processes of food waste in the field of airline catering. Questionnaires were also designed based on the literature as expounded in chapter 2. The aim was to learn about their knowledge of what was done with left-over food, amounts and types of food, opinions, attitudes and experiences.

3.3.3 Waste Audit Forms

The waste audit forms (Annexure E) were used to collect data to give a snapshot view of an ongoing situation (Leedy and Ormrod, 2010). The waste audit form design was informed by the menu structure designs at SAA (detailed in section 2.3.5.1). This kind of data collection was used by Ross (2015) who conducted a waste audit to quantify food waste in the airline production kitchen. These waste audit forms were used to log

in the economy class waste information into different categories as per the SAA tray set up composition and SAA meal specifications for each route (SAA Domestic, regional and international meal specifications Cycle 1 2016) (Annexure F).

In this case, primary data was collected from economy class food service trolleys and meal ovens. These trolleys were returning from South African Airways' routes to the offloading bay (sanitation area) at Air Chefs Johannesburg. To reduce interruptions and to prevent deviations from company procedures, food waste was counted on the stripping tables as meal trollies were being stripped and equipment and food was separated. Data collectors stood on three different points for data collection. These points were for domestic flights, regional flights and international flights. To ensure safety, sanitation standards and to be safety compliant, hair nets, plastic aprons, face masks and safety boots were provided by the company to data collectors. Clipboards with waste audit forms and a calculators and food scales were also provided at the data collection table.

Economy class post-flight food that was on meal service trolleys and ovens was physically counted and or weighed. Countable items such as pre-portioned and individually wrapped cheeses, crackers, butter portions, jam portions, salad dressings, breads and chocolates per flight were counted and recorded on to the allocated spaces on the waste audit forms.

Cooked foods such as hot meals, salads and desserts were separated and their weights were drawn from menu specs. Amounts were recorded in grams on the allocated spaces on the waste audit forms. The figures were represented on to waste audit forms in quantity and in grams. Each flight was counted individually to allow room for the study to uncover maximum information. Four days of data were collected.

Findley, Daum and Stineman (1990) recommend that data collection, for the first few subjects, must be conducted by the primary investigator (PI) but can later be delegated. To clarify ambiguity and ensure understanding, the PI trained all data collectors and answered all questions about the data collection expectation and process. Site visits, regular meetings, spot checks and data review for accuracy prior to analysis was also

conducted throughout the data collection process. Data collection in this section was for four days, collected by the primary investigator and then later delegated to data collectors.

3.4 TARGET POPULATION AND SAMPLING

The study was aimed at investigating the amount of economy class post-flight food waste at South African Airways, at identifying the challenges that the airline catering industry faces with regards to managing food waste, at identifying employee perceptions on economy class post-flight food waste policies, and making recommendations to improve the management of post-flight food waste policies by considering CSR principles and the food waste hierarchy in inflight catering companies.

Non-probability sampling is when subjects of the study recommend other individuals. This kind of sampling also extends to convenience sampling, quota sampling and snowball sampling (Acharya; Prakash; Saxena; and Nigam, 2013). This study adopts a non-probability sampling method following the theory of convenience sampling. Convenience sampling uses subjects that are readily available, nearby and accessible to the researcher. Participants that are used are often those that are at the right place at the right time and meet the inclusion criteria. This method of sample selection is recommended because it is inexpensive and doesn't need a list of all subjects (Acharya *et al*, 2013).

Air Chefs employs a total of 1175 employees, 1004 people at the Johannesburg base, 107 in Cape Town and 64 employees in the Durban base (Air Chefs presentation, 2016). As much as this is the total target population for this study, it was not easy to access them it. The Johannesburg base was then chosen because it is the head office of Air Chefs catering for international, regional and domestic flights whereas the other two are sub units that cater for domestic flights. Air Chefs Johannesburg employs the majority (85.5%) of the total employees and has the biggest catering capacity (Air Chefs presentation, 2016).

3.4.1 Sample Size

Firstly, for qualitative data collection the study interviewed the operations manager at Air Chefs using a semi-structured interview schedule as already explained. This was aimed at unpacking and understanding the food waste management policy, answer questions on CSR and the food waste hierarchy, and draw managements recommendations based on experience. Only one interview was conducted as there is only one operations manager.

Secondly, Singh and Masuku (2014:11) state that in a population size of 1000, a sample of 91 respondents would yield 95% confidence level in the results with a 10% margin of error. Israel (1992) suggests that a sample size of 169 in a population of about 1000 would yield a 95% level of confidence with a 7% margin of error. Therefore 200 survey questionnaires were administered to inflight catering company staff members at Air Chefs SA. This population of people was conveniently found at the premises of the establishment during the week of data collection.

Lastly quantitative data was collected through counting economy class post-flight food waste using waste audit forms. A waste audit exercise by definition is a process of waste analysis which helps to identify the types and amounts of waste that is generated. This exercise is advantageous because it can assist to reduce waste management costs, improve operations, promote the minimization of resource usage, and develop factual knowledge for stakeholders and employees (Smiley, 2012).

According to the introduction to Air Chefs presentation, Air Chefs caters for 171 flights per day where about 85% (more or less 145 flights per day) of them are SAA flights. This study concentrates on food waste only from SAA flights because SAA is Air Chefs keys account and Air Chefs is part of the SAA group, therefore their core business is to cater for SAA flights.

In a study conducted by Ross (2015) who assessed food waste in an airline caterer's production kitchen, data was collected over a period of two days to draw the kitchens'

average food waste. A four-day average was used in this study. Data were therefore collected over a period of four days as already explained in 3.3.3.

3.5 DATA ANALYSIS AND PRESENTATION

Qualitative data collected through the interview was analyzed through coding and categorised into themes. Thematic data were analysed using the NVivo 11 Plus software. Descriptive statistics (frequency tables, cross tabulations, component, simple bar charts, histograms and pie charts were used to display data.

Quantitative data which was sourced through questionnaires and the food waste audit was analyzed statistically. In this research the services of a statistician were sourced to analyze quantitative data through the generation of histograms, graphs, tables and inferential statistics (Kaplan, Gabrosek, Curtiss and Malone, 2014). This process allowed a researcher to actively compare variables using actual measurements such as numbers, amounts, and weights (Garth, 2008).

3.6 PILOT STUDY

A pilot study is described as a miniature version of the actual study. It is conducted as a trial run or a pre-testing session to test the feasibility of the actual running of the study. It equally aims to check where the research project may fall short in answering the research questions by subsequently testing the adequacy of data collection instruments (van Teijlingen and Hundley, 2001).

The research instrument used for qualitative data collection was an interview as well as some sections of the questionnaire. Quantitative data was collected using waste audit forms and certain sections of the questionnaire. These instruments were pre-tested for validity through a trial run. Piloting or pre-testing was done through a one day trial run with peers. This allowed them to point out ambiguities on questions and helped to iron out misunderstandings of interview questions and inadequacy of waste audit forms.

The piloting session was run on people other than those that were to participate in the study. These people were made to understand what the study aimed to establish. This

process tested the effectiveness of research instruments to ensure that they accurately collect required data that would enable the researcher to satisfy the requirements of the research objectives (Bell, 2010). Validity of the research instruments serves to check if the data collection tools ask relevant questions that would fulfill the objectives and answer the research questions as given in chapter 1 (Gomm, 2009). Validity was of the data collection tools were tested through the pilot study as stated in 3.6.

Reliability refers to the ability of a study to produce the same results if it was recreated using the same methodology under the same circumstances. This process checks if the tools have the ability to yield the same results if used exactly the same on different days. Menu items and meal service catering structures that informed the food waste audit forms may also change. Reliability may be harder to test because circumstances may change and the research tools were not standardised. So against that consideration results may also change.

3.7 DELIMITATION OF THE STUDY

The delimitations are defined as boundaries in the researchers control that outline the capacity, limits and margins of a study (Simon, 2011).

- The sample population selected for this study was food waste produced solely on South African Airways flights, not other sources; this means the study is not exhaustive.
- This study had a premise that food waste cannot be completely eradicated. So it aims to look at the management of unpreventable food waste so it ignores the prevention of food waste.
- The study does not concentrate on causes of food waste, nor financial implications of food waste.
- The study was limited to only economy class economy class post-flight food waste not on food waste generated from the business class or premium class or through any other possible sources such as the kitchen or departure and arrival lounges.

- Therefore, this study does not cover all areas of knowledge in airline catering food waste management.
- The findings thereof apply to Air Chefs South Africa within the context of South African Airways economy class economy class post-flight food waste.

3.8 DISCUSSION

Table 3-1 summarizes the relationship between research objectives and the data collection tools that were used to answer the guiding questions. In this chapter it was presented that a mixed method approach was used. It also summarised the collection methods, sample size and data analysis tools. Data analysis programs such as NVivo 11 Plus software and SPSS were used because they are recommended for advantages such as safe-keeping and data organisation (Rambaree, 2014).

This chapter gave a detailed description on how data was collected, who collected it, for what periods of time as well as who it was collected from. It equally detailed the data analyses and representation methods. This gives a clear description of the path ahead on this research.

3.9 CONCLUSION

In consideration of the nature of the investigation, through drawing support from literature the study adopted a mixture of research methods. Interviews, questionnaires as well as a waste audit exercise were used to collect data. This was done to get clearer, reliable and valid data sets. Data sets with a combination of quantities and descriptive was used. The research methods were carefully selected for relevance, validity and reliability on the study. This chapter ensured that the information that the study brings to light in the next chapters answer the research questions and meet the research aims and objectives, yet flexible enough to give room for new unexpected findings to emerge.

CHAPTER 4

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 INTRODUCTION

This chapter was arranged to start with the presentation, analysis and interpretation of qualitative data followed by the presentation, analysis and interpretation of quantitative data. Qualitative data was collected through an interview with the general manager at Air Chefs SA as well as some sections of the employee questionnaire. Some of the research questions sought qualitative kind of data from the respondents and the first section of this chapter addresses those questions. The qualitative data section was aimed at answering the following research questions stated in chapter 1:

- *What are the policies that inform economy class post-flight food waste management procedures in the airline catering industry?*
- *What could be done to improve the management of post-flight food waste through the use of the waste hierarchy and CSR principles in the airline catering industry?*
- *What are employee perceptions on economy class post-flight food waste management at Air Chefs SA?*

4.2 QUALITATIVE DATA PRESENTATION, ANALYSIS AND INTERPRETATION

Section 4.2 of the chapter presents interview data. As mentioned in chapter 3, one interview was conducted with the general manager at Air Chefs. This was done with the aim to unpack the food waste management policy, to draw meaning and to give a deeper understanding of the phenomenon. It was also conducted to create new knowledge drawn from the perspective of the interviewee.

The study assumed that the best way to address the problem in the airline catering industry is by using the food waste hierarchy as well as CSR as discussed in chapters 1

and 2. Therefore, themes and categories were created before the interview was conducted. There were three themes and categories that were set as main categories for the interview section of the data analysis and interpretation. The three main themes which formed the main categories were as follows:

Theme 1: Unpacking the phenomenon of food waste

Theme 2: Policy and regulation

Theme 3: The food waste hierarchy and Corporate Social Responsibility (CSR)

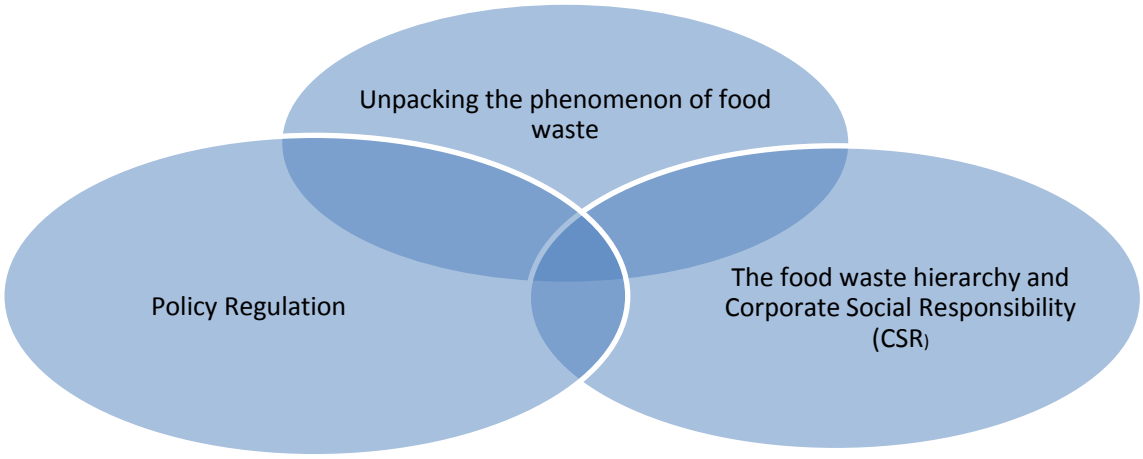


Figure 4-1: Qualitative data main themes

From the above themes, sub-categories emerged. These sub-categories were new unexpected information that came up through the interview. These were themed as follows:

Sub-category 1: Seeking information

Sub-category 2: Problem solving

Sub-category 3: Catering industry regulation

Sub-category 4: In-house policies

Sub-category 5: Industry specific challenges

Sub-category 6: Recommendations

The structures in which the sub-categories emerged are illustrated on the network diagrams below (figures 4-2, 4-4 and 4-7). These diagrams display the relationship between the main categories and sub-categories.

4.2.1 Qualitative Interview Data Presentation

This subsection is analyzed through the presentation of interview questions.

4.2.1.1 Theme 1: Unpacking the phenomenon of food waste

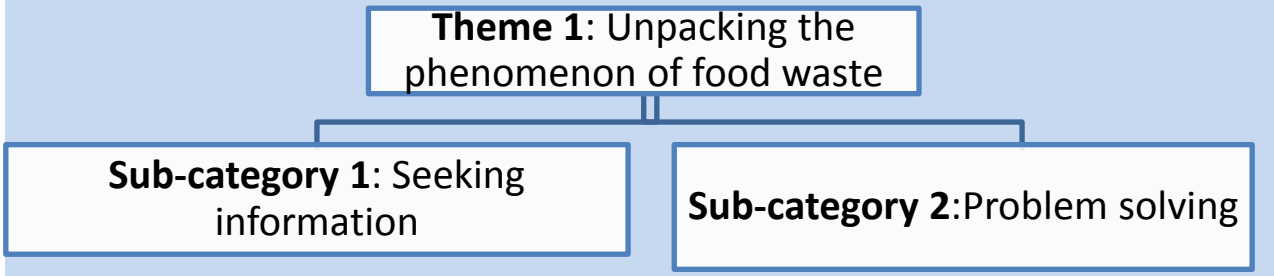


Figure 4-2: Unpacking the phenomenon of food waste

Question 1

Sub-category 1 - Seeking information

Flight specific meals prepared by Air Chefs cater for South African Airways

Response to question 1

There is a different variety of meals that we do for SAA. We have dry snacks, hot and cold breakfasts, lunches, dinners and afternoon snacks meal window periods, illustrated in figure 4-1. It is all determined by the airline. SAA food and beverage department in the airline lets us know what meal categories the airline wants. The catering company does a presentation of the variety of food items prepared for this purpose. Air Chefs calculates the cost of production and present those figures to the airline (Annexure B). The airline then makes a selection considering factors such as route, meat type, passenger preference, food presentation and the cost of production of each meal. The airline, then selects what is suitable and what they are happy to serve on board. These

selected meals then run in window periods and in 6 cycles each running on a seven day period.

Table: 4-1: Meal window periods

Meal window periods
Hot breakfast
Cold breakfast
Morning snacks
Hot Lunch
Afternoon snacks
Hot Dinner

Question 2

Sub-category 1 – Seeking information

Kindly share with the researcher what Air Chefs does with food that comes in from flights whether it is domestic, regional or international routes.

Response to question 2

How we handle food waste should be dependent on where the food comes from. That would dictate how food waste would be disposed. Ideally, it should be disposed in different categories based on its departure destination *i.e.* domestic food waste or international food waste. However, currently we treat all food waste as if it was international food waste. This is due to the lack of systems to dispose of it separately. So what happens is all food waste from flights, irrespective of where flights are from gets disposed of the same way. Remember this food has already been paid for by the airline for passenger consumption. If the passenger doesn't consume it, it is not a financial loss to the airline. Figure 4-3 illustrates the response to question 2.

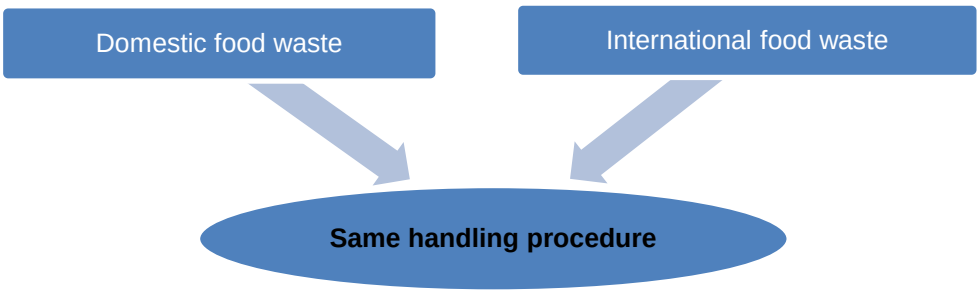


Figure 4-3: Food waste handling procedure

4.2.1.2 Theme 2: Policy and regulations

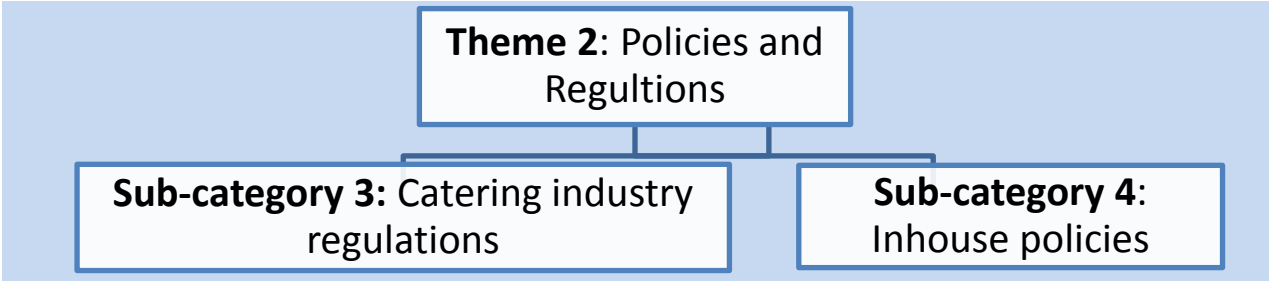


Figure 4-4: Policy and regulation category and sub-categories

Question 3

Sub-category 3- Catering industry regulation

Please enlighten the researcher on the policies and procedures that informed Air Chefs' current food waste handling processes.

Response to question 3

The food waste policy is informed by the HACCP policy of the catering industry. In every mass catering production kitchen there would be waste, it's inevitable. We assume a 1% waste factor to our purchases. However, the airline catering industry is unique, complex and fast paced. It is unpredictable and demands may change in the spur of the moment. Forward planning is therefore very important so we don't experience food shortages and or an oversupply. We use flight historical data to

calculate an average of what we need to produce with a 2-day expiry date. We then prepare the food and roll it out within the set date. The reason for that is we are guided by the HACCP policy as well as food safety policies. These stipulate that when food has been exposed to a broken cold chain, it becomes high risk for bacterial growth and that can create food safety threats. So we are strict on food safety and temperature control at all times, it is important. Food safety policies stipulate that once food and used equipment are together it cannot be consumed again because there is a risk of cross contamination. For example, if a passenger didn't use his butter but put his fork on it, that butter cannot be used again because it may have been contaminated by the fork, even if it's a pre-portioned sealed butter portion. For us, the risk is too high to reuse it, so we discard it. There are also unforeseen circumstances that may cause food waste such as flight delays, flight cancelations and industrial action, but such is the nature of this industry.

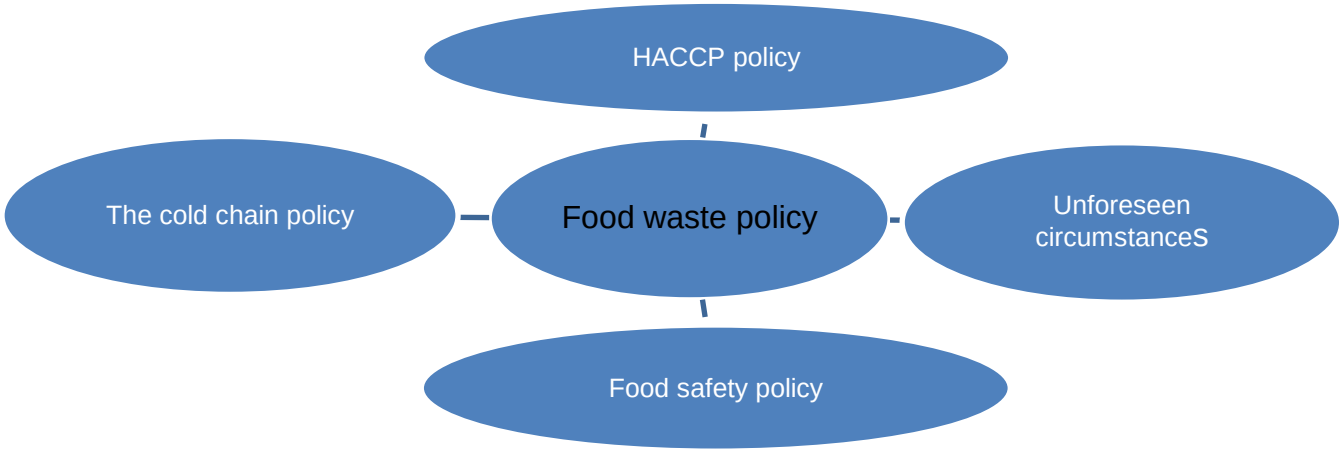


Figure 4-5: Factors that inform the Air Chefs food waste policy

To prevent waste and maximize food safety, we use a cook chill method which is a food preservation technique which involves the full cooking of food, followed by rapid chilling and storage of food at controlled temperatures. That method of food preservation doesn't give bacteria the opportunity to grow and the food is maintained at

those low temperatures. Food would only get reheated again on board. Figure 4-5 displays the response to question 3.

Question 4

Sub-category 4- In-house policy

I would like you to share with me areas and points at which the cold chain get broken.

Response to question 4

The cold chain can be broken at many possible points. When food is removed to the isles for on-board service, when food gets warmed for service and when food gets displayed for passengers. Those are points where food temperatures fluctuate. It is undoubted that after hours of uneaten food travelling by air travel where the air itself is unhygienic and contaminated, this food is too risky for human consumption.

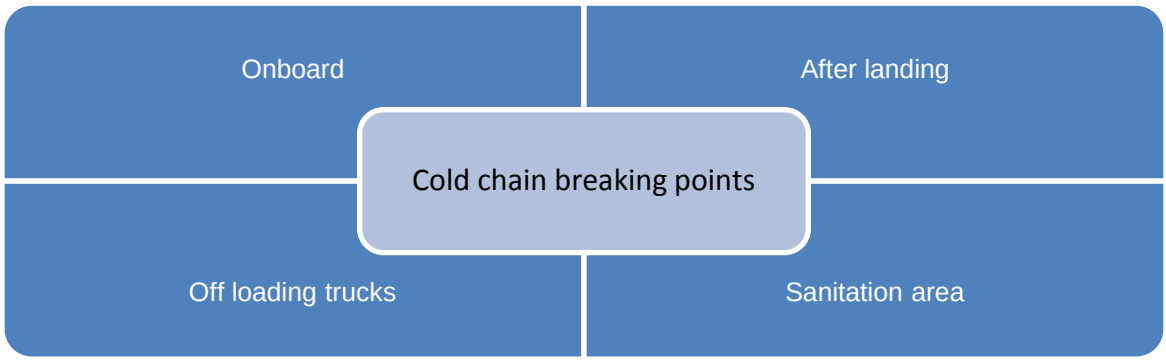


Figure 4-6: Cold chain breaking points

Also after landing all aircraft systems get switched off including the on board chillers. Sometimes it takes a while for the food to be removed from the aircraft. Another factor is that some of our offloading trucks are not equipped with cold storages. Lastly, food comes from the offloading trucks into the sanitation area which in itself is considered as a contaminated area. Figure 4-6 captures the response to question 4.

Question 5

Sub-category 4- In-house policy

It would be interesting to know whose decision it is what happens to post-flight food.

Response to question 5

In essence the food waste belongs to the airline in this case (SAA), the airline should give us instructions on what we must do with all left over food. It is however still our responsibility as a caterer to manage post-flight food waste. We however have instructions from the airline that unopened milk, sealed water and sealed juices must be returned to the airline stores (figure 4-2). Those don't get off loaded at the sanitation area where food waste goes. They get off-loaded at KWE which is a logistics company that keeps SAAs bar items amongst other things.

Table 4-2: Currently recycled foods

Recycled food
Sealed Milk
Sealed water bottles
Sealed juices

4.2.1.3 Theme 3: CSR and food waste hierarchy

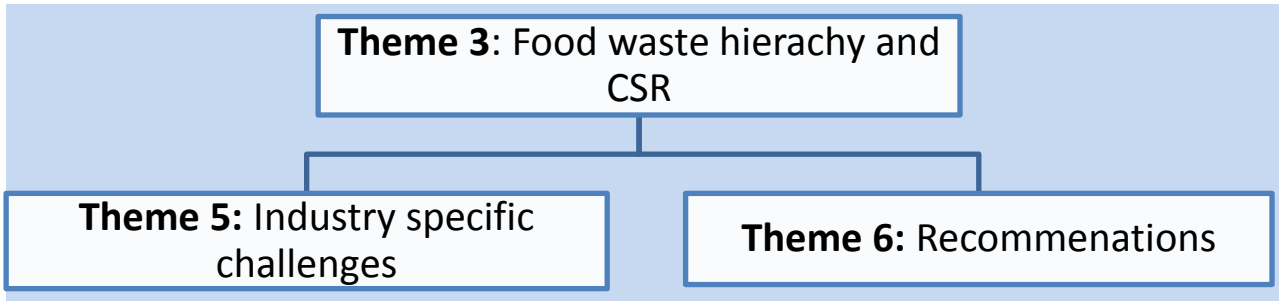


Figure 4-7: CSR and the food waste hierarchy category and sub-categories

Question 6

Sub-category 5 - Industry specific challenges

Air Chefs is the catering wing of South African Airways (SAA). In 2013, SAA was acknowledged by the International Air Traffic Association (IATA) as one in six airlines globally, and the only airline in Africa to achieve a stage 1 environmental assessment status. This achievement essentially means that the SAA group manages waste responsibly in its operations and it displays an environmentally conscious attitude in the running of its departments. Kindly elaborate of Air Chefs role in maintaining Stage 1 environmental status.

Response to question 6

It's true, Air Chefs has that to live up to. In 2015 Air Chefs also received stage 1 IENVA (IATA Environmental Assessment) recognition and are currently working on stage 2. IENVA stage 1 confirms that it is compliant in all Emergency Management Services (EMS) and is legally compliant as an establishment. Figure 4-8 best illustrates the response to question 6.

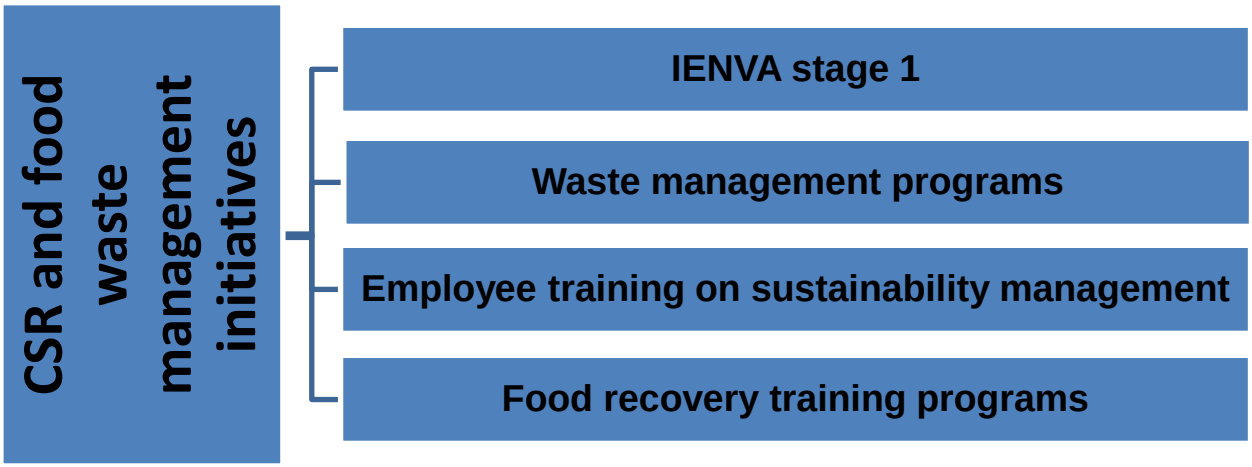


Figure 4-8: CRS and food waste management initiatives

Stage 2, which we are working towards now is where we are determining the significance of the environmental aspects of our running. Some of the in-house initiatives in place to bring about food waste awareness are employee training programs

such as the sustainability management program, separation at source, waste recovery programs and waste management processes.

Question 7

Sub-category 6- Recommendations

The South African Press Association reported that Air Chefs was no longer donating surplus food because of lack of transparency on the criteria used to select charities. Please share with me the challenges that this establishment faces regarding food donations.

Response to question 7

Post-flight food waste was never donated. According to the industry's guiding principles, it was never fit for human consumption. Air Chefs did in the past donate food that was in stores such as unused ingredients when the menu cycles change or sandwiches that were already prepared. But the decisions to donate were determined by what was used as a filling in the sandwich, not all sandwiches were fit for donations. They would be given out with special consumption instructions such as "consume today". Yes, this was discontinued due to some malpractices by charity owners.

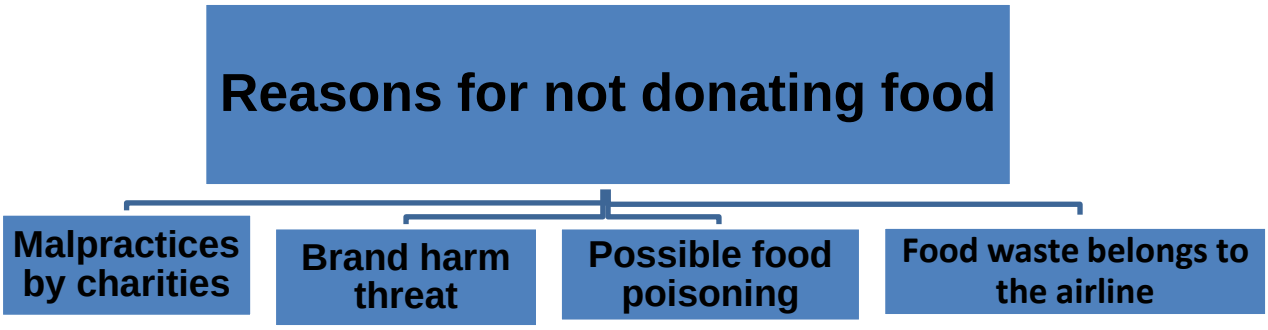


Figure 4-9: Reasons for not donating food

The politics around it as well as the risk our brand being harmed should there be food poisoning though this good deed, discouraged the practices of food donation, so unfortunately we no longer donate food (See Figure 4-9).

Question 8

Sub-category 6 – Recommendations

Considering the waste hierarchy and CSR, kindly share your ideas on what could be done with post-flight food waste as a means to improve on profits, the planet and the people's wellbeing at this establishment.

Response to question 8

At the moment we are working on our stage 2 IENVA compliance. We are looking at the feasibility of channeling food waste into pig farming, however, the risk of disease outbreaks such as foot and mouth is still a threat. We are considering and in talks about the feasibility of creating Bio Fuel with post-flight food waste. This can help to reduce the costs of food production. There are regulations around all that, regulations that need to be studied in much detail before implementation. We want to pilot the Bio Fuel initiative at the Cape Town base and if it proves successful then we can expand it to all our bases.

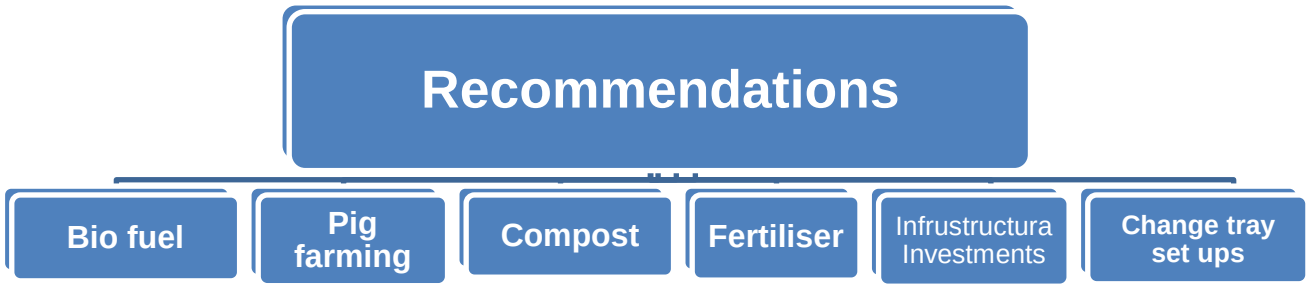


Figure 4-10: Recommendations on what can be done with food waste

According to regulation, international food waste needs to be treated accordingly before it can be used as fertilizer or compost so that complicates the possibility of that. The on-board food service procedures also perpetuate food waste. If cheese, butter and jam portions were not loaded as standard on each tray, that could reduce waste because then those could be recycled. Investment on infrastructure is a necessity and needs to be looked at collectively. Figure 4-10 summarizes the recommendations made in response to question 8.

4.2.2 Qualitative Questionnaire Data Presentation

Following the lead of the quote that says “what gets measured gets managed”, this chapter aims to unpack the phenomenon by measuring the magnitude of post-flight food waste, unpacking it through a descriptive analysis. This section aimed to answer the following research questions:

4.2.2.1 Please enlighten me on the categories of food that mostly end up as economy class post-flight food waste.

Table 4-3: SAA Routes

Routes	Number of flights per day per route
Domestic	42
Regional	23
International	9
Total flights	**74**

To answer the research question above, the study needed to unpack the routes, the type of meals served and eventually the totals and monetary values. Table 4-3 and Figure 4-11 show that domestic routes are the most frequent routes at 56.8% of the flights per day followed by regional routes making 31.1% of daily flights while the remaining 12.2% of daily flights goes to international routes. This is a total of 74 flights per day across all routes.

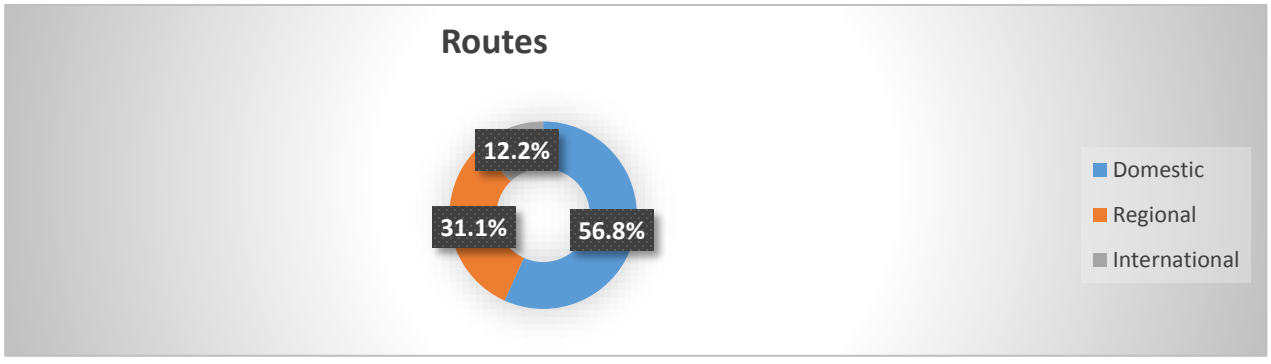


Figure 4-11: SAA Routes

4.2.2.2 Feelings about eating post-flight left over food.

Figure 4-12 reveals the reasons not to eat post-flight food 79.0% of the respondents would not eat it because they fear company policy, whilst no one feared humiliation and no one could claim they always have enough to eat. An overwhelming majority (91.0%) would not eat it because they are provided with staff meals. Another significant number (80.0%) would not eat it because of the poor sanitation in the sanitation area. Respondents chose more than one response to this question.

Depending on which spoke to them the most. Interestingly, just below ⅔ (60.0%) would not eat post-flight food waste for the of food poisoning, which means 40% didn't see any food poisoning danger in eating such food. A very big number (77.0%) would not eat left over food due to poor handling.

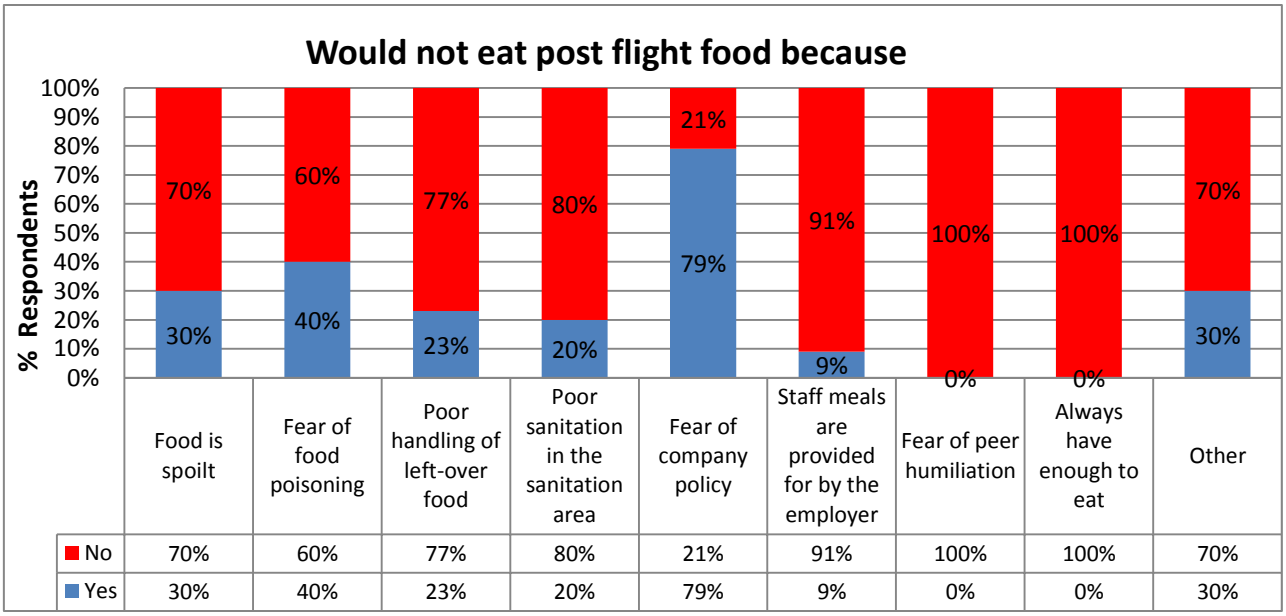


Figure 4-12: Why respondents would not eat post-flight food

Another 70.0% would not eat post-flight food waste for unspecified reasons. Depending on which spoke to them the most. Interestingly, just below ⅔ (60.0%) would not eat post-flight food waste for the of food poisoning, which means 40% didn't see any food poisoning danger in eating such food.

4.2.2.3 Thoughts about buying surplus post-fight food.

The data on figures 4-13 and 4.14 illustrate food types that respondents said they would buy as they thought such food items got disposed of while still fit for reuse. Cold foods, cooked foods, sandwiches and cheese also featured even though not across most respondents as foods that they would buy if sold. Similar to the question above, figure 4-13 and 4-14 present data from the open question on which foods respondents saw as fit for reuse. Food within expiry dates, dry snacks, food from certain flights, foods that are still sealed as well as snacks are perceived as reusable by respondents.

Figure 4-13: Surplus post-fight food that they would buy if sold

Foods such as chocolates, dry snacks, butter, food from domestic flights such as sandwiches, yoghurts, fresh fruits, biscuits, bread and other food items that are sealed and within expiry dates featured prominently in figure 4-13 and figure 4-14 that follows.

The biggest question is then why such food items got disposed of and not either given to staff, charity organisations or even sold to willing buyers. The fact that the airline (SAA in this case, which also happens to be government owned) would have paid for the food, is justification enough for such food items to be donated to help alleviate the problem of food insecurity.

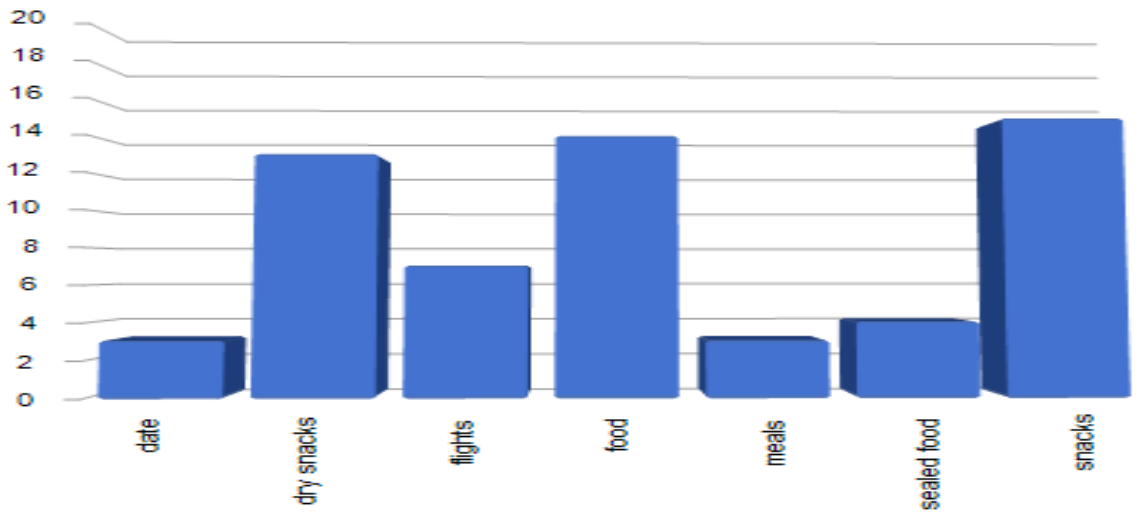


Figure 4-14: Food seen as fit for reuse

4.2.3 Qualitative Data Interpretation

In the interview, data revealed that the major factors that inform the food waste policy at Air Chefs were the cold chain policy, food safety policy and HACCP policy. Although these are different policies they interlink to a large extent. These are the same policies that govern food waste in any food sector and not unique to inflight food services only. They were all in the interest of food safety and it was crucial to ensure that there is no parts of such pieces of regulation were overlooked. Other food establishments governed by the same policies do donate surplus food as it is done though the "Woolworth's good business journey" aimed at addressing issues of CSR and sustainability. This was done through prioritising issues such as increasing donation programs, responding to climate change by designing biodegradable packaging

materials, promoting ethical trade, enhancing operational efficiencies, livestock farming, using surplus food for animal feeding and others (Smith, 2009).

In the airline catering industry, most food gets disposed of yet there is no evidence that by virtue of food having have been in the aircraft, it is then dangerous for human consumption. The major challenge seemed to be the handling and storage post-flight food. When it comes to implementation of these policies seemingly there was a call for infrastructural investments as mentioned by the general manager at Air Chefs SA and it was not clear whose responsibility that would be. There also seemed to be the lack of clarity as to who should take the first step and invest purely for the better management of food waste without making profit of such an initiative.

The airline catering industry could adopt the use of the food waste hierarchy and CSR policies to increase the life cycle of post-flight food while contributing towards alleviating the starvation problem. The interview further proved that in essence there was no compelling reason to dispose foo unserved food from domestic aircrafts at though it were international waste. According to literature from Animal and Plant Health Agency and Department for Environmental as well as Food and Rural Affairs in the UK (2014), the airline is responsible for drawing up food waste handling instructions to a caterer. This is the same point highlighted by management in the study as a stumbling block for bringing about the necessary changes as in essence food waste belonged to the airline.

The practice of all food waste disposal is surprising and unfortunate because management and employees collectively are in agreement that unused food could be used to make bio-fuel, for pig farming, for composting, and used as fertiliser. Management went on to recommend that food waste could be avoided by changing passenger tray set ups, whilst employees added that it could be used for animal feeding, given to employees and donated to the poor. However, in reality none of these ideas were realised at Air Chefs.

According to Ramlagan, Peltzer, & Matseke, (2010) collaborations of institutions is what is needed to work on eradicating poverty and hunger and substance abuse. Unfortunately, the data also reveals that some of the decisions didn’t lie with the

catering company but with the airlines or client they service. This is a dialogue that needs to be started by the airline in a display of willingness to implements such initiatives. With urban poverty on the increase, it is unfortunate that there were no initiatives to salvage the food that is disposed in the airline catering company. SAA could be responding to Mohapatra's (2014) warning against making emotional decisions which could be dangerous in terms of company liability in cases of food borne illness outbreaks. Some of the most emergent themes from the qualitative data from the employee participants were within expiry dates, dry snacks, flight routes, sealed foods, snacks, temperatures and good condition. Interestingly the main reason why employees would not consume post-flight food was responding to company policy (79.0%). A small 24.0% of the employees declared that they had eaten post-flight. About 40.0% would not eat it because they feared food poisoning and 30.0% felt that food may be spoilt. The fact that questionnaires were administered in the work place may have influenced their responses towards work related questions as employees may have also been basing their responses on training manuals. As seen in the literature (SABS, 2007), all food handling procedures are informed by ISO 22000, implying that the process flow of the organisation was certified. As much as the organisation may have the will to change the processes, they could not easily do so without consultation with the certification bodies and without evidence that it would not be compromising public health and exposing the company to liability claims. Data collected from employees indicated that storage facilities of food after a flight and the hygiene standards of the sanitation area were some of the major concerns leading to unwillingness to eat post-flight food waste. This calls for a look at the application of the separation at source waste management model when dealing with food waste as this may address these concerns and save unspoilt food from landfilling.

Nowhere in data collected was there a mention of the separation at source model. This is strange because this model forms part of the Waste Act, but it does not recognize food waste as recyclable waste that should be separated at source. This could be the reason for Air Chefs SA not even making reference to separation at source. The Waste Act itself directs food waste and food scraps to the landfills (de Beer 2015). This points

to the lack of understanding from a regulation level on what food waste is. This model discourages food recovery and recycling and encourages dumping. If this model had to be applied, a whole channelling would need to be created that directs food waste to its point of reuse. The act would have to be amended to accommodate the waste collection process, storage and distribution as part of regulation. The source at which food waste must be separated must be stated, whether it is on-board, upon loading onto the truck or upon arrival at base.

4.3 QUANTITATIVE DATA PRESENTATION AND ANALYSIS - BIOGRAPHICAL

The quantitative data collected was analysed and presented in the subsections that follow.

4.3.1 Gender of respondents

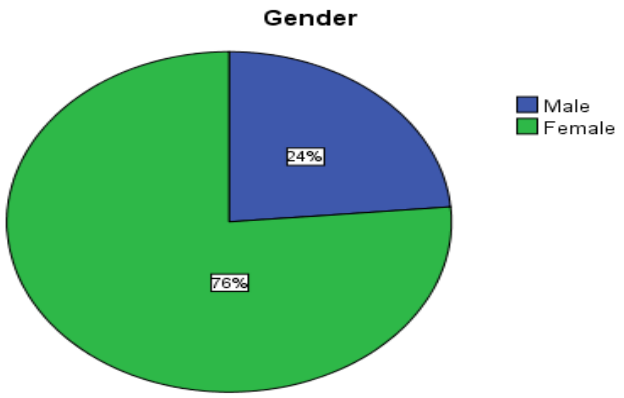


Figure 4-15 Gender of respondents

As shown in figure 4-15 about 76.0% of the respondents were female and 24.0% were male.

4.3.2 Age of respondents

There were 200 respondents. Respondents were between the ages of 20 and 60. There were 45 respondents who were between ages 20 to 30 year, 98 respondents were between ages 30 and 40 year olds, about 50 were between 40 and 50 years and the remaining 10 were between 50 and 60 years.

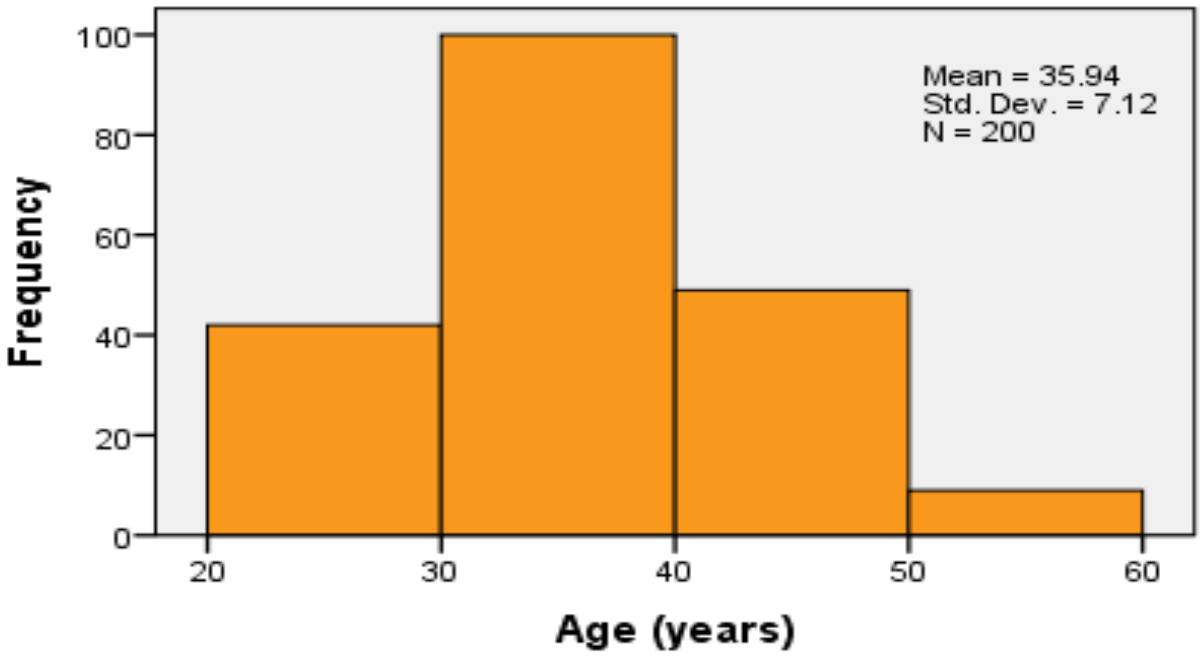


Figure 4-16: Age of respondents

4.3.3 Education level of respondents

This question would help the researcher determine if their responses were affected by the level of understanding and confidence. An overwhelming majority of 93.0% had matriculation as their highest level of education. The remaining 7.0% were between diploma level (5.0%), graduate level (1.0%) and postgraduate level (1.0%). To the question of highest education. 93% of the respondents had matric whist only 5% had diplomas. Undergraduates and postgraduates were at 1%.

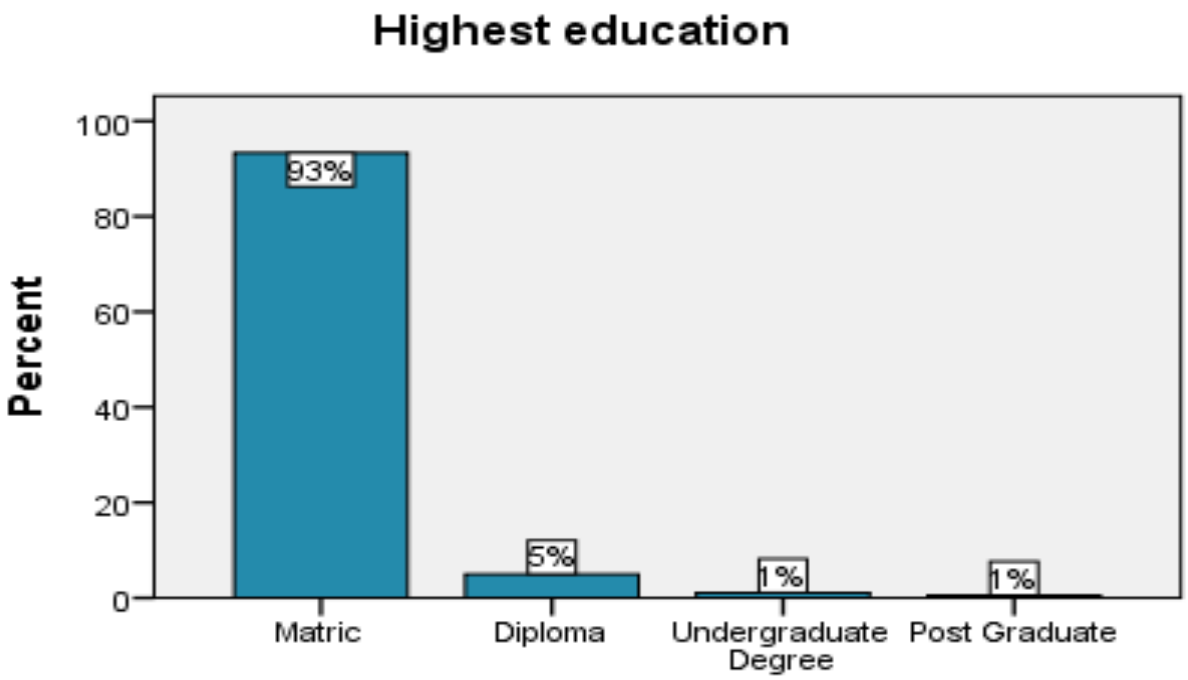


Figure 4-17: Highest education of respondents

4.3.4 Occupation of the respondents

Figure 4-18 shows the occupations of the respondents within the company. It shows that the majority of respondents (31.7%) worked in the kitchen as expected, 12.1% worked in the sanitation area, 8.0% worked in the tray set up section, another 8.0% worked in the hot belt section and 7.5% worked in the butchery. The remaining third of the respondents worked in customer service (5.0%), inventory (4.5%), equipment supply section (3.5%), operations (3.0%), stores, (3.0%), bakery (2.5%), cleaning (2.0%) and the rest in security, cold belt, food production, internal logistics and fresh produce preparation.

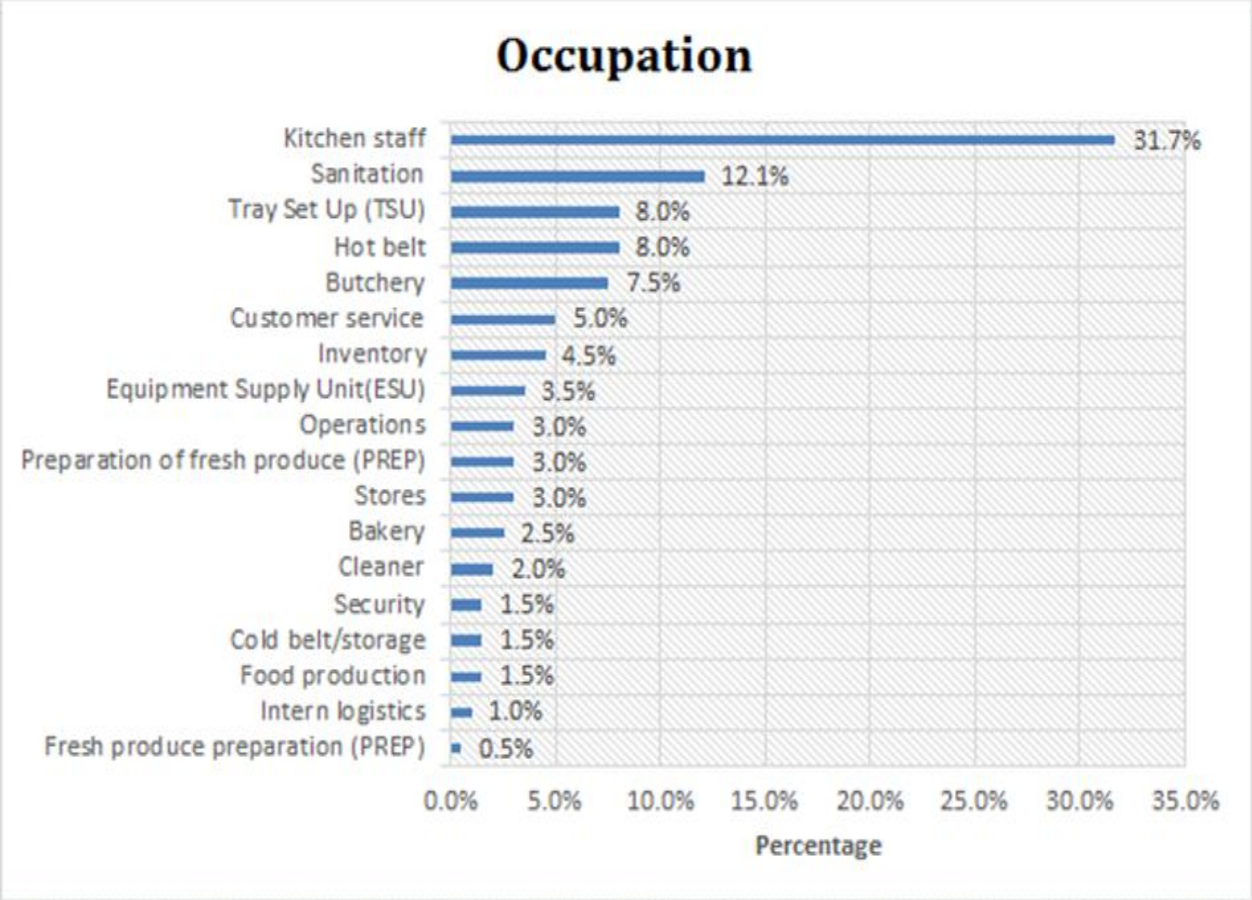


Figure 4-18: Occupation of respondents

4.3.5 Length of service at Air Chefs

Figure 4-19 shows that about a 10th (9.0%) of the respondents were employed for a period of 0-6 months. Another 39.0% were employed for a period of 7 months to 2 years. Just above a third (37.0%) were employed at Air Chefs for a period of 2 to 5 years whilst 15% had been employed for over 5 years.

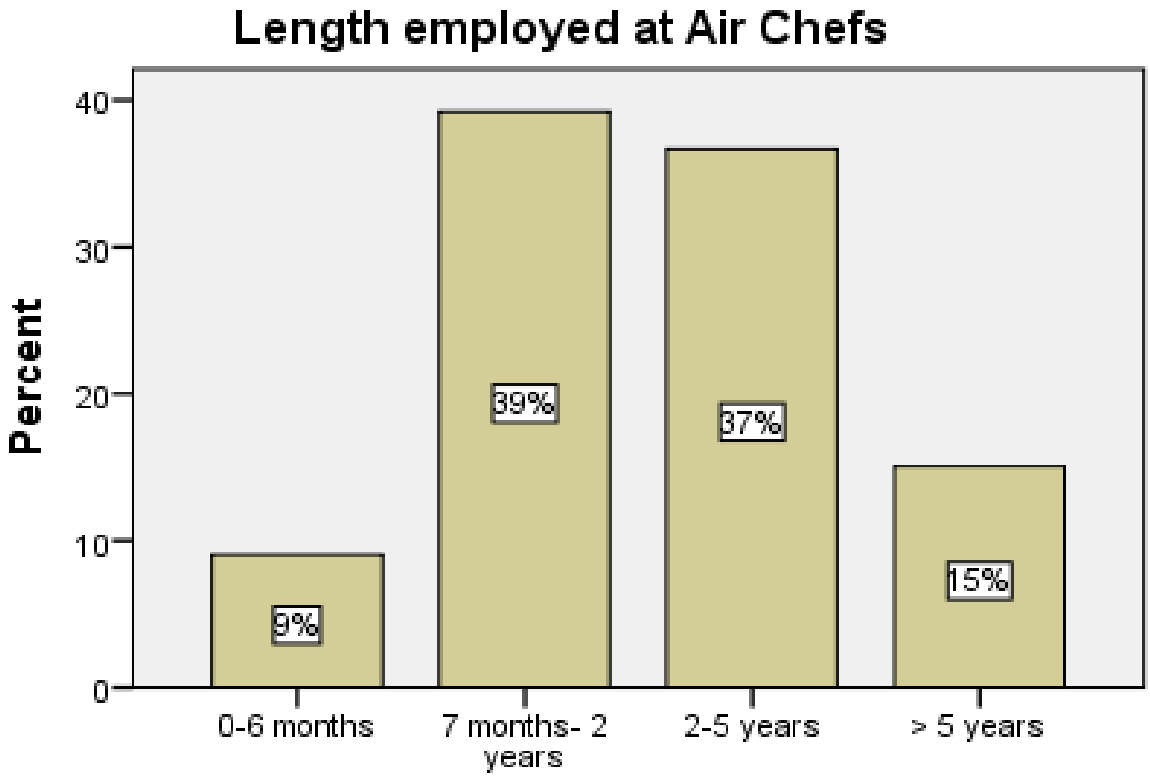


Figure 4-19: Period of employment of respondents

4.4 STATUS QUO RESPONSES

Respondents were asked a number of questions that were deemed crucial to answering research questions and helping the researcher satisfy the requirements of the research objectives.

4.4.1 Whether respondents directly handled post-flight food waste

As shown in figure 4-20, 66.0% of the respondents did not directly handle post-flight food waste and only 34.0% responded that they did. This was the case because there were a number of departments within Air Chefs that the majority of employees could have been working in besides post-flight food handling.

Figure 4-20: Whether respondents directly handled post-flight food waste

4.4.2 Whether respondents were comfortable throwing away post-flight food

In response to whether respondents were comfortable throwing away post-flight food waste about a 5th (19.0%) responded that they were never comfortable throwing away post-flight food, just above a 3rd (35.0%) were sometimes comfortable, 37.0% were often comfortable and the remaining 8.0% shared that they were always comfortable throwing away post-flight food as displayed of figure 4-21.

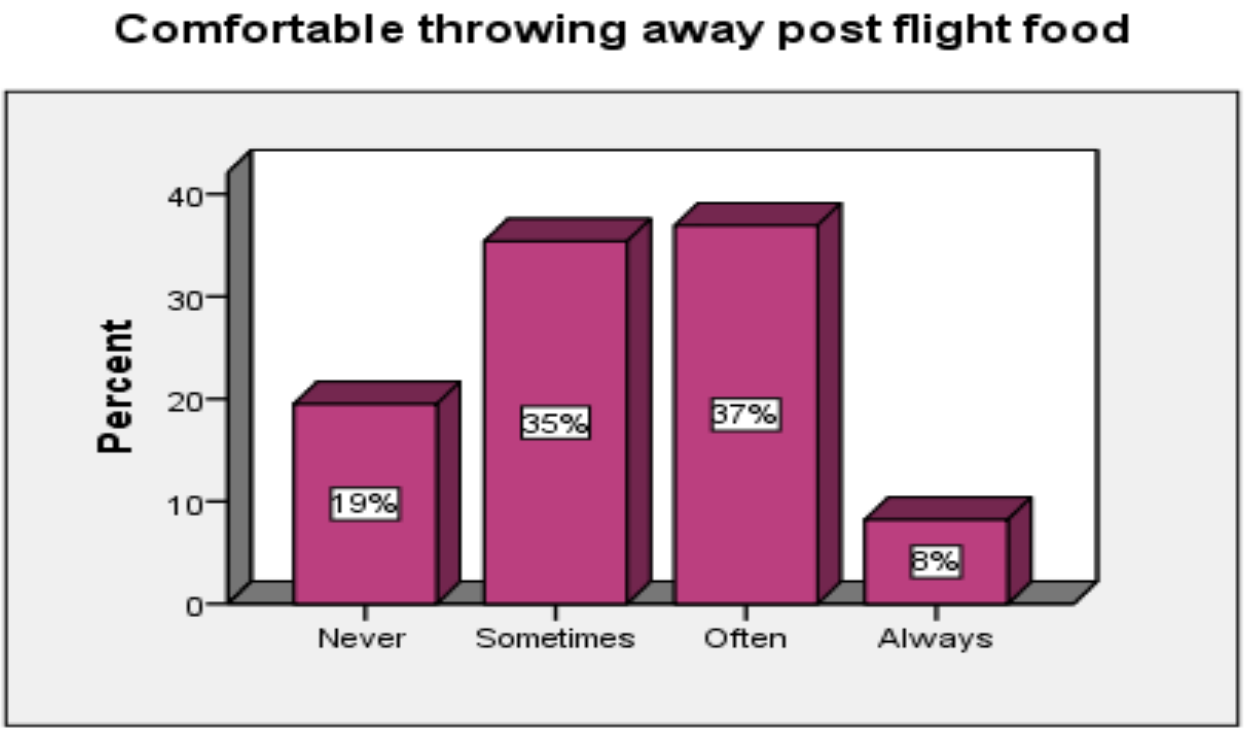


Figure 4-21: Whether respondents were comfortable throwing away post-flight food

4.4.3 Whether they would take some post-flight food if given

When respondents were asked whether they would take some of the post-flight food if given to them (Figure 4-22), the majority chose the safer options of sometimes (44.0%) and often (41.0%). The remaining 15.0% went with the never (6.0%) and always (9.0%).

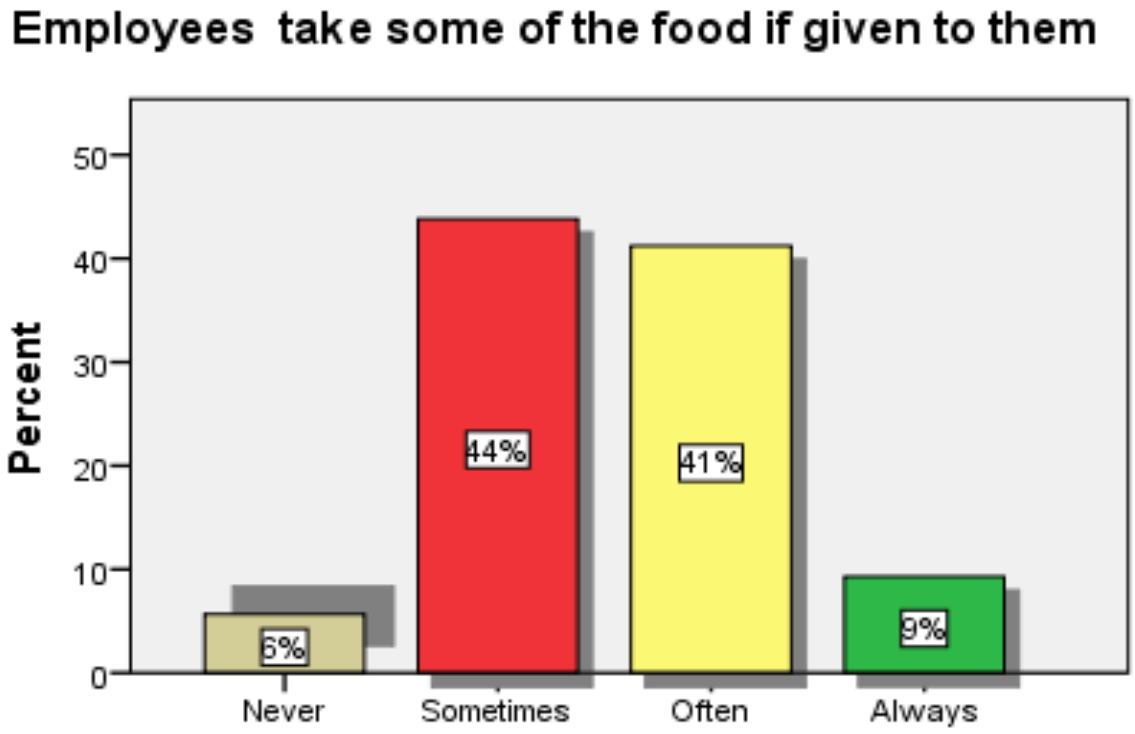


Figure 4-22: Whether they would take some post-flight food if given

4.4.4 Some food gets thrown away while still edible to donate to the poor

In response to the question on whether respondents viewed some of the food that got thrown away as still edible, 5.0% responded that food never got thrown away while still edible to donate to the poor. The majority of respondents selected the safer options of sometimes (44.0%) and often (39.0%). As illustrated in figure 4-23 the remaining 12.0% thought that food always got thrown away while still edible to donate to the poor.

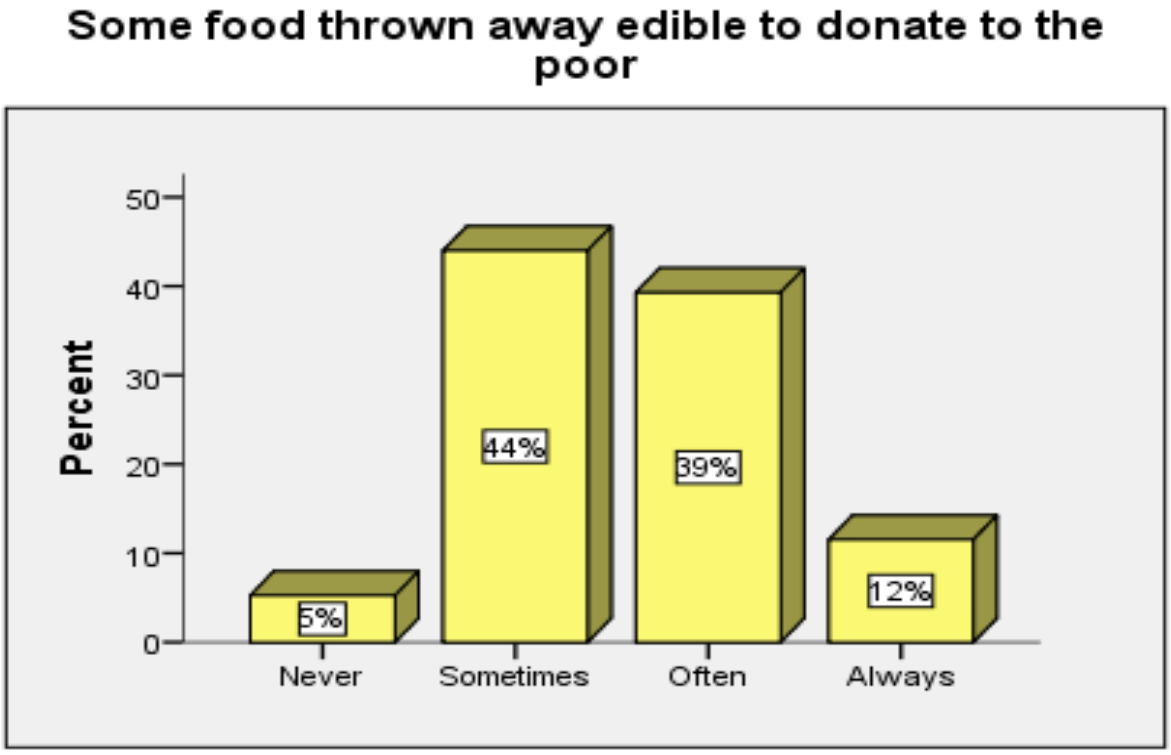


Figure 4-23: Whether some food got thrown away while edible

4.4.5 Whether employees request management's permission to eat some post-flight food

Figure 4-24 shows that an overwhelming majority of respondents (97.0%) shared that they had never requested permission to eat some post-flight food. An insignificant 3.0% responded that they had sometimes requested permission to eat some post-flight food (2.0%) and another 1.0% stated that they had always requested permission to eat some post-flight food.

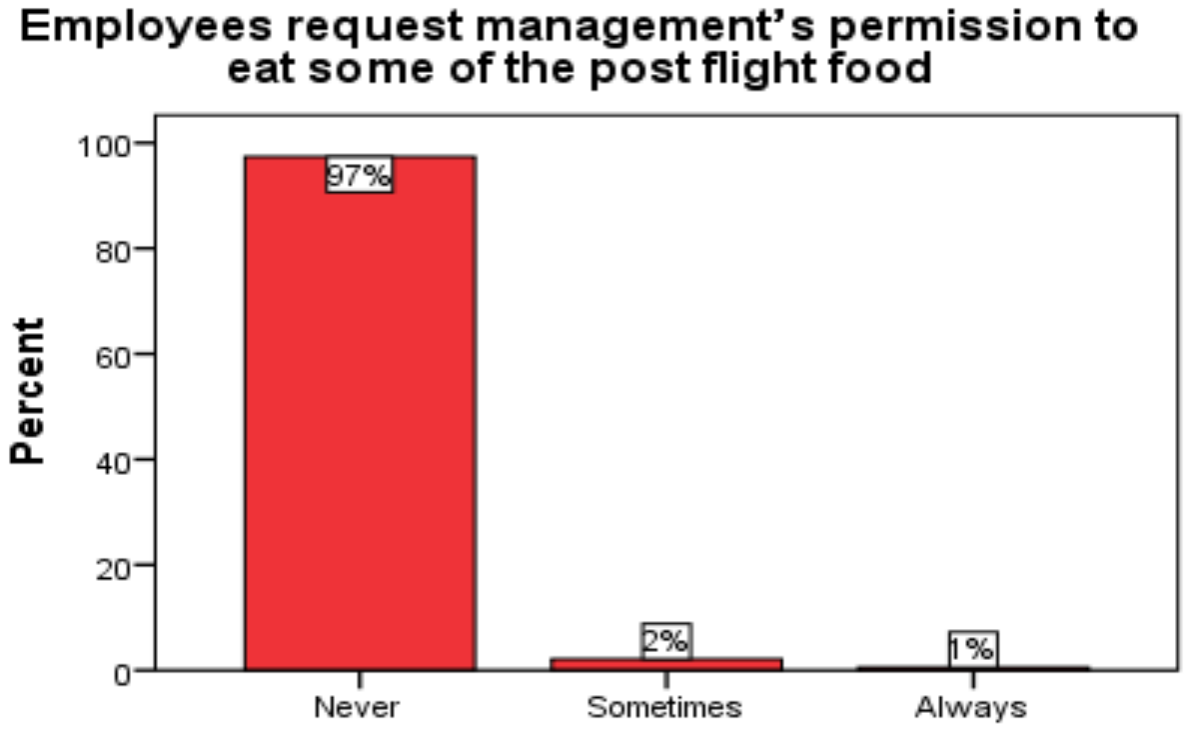


Figure 4-24: Whether respondents had requested permission to eat some post-flight food

4.4.6 Whether respondents had eaten post-flight food

As illustrated in figure 4-25 a resounding 76.0% of the respondents shared that they had never eaten post-flight food with only 24.0% stating that they had eaten post-flight food.

Figure 4-25: Whether they had eaten post-flight food

4.4.7 Whether they would buy post-flight food

As shown in figure 4-26 an overwhelming majority of respondents stated that they would buy post-flight food if opportunity was given. Only an insignificant 5.0% would not buy post-flight food.

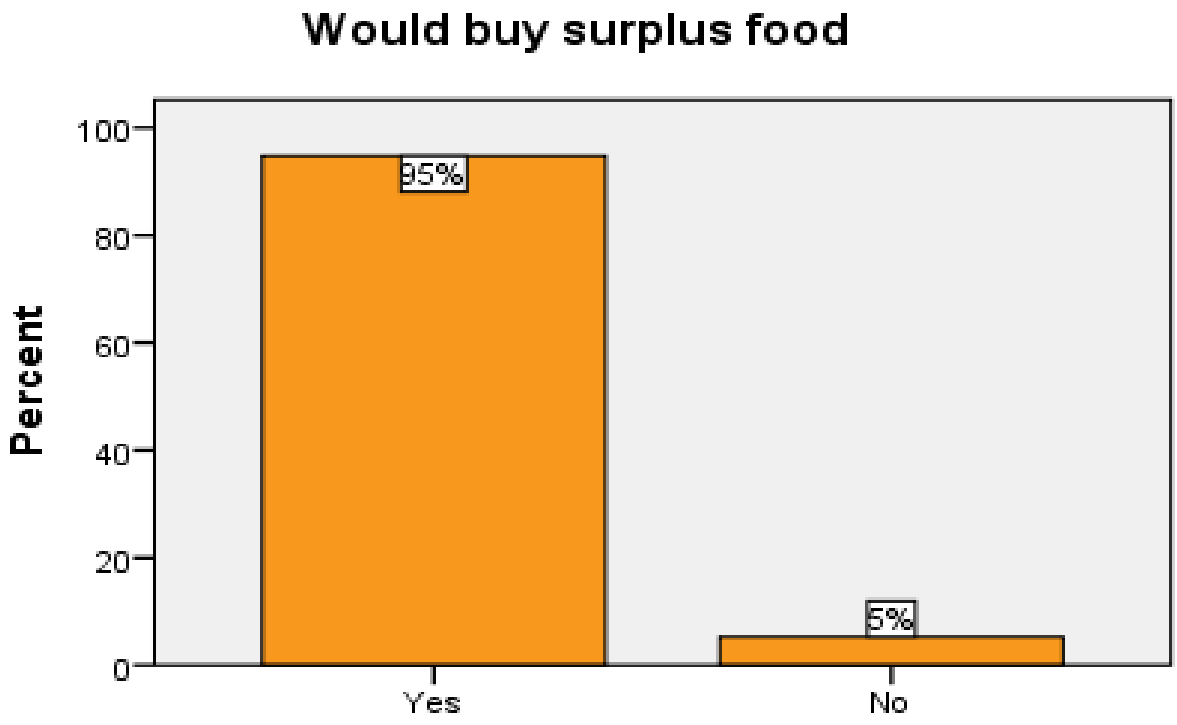


Figure 4-26: Whether respondents would buy post-flight food

4.4.8 Whether post-flight food should be reused

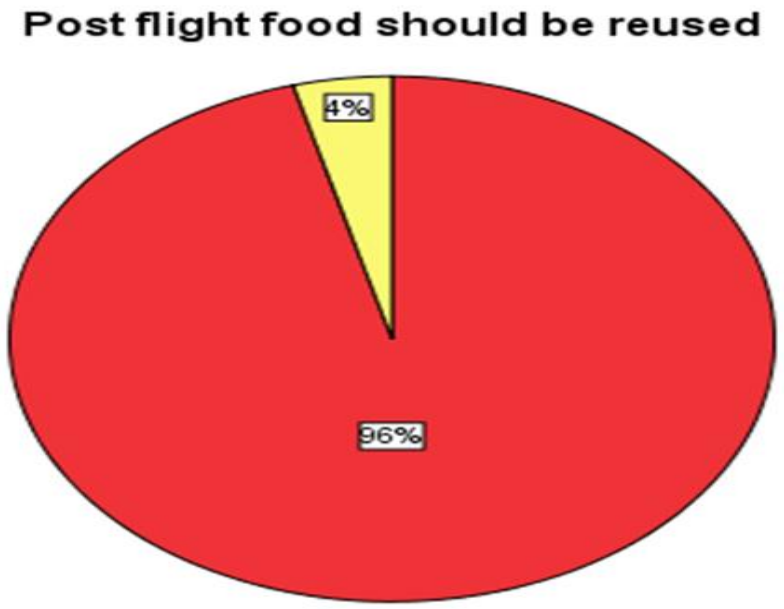


Figure 4-27: Whether post-flight food should be reused

Figure 4-27 shows that an astounding 96.0% of the respondents thought that post-flight food should be reused and only a small proportion of the respondents felt that post-flight food should not be reused.

4.5 QUESTIONS CROSS TABULATED BY VARIABLES

As stated in chapter 3, 200 questionnaires were issued out to respondents at the Johannesburg kitchen of Air Chefs. The questionnaire was designed to collect both qualitative and quantitative data at the same time. The quantitative responses from the questionnaire are presented and analysed in this section. The main aim of the questionnaire was to answer the question on employees' knowledge and perceptions on the food waste phenomenon. The questionnaire started by gathering biographical information before answering the questions pertaining to the food waste phenomenon. The questionnaire was designed with the research objectives and theoretical framework in mind. The researcher used cross tables to compare certain responses on the bases of age, gender, number of years employed and level of education in order to determine

if these had any influence on the way that the respondents viewed the phenomenon of food waste. Some of the respondents chose not to answer certain questions on the questionnaire meaning that not all the questions got 100% response rates as seen in the section that follows.

4.5.1 Questions Cross Tabulated by Age

The researcher cross-tabulated some questions by the age of the respondents in order to compare the responses on the basis of their ages and determine if this variable had any influence on the reactions and responses given.

4.5.1.1 Whether employees had ever eaten post-flight food.

Table 4-4 is a cross-tabulation of the question of whether the respondents had eaten post-flight food by the age of the respondents. All the 200 respondents answered this question and data revealed that there is a significant difference between the responses of employees of the age groups of 30-39 years and those above 50 years in how they responded to the question on whether they have eaten post-flight food.

Table 4-4: Cross tabulation for ever eaten post-flight food - Age group

			20-29 yrs	30-39 yrs	40-49 yrs	>50 yrs	
Ever eaten post-flight food	Yes	Count	$10_{a, b}$	20_{b}	$13_{a, b}$	5_{a}	48
		% of Total	5.0%	10.0%	6.5%	2.5%	24.0%
	No	Count	$32_{a, b}$	80_{b}	$36_{a, b}$	4_{a}	152
		% of Total	16.0%	40.0%	18.0%	2.0%	76.0%
Total		Count	42	100	49	9	200
		% of Total	21.0%	50.0%	24.5%	4.5%	100.0%

A tenth (10.0%) (n=20) respondents of the age category 30-39 years responded with yes and 40.0% (n=80) in this age category responded that they had never eaten post-flight food. However, the majority (2.5% of 4.5%) of the respondents in age category 50 years and above had eaten post-flight food. A total of 76% (n=152) across all age categories stated that they had not eaten post-flight food, with only 24% (n=48) responding that they had (Table 4-4). The majority of respondents who had eaten post-flight food waste were between the ages 30-39 years, making about 10.0% of the total of all respondents in this age category. This age category accounted for the biggest percentage (41.7%) that had never eaten post-flight food with the remaining 58.3% spread across the other three age categories. This age category was followed by the 40-49 years at 6.5% (n=13) who had eaten post-flight food. Obviously this category also made the majority of the respondents at 50.0% (n=100), so they tended to dominate the statistics.

4.5.1.2 Whether employees directly handled food waste

Table 4-5: Cross tabulation for do you directly handle post-flight food waste - Age group

The respondents were also asked whether they directly handled food waste. A total of 200 responded to the question of whether they directly handle post-flight food waste. About a third (34.0%, n=68) directly handled post-flight food waste with the remaining 66.0%, (n=132) stating that they did not directly handle post-flight food waste (Table 4-5).

			Age group				
			20-29 yrs	30-39 yrs	40-49 yrs	>50 yrs	Total
Directly handle food waste	Yes	Count	10[a]	35[a]	20[a]	3[a]	68
		% of Total	5.0%	17.5%	10.0%	1.5%	34.0%
	No	Count	32[a]	65[a]	29[a]	6[a]	132
		% of Total	16.0%	32.5%	14.5%	3.0%	66.0%
Total		Count	42	100	49	9	200
		% of Total	21.0%	50.0%	24.5%	4.5%	100.0%

Of the total of 34.0% (n=68) who directly handled post-flight food the majority seemed to come from the 30-39 years (51.5%, no=35) and 40-49 years (29.4%, no=20) categories. The remaining two categories (20-29 years and >50 years) together accounted for 19.1% (n=13) who directly handled post-flight food. The >50 contributed a mere 1.5% to the group that directly handled post-flight food. This proportion was about 33.3% of the total number of this category of respondents.

4.5.1.3 Post-flight food edible

The whole sample (n=200) respondents responded to the question of whether post-flight food was edible (Table 4-6). The respondents were given four options to choose from in response to this question as shown in table 4-6. An insignificant 9.0% across all age categories felt that post-flight food was never edible. Of these none (0.0%) came from the 20-29 years age group, 3.0% came from the 30-39 years age groups, forming the majority of this group at 5.0% was the 40-49 years category. (An overwhelming majority of about ⅔ (62.0%%, n=124) of the respondents thought that post-flight food was sometimes edible, the other 28.5% (n=57) felt that it was often edible.

Table 4-6: Cross tabulation for is post-flight food edible - Age group

			Age group				
			20-29 yrs.	30-39 yrs.	40-49 yrs.	>50 yrs.	Total
Is post-flight food edible	Never	Count	0$_{a}$	6$_{a, b}$	10$_{c}$	2$_{b, c}$	18
		% of Total	0.0%	3.0%	5.0%	1.0%	9.0%
	Sometimes	Count	23$_{a}$	64$_{a}$	31$_{a}$	6$_{a}$	124
		% of Total	11.5%	32.0%	15.5%	3.0%	62.0%
	Often	Count	18$_{a}$	30$_{a, b}$	8$_{b}$	1$_{a, b}$	57
		% of Total	9.0%	15.0%	4.0%	0.5%	28.5%
	Always	Count	1$_{a}$	0$_{a}$	0$_{a}$	0$_{a}$	1
		% of Total	0.5%	0.0%	0.0%	0.0%	0.5%
Total		Count	42	100	49	9	200
		% of Total	21.0%	50.0%	24.5%	4.5%	100.0%

Only 0.5% (n=1) of the respondents in the 20-29 years category perceived post-flight food as always edible (Table 4-6). Of the biggest group forming 62.0% (n=124) who believed that post-flight food was sometimes edible, the majority (32.0%) came from the 30-39 years category, followed by the 40-49 years category at 15.5%, then the 20-29 years category (11.5%). It was interesting to note that the majority of the >50 year category (66.6%) deemed post-flight food sometimes edible, with only 22.2% thinking that it was never edible and none considering it always edible.

It was not surprising that majority (90.5%) stayed within the safer options of sometimes (62.0%) and often (28.5%), leaving 9.0% for never as an option and a lousy 0.5% for always. Since the 30-39 year category formed the majority (50.0%), they also tended to dominate the sometimes (32.0%) and often (15.0%) responses making up 47.0% of the total 90.5% falling within this group. The 20-29 and 40-49 year categories accounted for 20.5% (20-29yr) and 19.5% (40-49yr) of the safer options of sometimes and often. This was mainly due to the fact that these three categories formed a bigger portion of the sample with the >50yr forming a smaller proportion of about 4.5% of the sample.

4.5.1.4 Comfortability in throwing away post-flight food

Not all participants responded to this question as table 4-7 illustrates that of 200 possible respondents, 195 (97.5%) responded to this question. The respondents were given four alternative responses to choose from in answering this question. Of the 195 participants that responded to this question, the majority at 72.3% selected the safer options of either sometimes or often with an insignificant 8.2% responding that they were always comfortable throwing away post-flight foods.

About ⅕ of the respondents (19.5%) were never comfortable throwing away post-flight foods. The 30-39 year category formed the majority of respondents at 49.7% (n=97) and 39.0% of them selected the sometimes (19.0%) and often (20.0%) as responses to the question.

Table 4-7: Cross tabulation for are you comfortable throwing away post-flight food? - Age group

			Age group				
			20-29 yrs	30-39 yrs	40-49 yrs	>50 yrs	Total
Are you comfortable throwing away post-flight food	Never	Count	6$_{a}$	20$_{a, b}$	8$_{a, b}$	4$_{b}$	38
		% of Total	3.1%	10.3%	4.1%	2.1%	19.5%
	Sometimes	Count	15$_{a}$	37$_{a}$	15$_{a}$	2$_{a}$	69
		% of Total	7.7%	19.0%	7.7%	1.0%	35.4%
	Often	Count	17$_{a}$	39$_{a}$	15$_{a}$	1$_{a}$	72
		% of Total	8.7%	20.0%	7.7%	0.5%	36.9%
	Always	Count	3$_{a}$	1$_{b}$	10$_{a}$	2$_{a}$	16
		% of Total	1.5%	0.5%	5.1%	1.0%	8.2%
Total		Count	41	97	48	9	195
		% of Total	21.0%	49.7%	24.6%	4.6%	100.0%

This age category was followed by the 40-49 year category forming about 24.6% (n=48). Even in this case, the respondents tended to select the safer options of sometimes (31.3%) and often (31.3%) in response to this question. In close heels was the 20-29 year category forming 21.1% (n=41). This category also tended to choose sometimes 36.6% (n=15) and often 41.7% (n=17) in response to this question. Overall most respondents across all four age categories sometimes (69.0%) and often (72.0%) felt comfortable throwing away post-flight food. The possible reason for these responses could lie in the responses given by them as part of qualitative data such as whether they were within expiry dates and the type of food items

4.5.1.5 Whether employees would take some of post-flight foods if given.

Table 4-8: Cross tabulation for employees would take some of the food if given to them - Age group

			Age group				
			20-29 yrs	30-39 yrs	40-49 yrs	>50 yrs	Total
Employees would take some of the food if given to them	Never	Count	0$_{a}$	4$_{a, b}$	6$_{b}$	1$_{b}$	11
		% of Total	0.0%	2.1%	3.1%	0.5%	5.7%
	Sometimes	Count	16$_{a}$	43$_{a}$	22$_{a}$	4$_{a}$	85
		% of Total	8.2%	22.2%	11.3%	2.1%	43.8%
	Often	Count	20$_{a}$	43$_{a}$	15$_{a}$	2$_{a}$	80
		% of Total	10.3%	22.2%	7.7%	1.0%	41.2%
	Always	Count	5$_{a}$	7$_{a}$	5$_{a}$	1$_{a}$	18
		% of Total	2.6%	3.6%	2.6%	0.5%	9.3%
Total		Count	41	97	48	8	194
		% of Total	21.1%	50.0%	24.7%	4.1%	100.0%

The respondents were also asked if they would take some post-flight foods if offered. They were given four alternative responses to select from as shown in table 4-8. This

question got a 97.0% response rate as 194 respondents answered it. Again the majority of respondents inclined towards the safer options of sometimes (43.8%) and often (41.2%) making up for the majority at 85.0%. Interestingly 22.2% of the 30-39 year category selected the sometimes and often options. None (0.0%) of the 20-29 year category would take post-flight foods if offered. Table 4-8 shows that only about a tenth (9.3%) of all the respondents across age categories would always take post-flight foods if offered and an insignificant 5.7% across all age categories would never take post-flight food when offered.

4.5.1.6 Some foods thrown away are still edible to donate to the poor

Table 4-9: Cross tabulation for some food thrown away is edible to donate to the poor - Age group

			Age group				
			20-29 yrs	30-39 yrs	40-49 yrs	>50 yrs	Total
Some food thrown away edible to donate to the poor	Never	Count	0$_{a}$	4$_{a, b}$	5$_{b}$	1$_{b}$	10
		% of Total	0.0%	2.1%	2.6%	0.5%	5.2%
	Sometimes	Count	18$_{a}$	40$_{a}$	22$_{a}$	4$_{a}$	84
		% of Total	9.4%	20.9%	11.5%	2.1%	44.0%
	Often	Count	18$_{a}$	44$_{a}$	13$_{a, b}$	0$_{b}$	75
		% of Total	9.4%	23.0%	6.8%	0.0%	39.3%
	Always	Count	5$_{a}$	9$_{a}$	6$_{a}$	2$_{a}$	22
		% of Total	2.6%	4.7%	3.1%	1.0%	11.5%
Total		Count	41	97	46	7	191
		% of Total	21.5%	50.8%	24.1%	3.7%	100.0%

About 4.5% of the respondents did not answer this question. The response rate was therefore 95.5% (n=191). An overwhelming majority of the respondents 83.3% across age groups felt that sometimes and often post-flight food that got discarded was still edible to donate to poor people. A sizable 11.5% were of the view that edible foods were always thrown away and a small proportion (5.2%) thought that the foods that got thrown away were never edible to donate to the poor (see table 4-9). The majority of those respondents who thought that edible food was always thrown away came from the 40-49yr age category (2.6%). The majority of those respondents who thought that post-flight food was always edible to donate to the poor came from the 30-39 year category (4.7% of the total 11.5%).

4.5.1.7 Respondents request managements permission to eat some post-flight food

Table 4-10: Cross tabulation for respondents request management's permission to eat some of the post-flight food - Age group

			Age group				
			20-29 yrs	30-39 yrs	40-49 yrs	>50 yrs	Total
Employees request management's permission to eat some of the post-flight food	Never	Count	41$_{a}$	94$_{a, b}$	45$_{a, b}$	6$_{b}$	186
		% of Total	21.5%	49.2%	23.6%	3.1%	97.4%
	Sometimes	Count	0$_{a}$	3$_{a}$	1$_{a}$	0$_{a}$	4
		% of Total	0.0%	1.6%	0.5%	0.0%	2.1%
	Always	Count	0$_{a}$	0$_{a}$	0$_{a}$	1$_{b}$	1
		% of Total	0.0%	0.0%	0.0%	0.5%	0.5%
Total		Count	41	97	46	7	191
		% of Total	21.5%	50.8%	24.1%	3.7%	100.0%

Table 4-10 reflects a cross-tabulation of the question whether the respondents had ever asked management's permission to eat some post-flight food by the age of the respondents. This question was answered by 191 (95.5%) respondents. It was interesting to note that a vast majority of 97.4% across age categories had never asked management's permission to eat post-flight food. Of this figure, 49.2% were from the 30-39 years age group. Also the majority 3.1% (n=6 of the total of 7) of the most senior respondents (>50yrs) had never asked for post-flight food. Only 0.5% of the most senior respondents and whole sample had always asked management's permission to eat post-flight food.

4.5.1.8 Whether employees would buy surplus post-flight foods.

The question was whether respondents would buy post-flight food if it was sold. This data reveal that 95.5% (n=191) responded to this question. An overwhelming 94.8% of the respondents across age categories indicated that they would buy post-flight food if sold. It seemed kind of strange that is kind of strange that table 4-10 showed that 97.4% of the respondents had never asked management's permission to eat post-flight food, but table 4-12 indicates that almost all of them across all age categories would buy post-flight food if sold.

Table 4-11: Cross tabulation for would respondents buy post-flight food - Age group

			Age group				
			20-29 yrs.	30-39 yrs.	40-49 yrs.	>50 yrs.	Total
Would buy post-flight food	Yes	Count	42$_{a}$	91$_{a, b}$	40$_{b}$	8$_{b}$	181
		% of Total	22.0%	47.6%	20.9%	4.2%	94.8%
	No	Count	0$_{a}$	4$_{a, b}$	5$_{b}$	1$_{b}$	10
		% of Total	0.0%	2.1%	2.6%	0.5%	5.2%
Total		Count	42	95	45	9	191
		% of Total	22.0%	49.7%	23.6%	4.7%	100.0%

Only 5.2% of all the respondents across all age groups would not buy post-flight foods. This shows that if Air Chefs offered the opportunity to the staff, very little edible post-flight foods would go to waste. The issue of shame could be preventing staff from asking management's permission to eat post-flight food.

4.5.1.9 Thoughts about post-flight foods being reused

Table 4-12 illustrates responses on employee perceptions of whether post-flight foods should be reused cross-tabulated by the age of the respondents.

Table 4-12: Cross tabulation for whether post-flight food should be reused - Age group

			Age group				
			20-29 yrs.	30-39 yrs.	40-49 yrs.	>50 yrs.	Total
Post-flight food should be reused	Yes	Count	40$_a$	94$_a$	43$_{a, b}$	7$_b$	184
		% of Total	20.8%	49.0%	22.4%	3.6%	95.8%
	No	Count	1$_a$	2$_a$	3$_{a, b}$	2$_b$	8
		% of Total	0.5%	1.0%	1.6%	1.0%	4.2%
Total		Count	41	96	46	9	192
		% of Total	21.4%	50.0%	24.0%	4.7%	100.0%

There was a 96.0% response rate to this question, meaning that 192 participants responded. Almost all the respondents across age groups (95.8%, n=184) seemed to think that post-flight foods should be reused. Only an insignificant 4.2% (n=8) across all age categories responded negatively to this question.

4.5.2 Questions Cross Tabulated by Gender

The researcher took the same questions and cross-tabulated them by the gender of the respondents in order to compare the responses on the basis of the gender of the participants to determine the if the gender of the respondents had any influence on the options selected to respond to the questions. The female respondents formed the majority of the sample at 76.4% with the males forming the remaining 23.6% of the total sample. It was expected then that the female respondent would dominate all the alternative answers.

4.5.2.1 Whether employees had ever eaten post-flight food.

Table 4-13: Cross tabulation for whether respondents have ever eaten post-flight food - Gender

			Gender		
			Male	Female	Total
Ever eaten post-flight food	Yes	Count	13[a]	33[a]	46
		% of Total	6.7%	16.9%	23.6%
	No	Count	33[a]	116[a]	149
		% of Total	16.9%	59.5%	76.4%
Total		Count	46	149	195
		% of Total	23.6%	76.4%	100.0%

The respondents had to answer the question of whether they had ever eaten post-flight food which was cross-tabulated by gender as illustrated in table 4-13. A total of 195 responded to the question resulting in a 97.5% response rate. Of the 23.6% respondents that had eaten post-flight food, 16.9% were female. The majority of respondents 149 (76.4%) had never eaten post-flight food. As expected the majority of

this group (59.5%) were females. The male respondents made a total of 46 (23.6%). Of these 6.7% had eaten post-flight waste and 16.9% claimed that they had not.

4.5.2.2 Whether employees directly handled food waste.

The majority of respondents did not directly handle food waste (66.2%). Of this figure 51.3% were female and 14.9% were male. The majority of those respondents who directly handled food waste (33.8%) were also female constituting 25.1% with males accounting for only 8.7%. The females formed 76.4% of the respondents to this question while just above ⅕ (23.6%) were males (Table 4-14).

Table 4-14: Cross tabulation for whether respondents directly handle food waste - Gender

			Gender		
			Male	Female	Total
Directly handle food waste	Yes	Count	17[a]	49[a]	66
		% of Total	8.7%	25.1%	33.8%
	No	Count	29[a]	100[a]	129
		% of Total	14.9%	51.3%	66.2%
Total		Count	46	149	195
		% of Total	23.6%	76.4%	100.0%

4.5.2.3 Whether employees thought that post-flight food was edible

The respondents were asked to share their thoughts regarding the question of whether post-flight foods were edible or not. A total of n=195 respondents to this question. This data reveals that there is a significant difference between male and female respondents who responded with never and often. Most respondents at 61.0% (n= 119) thought that post-flight foods were sometimes edible (Table 4-15). Of this number 45.6% were female and 15.4% were male. This can be understood in the light of the information

given at the beginning of this section that the majority of the respondents were female. Also a sizable number (29.2%) made of 25.6% female respondents seemed to think that post-flight foods were often edible.

Table 4-15: Cross tabulation for whether post-flight food is edible – Gender

			Gender		
			Male	Female	Total
Post-flight food edible	Never	Count	9$_a$	9$_b$	18
		% of Total	4.6%	4.6%	9.2%
	Sometimes	Count	30$_a$	89$_a$	119
		% of Total	15.4%	45.6%	61.0%
	Often	Count	7$_a$	50$_b$	57
		% of Total	3.6%	25.6%	29.2%
	Always	Count	0$_a$	1$_a$	1
		% of Total	0.0%	0.5%	0.5%
Total		Count	46	149	195
		% of Total	23.6%	76.4%	100.0%

4.5.2.4 Whether employees were comfortable throwing away post-flight foods.

The question was whether respondents are comfortable throwing away post-flight food on the basis of gender. This question had a response rate of 95.5% as 191 respondents answered this questions (Table 4-16). It was surprising to note that only about a tenth (9.2%) of the respondents were never comfortable throwing away post-flight foods, implying that a great majority of them were comfortable. One would have expected that none of the respondents would be comfortable throwing away any food for that matter bearing in mind the problem of food insecurity in the country. About a tenth (8.4%) of the respondents were strangely always comfortable throwing away post-

flight foods. The majority of the respondents across gender making 72.3% selected the sometimes (35.1%) and often (37.2%) options. Of these 138 respondents the majority as expected were female forming a total of 59.6%.

Table 4-16: Cross tabulation for whether respondents are comfortable throwing away post-flight food - Gender

			Gender		
			Male	Female	Total
Comfortable throwing away post-flight food	Never	Count	13$_a$	24$_a$	37
		% of Total	6.8%	12.6%	19.4%
	Sometimes	Count	14$_a$	53$_a$	67
		% of Total	7.3%	27.7%	35.1%
	Often	Count	10$_a$	61$_b$	71
		% of Total	5.2%	31.9%	37.2%
	Always	Count	8$_a$	8$_b$	16
		% of Total	4.2%	4.2%	8.4%
		% of Total	23.6%	76.4%	100.0%

4.5.2.5 Whether employees would take post-flight foods if given.

The question was whether respondents take some of the post-flight food if given to them. A total of n=190 participants responded to this question giving a response rate of 95.0%.

Table 4-17 shows that the majority of respondents would sometimes (43.2%) and often (41.6%) take post-flight foods if offered. Clearly the majority of this number making 161 and accounting for 84.7% would be female because they formed the majority of the sample.

Table 4-17: Cross tabulation for whether respondents would take some of the post-flight food if given to them - Gender

			Gender		
			Male	Female	Total
Employees take some of the post-flight food if given to them	Never	Count	5[a]	6[a]	11
		% of Total	2.6%	3.2%	5.8%
	Sometimes	Count	20[a]	62[a]	82
		% of Total	10.5%	32.6%	43.2%
	Often	Count	16[a]	63[a]	79
		% of Total	8.4%	33.2%	41.6%
	Always	Count	4[a]	14[a]	18
		% of Total	2.1%	7.4%	9.5%
Total		Count	45	145	190
		% of Total	23.7%	76.3%	100.0%

4.5.2.6 Some foods thrown away are still edible to donate to the poor

Table 4-18 that follows is an illustration of the responses of the participants to the question of whether they thought that some post-flight foods were thrown away while still edible to donate to the poor cross-tabulated by the gender of the participants. The question had a response rate of 93.5 as 187 of the participants answered it. A total of 155 (82.9%) across gender felt that sometimes (43.3%) and often (39.6%) some post-flight foods that were still edible to donate to the poor were discarded. A total of 64.7% female respondents were of these opinions with only 18.2% being male respondents.

Table 4-18: Cross tabulation for whether some food thrown away is still edible to donate to the poor - Gender

			Gender		
			Male	Female	Total
Some food thrown away is still edible to donate to the poor	Never	Count	4[a]	6[a]	10
		% of Total	2.1%	3.2%	5.3%
	Sometimes	Count	21[a]	60[a]	81
		% of Total	11.2%	32.1%	43.3%
	Often	Count	13[a]	61[a]	74
		% of Total	7.0%	32.6%	39.6%
	Always	Count	5[a]	17[a]	22
		% of Total	2.7%	9.1%	11.8%
Total		Count	43	144	187
		% of Total	23.0%	77.0%	100.0%

4.5.2.7 Respondents request management's permission to eat some post-flight food

The question was whether respondents request management's permission to eat some of the post-flight food on the basis of gender. A total of n=187 respondents responded to this question resulting in a 93.5% response rate as shown in table 4-19. It was surprising that such an overwhelming majority (97.3%) of respondents had never asked management's permission to eat some post-flight food and only 0.5% of female respondents had always. All the male respondents (23.0%) had never asked management's permission to eat some post-flight foods. Unfortunately this section of the questionnaire did not ask the respondents to give reasons for their responses. It would have been interesting to know why they never asked for post-flight food.

Table 4-19: Cross tabulation for whether respondents request management's permission to eat some of the post-flight food - Gender

			Gender		
			Male	Female	Total
Employees request management's permission to eat some of the post-flight food	Never	Count	43[a]	139[a]	182
		% of Total	23.0%	74.3%	97.3%
	Sometimes	Count	0[a]	4[a]	4
		% of Total	0.0%	2.1%	2.1%
	Always	Count	0[a]	1[a]	1
		% of Total	0.0%	0.5%	0.5%
Total		Count	43	144	187
		% of Total	23.0%	77.0%	100.0%

4.5.2.8 Whether they would buy surplus foods.

The respondents were also asked if they would buy surplus food which was cross-tabulated by their gender. A total of 187 responded to the question resulting in a 93.5% response rate. Surplus food seemed to be understood differently to post-flight food as an overwhelming majority across genders (88.4% of total male sample and 96.5% of total female sample) totaling to 94.7% would buy surplus food. Only 10.0% (male, n=5 and female, n=5) responded that they would not (see table 4-20).

Table 4-20: Cross tabulation for whether respondents would buy surplus food - Gender

			Gender		
			Male	Female	Total
Would buy surplus food	Yes	Count	38[a]	139[b]	177
		% within Gender	88.4%	96.5%	94.7%
	No	Count	5[a]	5[b]	10
		% within Gender	11.6%	3.5%	5.3%
Total		Count	43	144	187
		% within Gender	100.0%	100.0%	100.0%

4.5.2.9 Post- flight food be reused

Table 4-21 reflects that a total of 187 respondents responded to the question on whether post-flight food should be reused on and declared their gender. There is a significant difference between males and females.

Table 4-21 Cross tabulation for whether post-flight food should be reused – Gender

Generally the number of females who took part in responding to the questionnaires was higher. Of the 187 respondents 177 responded positively that they would buy surplus food and only 5.3% (n=10) said they would not (Table 4-21).

			Gender		
			Male	Female	Total
Would buy surplus food	Yes	Count	38$_a$	139$_b$	177
		% within Gender	88.4%	96.5%	94.7%
	No	Count	5$_a$	5$_b$	10
		% within Gender	11.6%	3.5%	5.3%
Total		Count	43	144	187
		% within Gender	100.0%	100.0%	100.0%

4.5.3 Questions Cross Tabulated by Length of Employment

The responses were further cross-tabulated by the length of employment at Air Chefs SA. This was important to enable the researcher to determine the role played by experience at Air Chefs in the responses given. The cross tables that follow show the statistics generated when the questions were looked into across the period of employment.

4.5.3.1 Whether they had ever eaten post-flight food.

A total of 199 responded to this question leading to a 99.5% response rate. Quite a big number (151) making 75.9% across all length of employment categories had never eaten post-flight food and only 24.1% had eaten post-flight food in varying percentages across all categories of length of employment. The category that had the biggest number was the one that had worked at Air Chefs for 7mnts to 2yrs (39.2%). This category was followed by 2-5 yrs at 36.7%. The biggest number that had eaten post-flight food came from the 2-5 yrs category at 10.6% followed by the 7 months to 2 yrs category at 9.0% (see table 4-22).

Table 4-22: Cross tabulation for whether respondents have ever eaten post-flight food - Length employed at Air Chefs

			Length employed at Air Chefs				
			0-6 months	7 months- 2 years	2-5 years	> 5 years	Total
Ever eaten post-flight food	Yes	Count	1_a	$18_{a, b}$	21_b	$8_{a, b}$	48
		% of Total	0.5%	9.0%	10.6%	4.0%	24.1%
	No	Count	17_a	$60_{a, b}$	52_b	$22_{a, b}$	151
		% of Total	8.5%	30.2%	26.1%	11.1%	75.9%
Total		Count	18	78	73	30	199
		% of Total	9.0%	39.2%	36.7%	15.1%	100.0%

4.5.3.2 Whether respondents directly handled food waste

The question was whether respondents directly handle food waste on the basis of length of time employed. A total of n=199 respondents responded to this question resulting in a response rate of 99.5%. Table 4-23 illustrates that the majority of respondents had been with the company for a period of 7 months to 5yrs (75.9%). It

can therefore be expected that the majority of the responses would come from these two categories. About half (47.2%) of the respondents who did not directly handle post-flight waste came from these two categories. It was also from these two categories that 28.7% of those that directly handled post-flight food waste. This means that the remaining 24.1% came from the categories that had been with the company for a period of 0-6mnts (9.0%) and those that had been with the company for more than 5 yrs (15.1%).

Table 4-23: Cross tabulation for whether respondents directly handle food waste - Length employed at Air Chefs

			Length employed at Air Chefs				
			0-6 months	7 months- 2 years	2-5 years	> 5 years	Total
Directly handle food waste	Yes	Count	5[a]	30[a]	27[a]	6[a]	68
		% of Total	2.5%	15.1%	13.6%	3.0%	34.2%
	No	Count	13[a]	48[a]	46[a]	24[a]	131
		% of Total	6.5%	24.1%	23.1%	12.1%	65.8%
Total		Count	18	78	73	30	199
		% of Total	9.0%	39.2%	36.7%	15.1%	100.0%

4.5.3.3 Whether employees thought post-flight foods were edible.

The question was whether respondents directly handle food waste on the basis of length of time employed. A total of 199 respondents responded to this question leading to a good response rate of 99.5%. Table 4-23 shows that just like in the other cases the majority of the respondents came from the two categories who had been with the company for 7 months to 2 yrs (39.2%) and those that had been with the company for 2 to 5 yrs (36.7%). It was noteworthy to see that only 0.5% across the years of service in the company thought that post-flight food was always edible. However, a sizable 62.3%

across years of experience in the company felt that sometimes post-flight food was edible and of this number the majority came from the 7 months to 2 yrs category (29.1%) followed by the 2 to 5 yrs category at 21.6%. Only 9.0% across all the categories thought that post-flight food was never edible (see table 4-24).

Table 4-24: Cross tabulation for whether post-flight food is edible - Length employed at Air Chefs

			Length employed at Air Chefs				
			0-6 months	7 months- 2 years	2-5 years	> 5 years	Total
Post-flight food edible	Never	Count	0_a	6_a	5_a	7_b	18
		% of Total	0.0%	3.0%	2.5%	3.5%	9.0%
	Sometimes	Count	$10_{a, b}$	58_b	43_a	13_a	124
		% of Total	5.0%	29.1%	21.6%	6.5%	62.3%
	Often	Count	8_a	14_b	24_a	$10_{a, b}$	56
		% of Total	4.0%	7.0%	12.1%	5.0%	28.1%
	Always	Count	0_a	0_a	1_a	0_a	1
		% of Total	0.0%	0.0%	0.5%	0.0%	0.5%
Total		Count	18	78	73	30	199
		% of Total	9.0%	39.2%	36.7%	15.1%	100.0%

4.5.3.4 Feelings about throwing away post- flight food.

Another question that was cross-tabulated by length of employment at Air Chefs was whether the respondents were comfortable throwing away post-flight food. A total of n=194 respondents responded to the question meaning that the response rate was 97.0%. It was reassuring to see that about $^1/_5$ (19.6%) of the respondents across length of stay with the company were never comfortable throwing away post-flight food. Some

of the respondents (35.1%) were however sometimes comfortable throwing away post-flight food and yet another 37.1% were often comfortable. Only 8.2% across years of service in the company were always comfortable throwing post-flight food away. The category 6-6 months of service were never comfortable (0.0%) and they also did not select always among the alternatives (See table 4-25).

Table 4-25: Cross tabulation for whether respondents are comfortable throwing away post-flight food - Length employed at Air Chefs

			Length employed at Air Chefs				
			0-6 months	7 months- 2 years	2-5 years	> 5 years	Total
Comfortable throwing away post-flight food	Never	Count	0$_{a}$	16$_{b}$	18$_{b}$	4$_{a, b}$	38
		% of Total	0.0%	8.2%	9.3%	2.1%	19.6%
	Sometimes	Count	8$_{a, b}$	33$_{b}$	19$_{a}$	8$_{a, b}$	68
		% of Total	4.1%	17.0%	9.8%	4.1%	35.1%
	Often	Count	9$_{a}$	22$_{a}$	29$_{a}$	12$_{a}$	72
		% of Total	4.6%	11.3%	14.9%	6.2%	37.1%
	Always	Count	0$_{a}$	4$_{a}$	7$_{a}$	5$_{a}$	16
		% of Total	0.0%	2.1%	3.6%	2.6%	8.2%
Total		Count	17	75	73	29	194
		% of Total	8.8%	38.7%	37.6%	14.9%	100.0%

4.5.3.5 Whether employees would take some post-flight food if given

In response to the question the question of whether they would take food home if given to them on the basis of length of employment, the researcher was surprised that not all answered. Table 4-26 shows a response rate of 96.5%. None of the respondents with 0-6 months of service selected never or always. Their responses lied between

sometimes (4.7%) and often (4.1%). As expected the majority of respondents were from the categories 7 months to 2 yrs (38.9%) and 2 to 5 yrs (37.3%). The respondents also tended to select the safer option of sometimes (44.0%) and often (41.5%) adding up to 85.5% across all categories. The other alternative responses had to share the remaining 14.5% across all categories.

Table 4-26: Cross tabulation for whether respondents take some of the food if given to them - Length employed at Air Chefs

			Length employed at Air Chefs				
			0-6 months	7 months- 2 years	2-5 years	> 5 years	Total
Employees take some food home if given to them	Never	Count	0[a]	4[a]	5[a]	2[a]	11
		% of Total	0.0%	2.1%	2.6%	1.0%	5.7%
	Sometimes	Count	9[a]	37[a]	28[a]	11[a]	85
		% of Total	4.7%	19.2%	14.5%	5.7%	44.0%
	Often	Count	8[a]	27[a]	35[a]	10[a]	80
		% of Total	4.1%	14.0%	18.1%	5.2%	41.5%
	Always	Count	0[a]	7[a, b]	4[a]	6[b]	17
		% of Total	0.0%	3.6%	2.1%	3.1%	8.8%
Total		Count	17	75	72	29	193
		% of Total	8.8%	38.9%	37.3%	15.0%	100.0%

4.5.3.6 Some foods thrown away are still edible to donate to the poor

Respondents were asked whether they perceived some post-flight food that got thrown away as still edible to be donated to the poor on the basis of the length of time employed. The 7mnts-2yrs and 2yrs-5yrs categories formed the majority of the sample at 77.4%. It therefore followed that most of the responses would come from these categories.

Table 4-27: Cross tabulation for whether respondents perceive some food that gets thrown away as edible to donate to the poor - Length employed at Air Chefs

About 37.9% of them made about 86% of the group that felt that post-flight food was sometimes discarded while still edible to donate to the poor. These length of employment categories also accounted for the majority (29.5%) of those respondents who felt that post-flight food was often thrown away while still edible to donate to the poor (39.5%).

			Length employed at Air Chefs				
			0-6 months	7 months-2 years	2-5 years	> 5 years	Total
Some food thrown away edible to donate to the poor	Never	Count	0_{a}	3_{a}	5_{a}	2_{a}	10
		% of Total	0.0%	1.6%	2.6%	1.1%	5.3%
	Sometimes	Count	$7_{a, b}$	41_{b}	$29_{a, b}$	7_{a}	84
		% of Total	3.7%	21.6%	15.3%	3.7%	44.2%
	Often	Count	9_{a}	23_{a}	33_{a}	10_{a}	75
		% of Total	4.7%	12.1%	17.4%	5.3%	39.5%
	Always	Count	$1_{a, b}$	8_{b}	5_{b}	7_{a}	21
		% of Total	0.5%	4.2%	2.6%	3.7%	11.1%
Total		Count	17	75	72	26	190
		% of Total	8.9%	39.5%	37.9%	13.7%	100.0%

4.5.3.7 Respondents request management's permission to eat some post-flight food

Respondents were asked whether they ever requested management's permission to eat some of the post-flight food. A total of 190 respondents responded to the question translating to a response rate of 95.0%.

Table 4-28: Cross tabulation for whether respondents request management's permission to eat some of the post-flight food - Length employed at Air Chefs

			Length employed at Air Chefs				
			0-6 months	7 months- 2 years	2-5 years	> 5 years	Total
Employees request management's permission to eat some of the post-flight food	Never	Count	17$_a$	74$_a$	69$_a$	25$_a$	185
		% of Total	8.9%	38.9%	36.3%	13.2%	97.4%
	Sometimes	Count	0$_a$	1$_a$	2$_a$	1$_a$	4
		% of Total	0.0%	0.5%	1.1%	0.5%	2.1%
	Always	Count	0$_a$	0$_a$	0$_a$	1$_a$	1
		% of Total	0.0%	0.0%	0.0%	0.5%	0.5%
Total		Count	17	75	71	27	190
		% of Total	8.9%	39.5%	37.4%	14.2%	100.0%

The majority (97.4%, n=185) responded that they had never requested management's permission to eat some post-flight food with a trivial 0.5% from the over 5year service category stating that they have always requested management's permission to eat some post-flight food. Only 2.1% of the respondents would sometimes ask management's permission to eat some of the post-flight food, however, none came from the 0-6 months category (see table 4-28).

4.5.3.8 Whether employees would buy surplus food.

Table 4-29: Cross tabulation for whether respondents would buy surplus food - Length employed at Air Chefs

			Length employed at Air Chefs				
			0-6 months	7 months- 2 years	2-5 years	> 5 years	Total
Would buy surplus food	Yes	Count	17a	71a	66a	26a	180
		% of Total	8.9%	37.4%	34.7%	13.7%	94.7%
	No	Count	0a	4a	3a	3a	10
		% of Total	0.0%	2.1%	1.6%	1.6%	5.3%
Total		Count	17	75	69	29	190
		% of Total	8.9%	39.5%	36.3%	15.3%	100.0%

Respondents were asked whether they would buy surplus food. The data reveals that employees generally did not differ in significance in their responses. Of the 190 respondents who responded to this question, fascinatingly 94.7% (n=180) employees across all years of employment said yes, they would buy it and only 5.3% (n=10) said no, they wouldn't buy it (Table 4-29).

4.5.3.9 Post- flight food should be reused

Respondents were asked whether post-flight food should be reused. Almost all the respondents answered this question (n=191, 95.5%). Of the 191 respondents who responded, a majority of them, at 96.3% across all years of service (n=184) responded positively, and the remaining 3.7% responded negatively. It was not very easy to compare the responses due to the fact that the number of respondents across all categories differed significantly except in the case of 7months to 2 yrs (n=76) and 2 to 5 yrs (n=70) (Table 4-30).

Table 4-30: Cross tabulation for whether post-flight food should be reused -Length employed at Air Chefs

			Length employed at Air Chefs				
			0-6 months	7 months- 2 years	2-5 years	> 5 years	Total
Post-flight food should be reused	Yes	Count	17[a, b]	73[a, b]	70[b]	24[a]	184
		% of Total	8.9%	38.2%	36.6%	12.6%	96.3%
	No	Count	0[a, b]	3[a, b]	0[b]	4[a]	7
		% of Total	0.0%	1.6%	0.0%	2.1%	3.7%
Total		Count	17	76	70	28	191
		% of Total	8.9%	39.8%	36.6%	14.7%	100.0%

4.5.4 Questions Cross Tabulated by Highest Education

It was important to cross-tabulate the questions by the highest level of education of the respondents in order to see if the responses they gave were in any way affected by the level of understanding. Respondents were asked if they had ever eaten post-flight food waste. Not all respondents answered this question as 180 of 200 responded leading to a response rate of 90.0%. Table 4-31 indicates that 136 (75.6%) of the respondents across highest qualifications had never eaten post-flight food. The remaining 24.4% across qualifications (except those with post graduate qualification) had eaten post-flight food. The majority (22.2%, n=40) of those that had eaten post-flight food came from the category with matric as their highest qualification.

4.5.4.1 Whether employees had ever eaten post-flight food.

Table 4-32 shows that not all the 200 sampled employees responded to this question. Of the 200 questionnaires issued, 180 responded to the question resulting in a response rate of 90.0%. Of those that responded, a vast majority (93.3%, n=168) of the respondents had matric as their highest level of education. It should therefore be expected that most of the responses would come from this group. Just about $^{2}/_{3}$ (62.2%, n=112) had not directly handled post-flight food waste and $^{1}/_{3}$ (31.1%, n=56) had directly handled post-flight food waste.

Table 4-31: cross tabulation on whether respondents have ever eaten post-flight food - Highest education

			Highest education				
			Matric	Diploma	Degree	Post Graduate	Total
Ever eaten post-flight food	Yes	Count	40[a]	3[a]	1[a]	0[a]	44
		% of Total	22.2%	1.7%	0.6%	0.0%	24.4%
	No	Count	128[a]	6[a]	1[a]	1[a]	136
		% of Total	71.1%	3.3%	0.6%	0.6%	75.6%
Total		Count	168	9	2	1	180
		% of Total	93.3%	5.0%	1.1%	0.6%	100.0%

4.5.4.2 Whether employees directly handled post-flight food waste

The implication is that handling post-flight food waste was not part of the job description of all staff, but some who probably had been trained on how to handle it. A very small proportion of the respondents (5.0%, n=9) had a diploma as their highest qualification. Of this group, 2.8% (n=5) had directly handled post-flight food waste and the remaining

2.2% had not. Only 1.1% of the respondents had a degree as their highest qualification and both of them had not handled post-flight food waste.

Table 4-32: Cross tabulation for whether respondents directly handle post-flight food waste - Highest education

			Highest education				
			Matric	Diploma	Degree	Post Graduate	Total
Directly handle post-flight food waste	Yes	Count	56[a]	5[a]	0[a]	0[a]	61
		% of Total	31.1%	2.8%	0.0%	0.0%	33.9%
	No	Count	112[a]	4[a]	2[a]	1[a]	119
		% of Total	62.2%	2.2%	1.1%	0.6%	66.1%
Total		Count	168	9	2	1	180
		% of Total	93.3%	5.0%	1.1%	0.6%	100.0%

4.5.4.3 Post-flight food edible

Respondents were asked if they perceived post-flight food as edible and this was corss-tabulated by the level of education. Not all the sample responded to this question as can be seen in table 4-33. Only n=180 responses were given of the possible n=200. About a tenth (9.6%, n=17) responded stated that post-flight food was never edible. Majority of the respondents 61.1% (n=110) perceived this food as sometimes edible whilst 0.6% (n=1) perceived it as always edible. Table 4-33 the greatest majority of respondents (93.3%) were in possession of matric, only 5.0% had a diploma, 1.1% had a degree and only 0.6% in possession of a post graduate qualification. Clearly the majority of responses were going to come from the matric category as they formed an overwhelming majority of the sample. Only 6.1% of this category thought that post-flight

food was never edible, 58.9% felt that it was sometimes edible, 27.8% regarded it as often edible and only 0.6% perceived it as always edible.

Table 4-33: Cross tabulation on whether post-flight food is edible- Highest education

			Highest education				
			Matric	Diploma	Degree	Post Graduate	Total
Post-flight food edible	Never	Count	11_a	4_b	1_b	1_b	17
		% of Total	6.1%	2.2%	0.6%	0.6%	9.4%
	Sometimes	Count	106_a	4_a	0_a	0_a	110
		% of Total	58.9%	2.2%	0.0%	0.0%	61.1%
	Often	Count	50_a	1_a	1_a	0_a	52
		% of Total	27.8%	0.6%	0.6%	0.0%	28.9%
	Always	Count	1_a	0_a	0_a	0_a	1
		% of Total	0.6%	0.0%	0.0%	0.0%	0.6%
Total		Count	168	9	2	1	180
		% of Total	93.3%	5.0%	1.1%	0.6%	100.0%

4.5.4.4 Feelings about throwing away post-flight food

Not all the respondents answered this question. The response rate was 87.5% (n=175) which means that all the statistics reflected on table 4-34 were based on 175 responses. As stated in subsection 4.3.5.1, respondents with matric as their highest qualification formed the biggest number of the sample which meant that most of the responses would come from this category. Of this category the majority (68.6%, n=120) selected the safer options of sometimes (32.0%) and often (36.6%). The remaining 25.7% of this category chose (18.3%) never comfortable and (7.4%) always comfortable throwing post-flight food away. The only respondent (0.6%) with a postgraduate qualification surprisingly selected always comfortable throwing post-flight food away, while the 2 respondents with a degree as their highest qualification split between sometimes and always comfortable throwing post-flight food away. The responses of

those with a diploma as their highest qualification were spread across all the 4 options given with the majority 3 out of 7 stating that they were sometimes comfortable throwing post-flight food away.

Table 4-34: Cross tabulation for whether respondents are comfortable throwing away post-flight food - Highest education

			Highest education				
			Matric	Diploma	Degree	Post Graduate	Total
Comfortable throwing away post-flight food	Never	Count	32[a]	2[a]	0[a]	0[a]	34
		% of Total	18.3%	1.1%	0.0%	0.0%	19.4%
	Sometimes	Count	56[a]	3[a]	1[a]	0[a]	60
		% of Total	32.0%	1.7%	0.6%	0.0%	34.3%
	Often	Count	64[a]	1[a]	0[a]	0[a]	65
		% of Total	36.6%	0.6%	0.0%	0.0%	37.1%
	Always	Count	13[a]	1[a, b]	1[b]	1[b]	16
		% of Total	7.4%	0.6%	0.6%	0.6%	9.1%

4.5.4.5 Whether employees would take some post-flight food if given.

Respondents were asked whether they would take some of the food if it was given or sold to them. There is a significance difference between employees who responded with never. A total of 5.7% (n=10) responded with never, of which 4.6% (n=8) of which have matric. There were 174 responded to this question, of which 43.7% (n=76) responded with sometimes and 40.8 (n=71) responded with often. A small proportion (9.8%, n=17) respondents responded that they would always take some of the post-flight food if it was given or sold to them. Majority of the respondents combined responded with often and always (Table 4-35).

Table 4-35: Cross tabulation for whether respondents would take some of the food if given to them - Highest education

			Highest education				
			Matric	Diploma	Degree	Post Graduate	Total
Employees take some of the post-flight food if it was given or sold	Never	Count	8$_{a}$	1$_{a, b}$	0$_{a, b}$	1$_{b}$	10
		% of Total	4.6%	0.6%	0.0%	0.6%	5.7%
	Sometimes	Count	71$_{a}$	3$_{a}$	2$_{a}$	0$_{a}$	76
		% of Total	40.8%	1.7%	1.1%	0.0%	43.7%
	Often	Count	70$_{a}$	1$_{a}$	0$_{a}$	0$_{a}$	71
		% of Total	40.2%	0.6%	0.0%	0.0%	40.8%
	Always	Count	15$_{a}$	2$_{a}$	0$_{a}$	0$_{a}$	17
		% of Total	8.6%	1.1%	0.0%	0.0%	9.8%
Total		Count	164	7	2	1	174
		% of Total	94.3%	4.0%	1.1%	0.6%	100.0%

4.5.4.6 Some foods thrown away are still edible to donate to the poor.

Respondents were asked on whether they perceive some food that gets thrown away as edible and can be donated to the poor. This question had a response rate of 85.5%, n=171. A great majority across qualifications selected the safer options of sometimes (43.3%) and often (39.8%) totaling to 83.1% feeling that sometimes and often food gets thrown away while still edible to donate to the poor. The remaining 16.9% per highest qualification was spread across all the options. Surprisingly none (0.0%) of the degree and post graduate holders thought food was thrown away while still edible to donate to the poor or that often edible food got thrown away. Their responses were between sometimes (1.2%) and always (0.6%). It should be remembered that these two categories constituted only 1.8% of the sample (see table 4-36).

Table 4-36: Cross tabulation for whether respondents perceive some food that gets thrown away as edible to donate to the poor - Highest education

			Highest education				
			Matric	Diploma	Degree	Post Graduate	Total
Some food thrown away edible to donate to the poor	Never	Count	8a	1a	0a	0a	9
		% of Total	4.7%	0.6%	0.0%	0.0%	5.3%
	Sometimes	Count	69a	3a	1a	1a	74
		% of Total	40.4%	1.8%	0.6%	0.6%	43.3%
	Often	Count	67a	1a	0a	0a	68
		% of Total	39.2%	0.6%	0.0%	0.0%	39.8%
	Always	Count	17a	2a	1a	0a	20
		% of Total	9.9%	1.2%	0.6%	0.0%	11.7%
Total		Count	161	7	2	1	171
		% of Total	94.2%	4.1%	1.2%	0.6%	100.0%

4.5.4.7 Respondents request management's permission to eat some of the post-flight food

Respondents were asked on whether they request management's permission to eat some of the post-flight food. About 171 respondents responded to this question resulting in a response rate of 85.5%. Of the total that responded to the question a resounding 97.1% (n=166) across highest qualification levels responded that they had never requested management's permission to eat some of the post-flight food. Only 0.6% from the matric as the highest qualification category stated that they had always requested permission to eat some of the post-flight food and the other 2.3% from the matric as the highest qualification category had sometimes requested management's permission to eat some of the post-flight food

Table 4-37: Cross tabulation for whether employees request management's permission to eat some of the post-flight food - Highest education

			Highest education				
			Matric	Diploma	Degree	Post Graduate	Total
Employees request management's permission to eat some of the post-flight food	Never	Count	156[a]	7[a]	2[a]	1[a]	166
		% of Total	91.2%	4.1%	1.2%	0.6%	97.1%
	Sometimes	Count	4[a]	0[a]	0[a]	0[a]	4
		% of Total	2.3%	0.0%	0.0%	0.0%	2.3%
	Always	Count	1[a]	0[a]	0[a]	0[a]	1
		% of Total	0.6%	0.0%	0.0%	0.0%	0.6%
Total		Count	161	7	2	1	171
		% of Total	94.2%	4.1%	1.2%	0.6%	100.0%

All the respondents with diploma, degree and post graduate qualifications had never asked management's permission to eat some of the post-flight food (see table 4-37).

4.5.4.8 Whether employees would buy surplus foods.

The question of whether the respondents would buy surplus food was cross-tabulated by the highest qualification of the respondents. This question had a response rate of 86.0%, n=172 (Table 4-38). A significant majority of 94.8%, n=163 across highest levels of education responded that they would buy surplus food. Only 9 (5.2%) of the respondents would not buy surplus food and these came from those respondents with matric (5.0%) and degree (50.0%) as their highest qualifications. As stated earlier, the majority (n=161) of respondents possessed matric as their highest qualification. Of these, 95.0% (n=153) would but surplus food. The next biggest category were in possession of diploma as the highest qualification (n=8) and all of them would buy surplus food.

Table 4-38: Cross tabulation for whether respondents would buy surplus food - Highest education

			Highest education				
			Matric	Diploma	Degree	Post Graduate	Total
Would buy surplus food	Yes	Count	153$_a$	8$_a$	1$_b$	1$_{a, b}$	163
		% within Highest education	95.0%	100.0%	50.0%	100.0%	94.8%
	No	Count	8$_a$	0$_a$	1$_b$	0$_{a, b}$	9
		% within Highest education	5.0%	0.0%	50.0%	0.0%	5.2%
Total		Count	161	8	2	1	172
		% within Highest education	100.0%	100.0%	100.0%	100.0%	100.0%

4.5.4.9 Post-flight food should be reused.

Respondents were asked if they felt that post-flight food should be reused. Just above $^{4}/_{5}$ (86.5%, n=173) of the total sample responded to this question. As indicated on table 4-37, a resounding majority (96.5%, n=167) across highest qualification levels thought that post-flight food should be reused.

Table 4-39: Cross tabulation for whether post-flight food should be reused - Highest education

			Highest education				
			Matric	Diploma	Degree	Post Graduate	Total
Post-flight food should be reused	Yes	Count	158[a]	7[a]	1[a]	1[a]	
		% within Highest education	96.9%	87.5%	100.0%	100.0%	96.
	No	Count	5[a]	1[a]	0[a]	0[a]	
		% within Highest education	3.1%	12.5%	0.0%	0.0%	3.
Total		Count	163	8	1	1	
		% within Highest education	100.0%	100.0%	100.0%	100.0%	100.

It was interesting to note that all (100.0%) of those with degree and postgraduate qualifications felt this way. An insignificant 3.5% of the sample did not think that post-flight food should be reused and most of them came from the category with matric as their highest education level. (Table 3-39).

4.6 INFERENTIAL STATISTICAL ANALYSIS AND INTERPRETATION

Various tests were conducted to reach conclusions that extend beyond immediate data

4.6 QUANTITATIVE DATA PRESENTATION AND ANALYSIS

4.6.1 Food waste totals per food item

Food waste that was collected over a period of four days is presented in grams and in actual numbers. The costing was done in Rands using figures on the SAA the economy class meal cost breakdown April 2016 – March 2017 as average pricing for meals type on all routes (Annexure B).

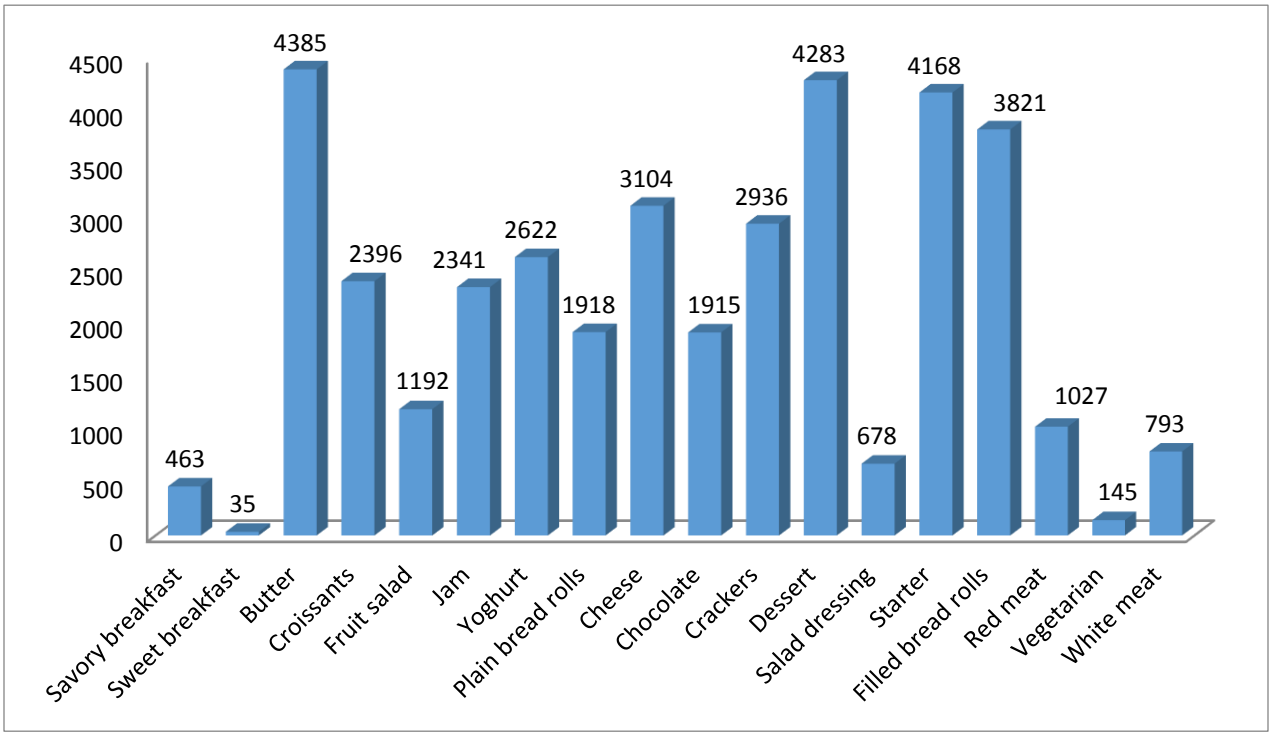


Figure 4-28: Food waste totals per food item

The section of data below aims to answer the question: What are the quantities and the monetary values of economy class post-flight food in the airline catering industry in South Africa?

Figure 4-28 is a representation of the total food waste per food item on the 4-day period of data collection. Across all routes the highest waste in terms of portions was dessert, amounting to 4283. This staggering figure was followed by starters at 4168 wasted portions over the period of 4 days across all routes.

Frilled rolls generated 3821 portions of waste across all routes over a 4-day period. Yoghurt was the fourth highest waste generating meal (2622) on the economy class food tray over the 4 day period across all three routes. Close on yoghurt's heels were croissants generating 2396 portions of waste. These were followed by red meat generating 1027 portions, white meat, savory hot meal, vegetarian hot meals which together generated 1436 portions of waste across all routes. The least waste was from sweet breakfast which according to the meal specifications was only served on the New York destination. If looking at meal items that were served on all destinations, vegetarian dishes therefore become the least generators of food waste across all routes.

4.6.2 Total waste count per route

This section presents route specific data. The routes are domestic routes, regional routes and international routes. It breaks down every meal item and categorises onto the route where it is served and the researcher thereafter contextually analysed it.

Most portions of waste on the domestic routes are from filled rolls at 2891 portions followed by yoghurt portions at 1201 and croissants at 1029. The disturbing reality is that these are individually wrapped croissants and 80 ml yoghurt tubs as indicated on the meal specification that are disposed of sealed in their original packaging.

On the regional and international routes, individually wrapped cheese portions that went to waste at an alarming 3104 portions, this figure was followed by crackers at 2936 portions, not far behind was butter at 2349, then jam at 2341 followed by chocolate pieces at 1915 just to mention the highest numbers.

Just by glancing at table 4-40, one can see the horrifying figures of food waste generated in just a four day period on each route on each window period. It also displays the meal items that are relevant to each route. International and regional routes seemed to generate more waste because we see in the data above that it has more items on the menu thus the variety of foods that gets disposed of on the regionals and international is vast.

Table 4-40: Total post-flight food waste count per route

Row Labels	Domestic	Regional	International	Total
Breakfast service hot meal	**62**	**131**	**305**	**498**
Savory	62	131	270	463
Sweet	0	0	35	35
Breakfast service trays				
Butter		691	1658	2349
Croissants	1029	391	976	2396
Fruit salad		351	841	1192
Jam		636	1705	2341
Yoghurt	1201	503	918	2622
Dinner service trays				
Bread		1572	301	1873
Butter		1033	1203	2036
Cheese		2077	1027	3104
Chocolate		954	961	1915
Crackers		1815	1121	2936
Dessert	784	2166	1288	4283
Salad dressing		678		678
Starter	847	2155	1166	4168
Dinner service hot meals				
Red meat	286	384	357	1027
Vegetarian	0	163	8	145
White meat	230	324	239	793
Snacks				
Filled rolls	2891	600	330	3821

4.6.3 Total post-flight waste per destination

Table 4-41, further breaks down the routes into destination. On that table one is able to see which destinations are the food waste yielding culprits. The actual destinations are listed under each route on table 4-41.

On the domestic flight routes, filled rolls yielded the most waste at an overpowering 2891 portions over a four-day period. The destination with the most post-flight filled rolls waste was from the Durban at 1068 portions, followed by Port Elizabeth at 994 portions and then Cape Town at 552 portions. East London has the least filled rolls food waste.

On the regional flight routes, butter, dessert and starters were food items that yielded the most post-flight food waste, with over 2000 portions of waste each. The data revealed that a devastatingly high total of 2809 portions of butter went to waste over the four day period of data collection. The destination that yielded the most post-flight waste for butter was Luanda at 506 portions, Lusaka at 404 portions and Windhoek at 256 portions.

The other item with the most waste on the regional routes was dessert at an overwhelming 2099 portions. This post-flight dessert waste was mostly generated from Mauritius at 279 portions, Windhoek at 200 portions and Lilongwe at 199 portions. The least dessert waste is generated from Harare at only 52 portions. This calls for a review on whether these destinations should in fact be catered for the same. The data also confidently revealed that a total 2096 starters were disposed of on the regional routes over the four day period of data collection. These post-flight food waste starters were primarily from three destinations, Luanda at 353, Mauritius at 262 and Windhoek at 241. The least waste for starter was 55 from Livingstone. This is a reflection of passenger preferences on those routes.

Studying data from the international routes, jam, butter and once again dessert shows up as a food item that has high waste. The total count of jam wasted was 1924 portions. The most post-flight waste on jam was from New York destinations at 324 portions, Sao

Paulo followed at 321 and London at 292 portions. This clearly signals that majority of passengers on those routes did not preferred to have jam with their breakfast meal services. With that said, a total of 1576 portions of butter went to the dustbin on the international routes. The most post-flight butter waste came from Perth at 373 portions, New York at 288 and followed by London at 321 portions.

Table 4-41: Total post-flight food waste per destination

Row Labels	Plain bread rolls	Butter	Cheese	Chocolate	Crackers	Croissants	Dessert	Filled rolls	Fruit salad	Jam	Red meat	Salad dressing	Savory	Starter	Sweet	Vegetarian	White meat	Yoghurt
Domestic	**0**	**0**	**0**	**0**	**0**	**1029**	**784**	**2891**	**0**	**0**	**281**	**0**	**62**	**792**	**0**	**0**	**210**	**1201**
Cape Town						141	784	552			281		62	792			210	277
Durban						376		1068										416
East London						243		277										239
Port Elizabeth						269		994										269
International	**423**	**1576**	**1147**	**1105**	**1243**	**1101**	**1400**	**230**	**990**	**1924**	**326**	**0**	**270**	**1280**	**35**	**40**	**255**	**1077**
Frankfurt	0	110	183	137	175	166	189		118	259	49		79	168		10	26	172
Hong Kong	15	60	3	20	26	16	41		10	66	23		20	40		4	41	11
London	127	231	130	156	156	241	196		136	292	45		38	173		12	22	153
Munich	0	215	149	130	159	47	178		126	242	34		57	127			37	163
New York	159	288	220	149	193	212	236	230	133	324	72		33	273	35	0	30	130
SAO Paulo	0	129	121	177	173	201	175		155	321	37		26	182		8	46	169
Perth	122	373	120	144	122	125	112		149	219	19			114			16	159
Washington DC		178	221	192	239	93	273		163	201	47		17	203		6	37	120
Regional	**1495**	**2809**	**1957**	**810**	**1693**	**266**	**2099**	**700**	**202**	**417**	**420**	**678**	**230**	**2096**	**0**	**105**	**328**	**344**
Dar Es Salaam	3	221	116		116	3	104		57		32		28	137		11	51	64
Douala	121	141	148				114				17			126		0	38	
Entebbe	151	162	132		167		117				11	119	43	111		2	13	
Harare	34	39					52	31			25	109	22	63		13	6	
Lagos		182	210	155	228		154				11			184		14	62	
Lilongwe		153	141		131		199				11	110		194		19	13	
Livingston	45	58					45	35			56	63	33	55		12	22	
Luanda	473	506	467	486	448		431				18			353			34	
Lusaka	169	404	134			166	112		74	283	10	46	34	104		14	8	208
Maputo								634										
Mauritius	280	318	245	169	236		279				53			262			35	
Nairobi		108	106		102		83				48		33	79			17	
Ndola	147	170					137				11	44		125		12	15	
Victoria Falls	72	91	37		42		72				40	49		62		6	3	
Windhoek		256	221		223	97	200		71	134	78	138	37	241		2	11	72
Grand Total	**1918**	**4385**	**3104**	**1915**	**2936**	**2396**	**4283**	**3821**	**1192**	**2341**	**1027**	**678**	**562**	**4168**	**35**	**145**	**793**	**2622**

The least butter waste was 60 portions again came from Hong Kong. This could mean that passengers from Hong Kong generally consumed what is presented to them by the airline as based on the evidence in this study.

A devastating 1400 portions of dessert were disposed of during this time. The most post-flight dessert waste was from Washington DC at 273 portions, New York at 236 and London at 196 portions. The least dessert waste was 41 portions from Hong Kong. Through this data it is seen that London and New York generally had the highest waste in numbers, Hong Kong flights generally had the least food waste in numbers on the international routes. This displays an element of over catering on some routes

4.6.4 The count, weight and cost of food waste per route

Table 4-42: Domestic routes post-flight food waste count, weight and cost

Domestic Routes					
Food Item	**Waste count totals**	**Portion sizes**	**Cost per portion in Rands (R)**	**Total waste in grams (g)**	**Total cost in Rands (R)**
Savory Breakfast hot meal	62	220	19.36	13640	1200.32
Croissants	1029	30	4.28	30870	4404.12
Yoghurt	1201	80	2.81	96080	3374.81
Red meat Hot meal	281	240	32.52	67440	9138.12
White meat Hot meal	210	240	29.89	50400	6276.90
Dessert	784	60	9.5	47040	7448
Starter	792	60	5.42	47520	4292.64
Filled rolls	2891	120	14.92	346920	43133.72
Totals				**699910**	**79268.63**

Table 4-42 and Figure 4-29 reflect the relationship between the count, weight and cost of post-flight food waste that was collected over a four-day period on the domestic routes. Filled rolls had the highest count of food waste on the domestic routes, a total of 2891 portions went to waste this translated to R43 133.72 in a four-day period.

Followed by yoghurt at 1201 portions which amounted to R3374.81 and 1029 portions of individually wrapped croissants at R4404.12. Almost 800 portions of desserts and starters respectively were disposed of. The least amount of waste was came from savory breakfast hot meals. A shocking sum total of 699910 grams (6999kg) of food from domestic routes were disposed of which amounted to R79268.63 worth of food got disposed during the data collection period of four days. A shocking 346920g of filled rolls were disposed of, 96080g of yoghurt, 67440g of red hot meals, and 50400g of white meat meals were amongst the highest disposed of menu items in volume. These menu items that cause the highest cost damage on the domestic routes are filled bread rolls at an unacceptable and hard to believe R43133.72.55, red hot meals follow at R9138.12 and white hot meals at R6276.90.

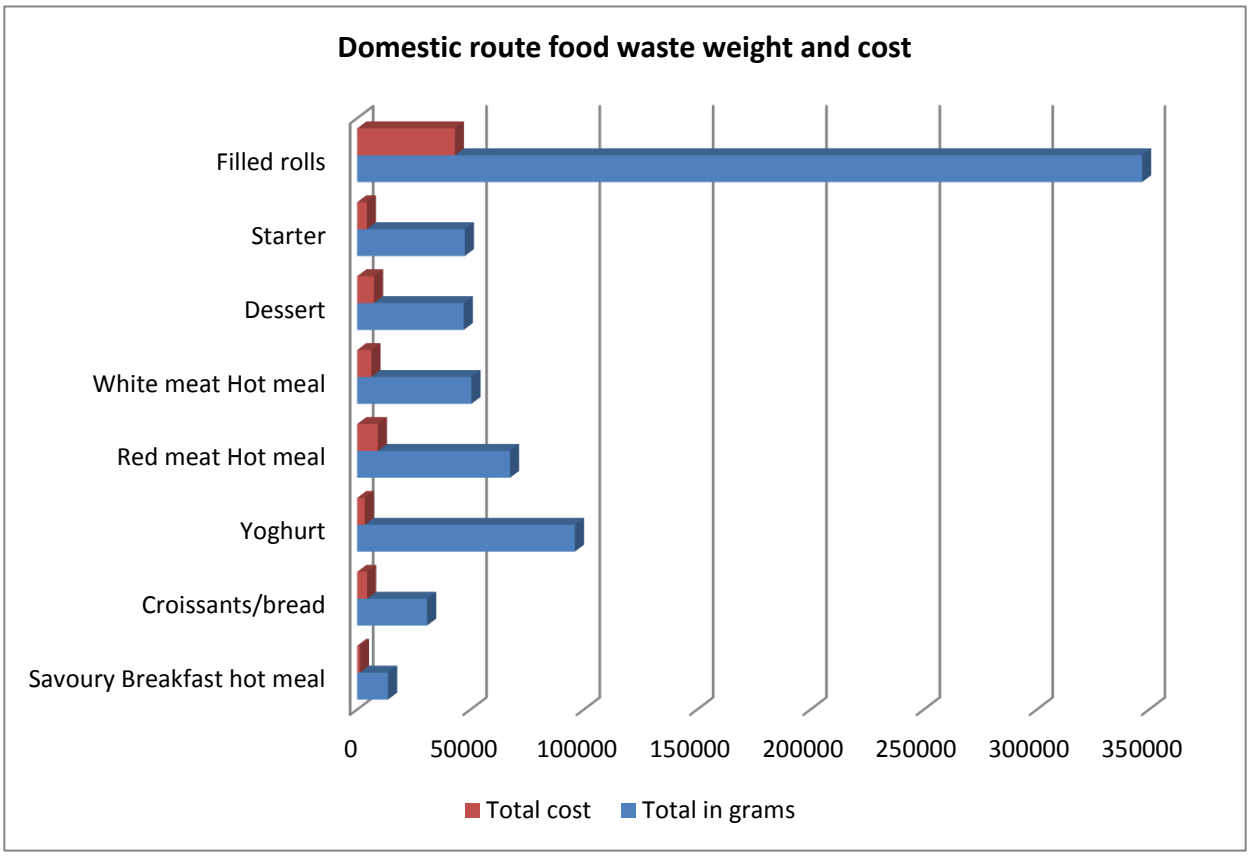


Figure 4-29: Domestic routes waste weight and cost

Food waste from regional routes counted over the four day period of data collection amounted to R114087.36, and was a sum total of 772668g. The most expensive food item on the menu in price is red meal hot meals at R32.52, a total of 420 portions of these meals were disposed of; this amounted to 100800g and R13658.40. Filled rolls were some of the foods with high cost of R14.92, 120 portions of them got disposed of during the data collection period, this waste amounted to 84000g at rand values R10 444.00. Interestingly and unexpectedly, vegetarian meals were the second expensive meals before white meat dishes.

Table 4-43: Regional routes post-flight food waste in count, weight and cost

Regional routes					
Food Item	**Waste count totals**	**Portion sizes**	**Cost per portion in Rands(R)**	**Total waste in grams (g)**	**Total cost in Rands(R)**
Savory Breakfast hot meal	230	220	19.36	50600	4452.80
Butter	2809	8	1.67	22472	4691.03
Croissants	266	30	4.28	7980	1138.48
Fruit salad	202	60	4.81	12120	971.62
Jam	1924	10	2.39	19240	4598.36
Yoghurt	344	80	2.81	27520	966.64
Red meat Hot meal	420	240	32.52	100800	13658.40
White meat Hot meal (chicken)	328	240	29.89	78720	9803.92
Vegetarian (Stuffed herbed pancake)	105	240	30.41	25200	3193.05
Bread	1495	30	2.76	44850	4126.20
Individually wrapped cream cheese portion	1957	8	4.73	15656	9256.61
Chocolate	810	10	13.31	8100	10781.10
Crackers	1693	10	2.19	16930	3707.67
Dessert	2099	60	9.50	125940	19940.50
Salad dressing	678	10	1.47	6780	996.66
Starter	2096	60	5.42	125760	11360.32
Filled rolls	700	120	14.92	84000	10444.00
Totals				**772668**	**114087.36**

The cheapest item on the menu was salad dressing at R1.47, followed by butter and crackers at R1.67 and R2.19 respectively. An interesting observation is that the most common food items that yield high waste . It is reflected in the data that there are items that ordinarily need not be standard on every tray. Food items such as butter were at waste counts of 2809 at R4691.03, desserts at 2099 at the amount of R19940.50, starters have a waste count of 2096 at the total cost of R11360.32, jam at 1924, individually wrapped cream cheese portion at counts of 1957 at a combined costs of R13854.97 and crackers at 1693 at the cost of R3707.67. The total waste on the regional routes was and alarming 772668g at a total cost of R114087.36.

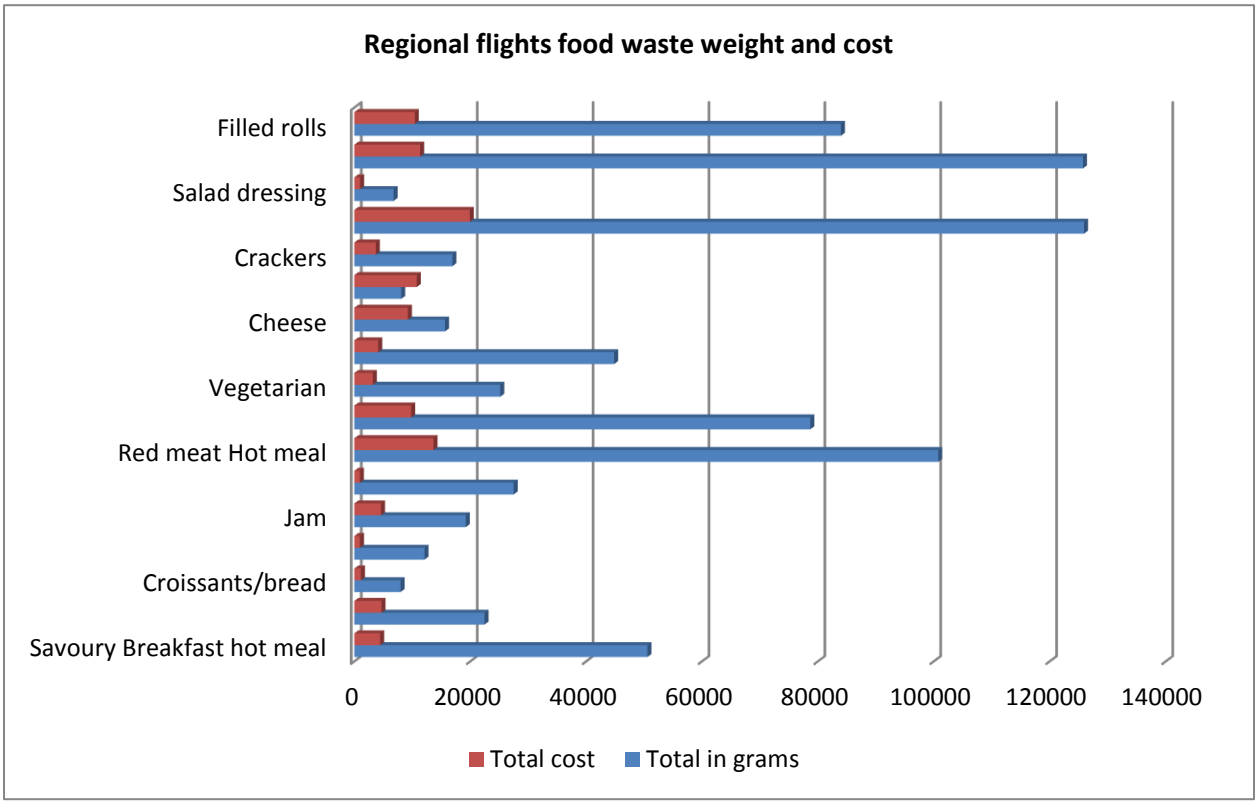


Figure 4-30 Regional route waste in weight and cost

Figure 4-30 illustrates the data on table 4-44 in a vivid way. Starters and desserts have the highest amount of waste in grams at 12760g and 12940g respectively. This is followed by red hot meals and white hot meals at 100800g and 78720g. These menu items

occupy the most landfill space. These menu items, with the exception of red hot meals, do not necessarily cost the most but they cause the most environmental damage. The meal items that have the highest cost value on the regional flights are desserts at R19940.50 and red hot meals at R13658.40 over the four day period of data collection. The menu items that had the least cost values were Yoghurt at R966.64 and salad dressing at R996.66 over the four-day period.

Table 4-44: International route waste in count, weight and cost

International Route					
Food Item	**Waste count totals**	**Portion sizes**	**Cost per portion in Rands(R)**	**Total waste in grams (g)**	**Total cost in Rands(R)**
Savory Breakfast hot meal	270	240	19.36	64800	5227.2
Sweet Breakfast hot meal	35	240	22.32	8400	781.2
Butter	1576	8	1.67	12608	2631.92
Croissants/bread	1101	30	4.28	33030	4712.28
Fruit salad	990	60	4.81	59400	4761.9
Jam	1924	10	2.39	19240	4598.36
Yoghurt	1077	80	2.81	86160	3026.37
Red meat Hot meal	326	240	32.52	78240	10601.52
White meat Hot meal	225	240	29.89	54000	6725.25
Vegetarian	40	240	30.41	9600	1216.4
Bread	423	30	2.76	12690	1167.48
Cheese	1147	8	4.73	9176	5425.31
Chocolate	1105	8	13.31	8840	14707.55
Crackers	1243	10	2.19	12430	2722.17
Dessert	1400	60	9.5	84000	13300
Starter	1280	60	5.42	76800	6937.6
Filled rolls	230	120	14.92	27600	3431.6
Total				**657014**	**91974.11**

Table 4-44 and Figure 4-31 display data which reflect the count, weigh and cost of food wasted on the international routes. The highest count was for jam at 1924 portions

which amounted to 19240g and R4598.36. This was followed very closely by butter at 1576 at 12608g and R2631.92.

Dessert was also high with 1400 portions, they weigh the most at 84000g at R13300 on the four day period. Interestingly the highest cost in cost was for R14 707.55 yet the total amount in count was 1105. The total amount in grams was a sinful 657014g and it cama at a total cost of R91974.11.

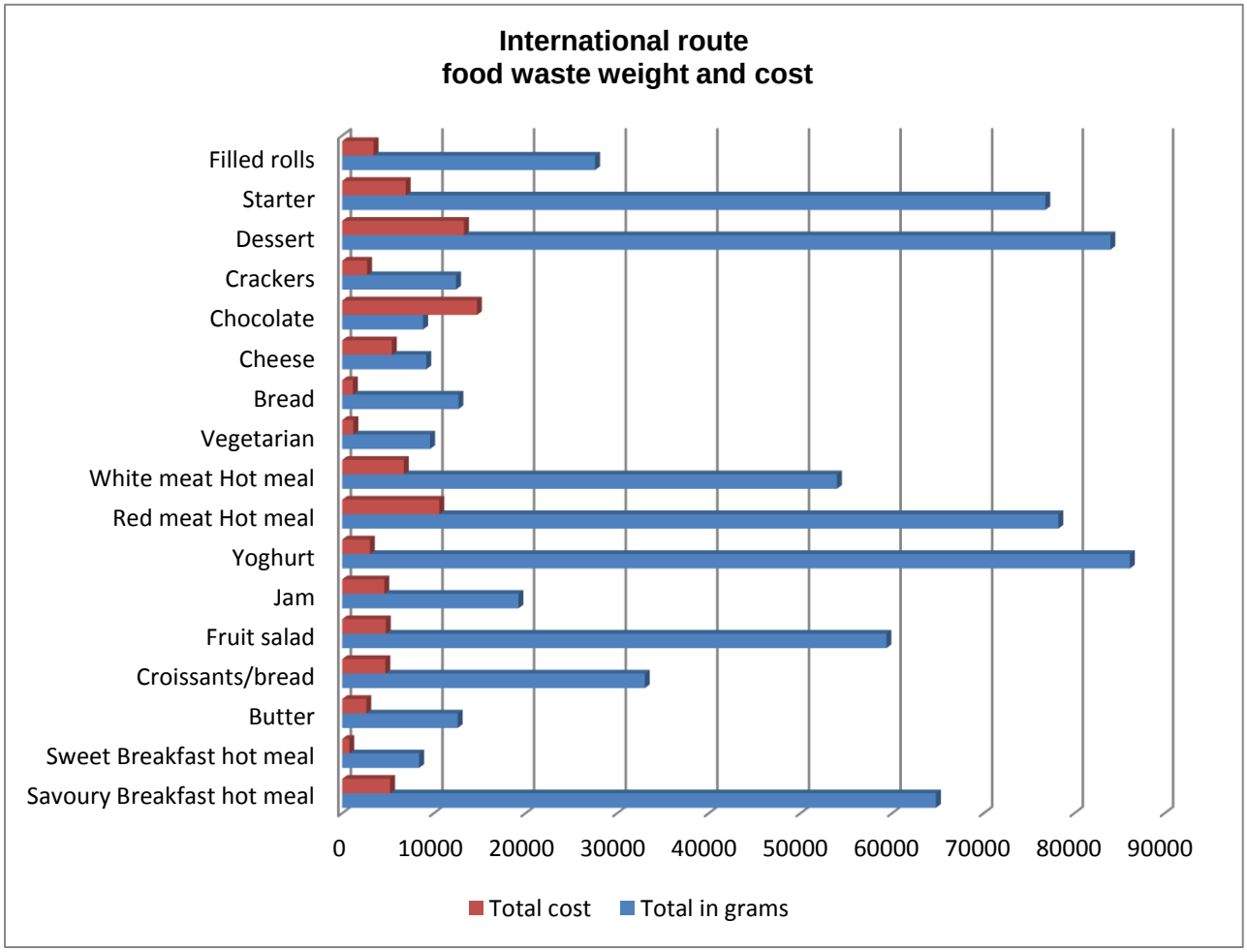


Figure 4-31: International route waste in grams and cost

On the international routes a shocking 1077 yoghurt portions went to waste. Red meat hot meals were 78240g, 54000g white meat, 64800g of savory hot breakfast and 59400g of fruit salads amongst other food items were disposed of. Once again it is

seen that hot meals make up the highest volumes of waste. Chocolates, desserts and red hot meals are the most expensive waste items. It is also visible that desserts and red hot meals yielded some of the highest waste in grams on all the route, domestic, regional and international.

4.6.5 Quantitative data discussion

The data reveals that in totality most waste in numbers comes from the dinner trays totaling 22383 food items that were uneaten. These are different food items. The dinner tray is broken down to different food items such as a salad portion, a salad dressing, a portion of dessert, a portion of butter, a bread roll, a portion of cheese, a packet of crackers, a chocolate as well as a hot meal using figures on the SAA economy class meal cost breakdown April 2016 – March 2017 (Annexure B). Breakfast trays which consist of a fruit salad, a yoghurt portion, a croissant, butter and jam as well as a hot or cold breakfast has the second highest total waste items at 10900 uneaten items on the four day period. Snacks which are ordinarily served on domestic routes are sandwiches with different fillings this meal item comes to 3821 sandwiches per four day period.

The highest amount of food waste on the domestic route is from filled rolls at 3821, followed by croissants. These sectors are often catered for the outbound and inbound sectors. This may be the reason why there is a lot of waste on these routes because the inbound flight will always be assumes as a full flight. This assumption may need to be reviewed as revised because inbound flight may not always be full then as per the current practice; whatever is left over would be disposed of.

On the regional route dessert, starter, cheese, crackers, butter and bread yield the most waste. Looking at it carefully, it is evident that these are almost all the food items on the trays except for hot meals. This data has an underlying message that perhaps there could be a disconnection between what passengers want and what is currently on offer. An option to serve a basic meal with no frills on sizes probably work best than serving a 3 course meal whereas most of the passengers may not prefer it in the economy class cabin. As much as the history of inflight catering was that for upmarket people (Foss,

2015), it is important to realise how much the industry has evolved to a point that it is now just another form of transportation. This data reality may be the very reason why there has been an increase in low cost airlines that offer transportation more that food service (Jacobs & Hoeller, 2015).

On international routes, butter yield 2809 portions and 1576 on regional. Combined its 4385 portions of butter are disposed of on each four day period. This could be evidence of passengers eating habits and maybe that the main reason they fly is not to eat but they see flying as a mode of transport. This could be that the clientele is changing or peoples eating habits are changing and the catering needs to change too.

Dessert portions show up as an item that generates much waste, 784 portions on the domestic routes and 2099 on regional and 1400 portions on the international, this is a total of 4283 portions in every four days. This picture was painted by SAPA (2013) that reported that 840 lemon meringue pies were disposed of on a weekend therefore this is an already known.

The reality of this situation calls for the tray set up to be looked at in much detail and attention must be given to passenger food preferences. According to the food waste hierarchy, the first step to manage food waste is to prevent it and avoid it (Papargyropoulou, 2014).

Lindgreen and Hingley pointed out the challenge of multi-culturism of customers in the hospitality industry that calls for more varieties of food to be served, in fear of not satisfying everyone. This therefore calls for route specific studies to be conducted to understand what travelers want to eat onboard and give them that instead of assuming they would like a variety of things and give each one of them all of them. This data is a clear indication that for an airline to remain competitive, and to differentiate itself it uses food (Jones, 2007). This practice unfortunately does not favor any sustainable food waste management practices.

Through this study evidence shows that butter, desserts and starters are food items that generate the highest numbers in food waste on each route where they are served. This

is an indication that these meal items are somewhat not always appreciated by passengers, not to say no one appreciates them but they are not appreciated by majority of the passengers. Table 4-45 show the high waste three food categories and the destinations where such waste is from.

Analysing food waste in relation to route and cost, it is seen that filled rolls yield the most waste on the domestic routes. These menu items are the most expensive meal items at a cost of R14.92 per roll. This amounts to a total of 3821 filled rolls every 4 days, which means a disposal of 28 658 filled rolls per month or the equivalence of R427 570 per month.

Table 4-45: Destinations that yield the most post-flights food waste

Butter		Jam		Desserts	
Perth	373	New York	324	Washington DC	273
New York	288	Sao Paulo	321	New York	236
London	231	London	292	Frankfurt	189

International food waste data paints a picture that revealed yoghurt to be yielding the highest waste at 86160g (86kg) however it is chocolates, dessert and red hot meals yield the highest costs. The data has brought to light that Inflight meal service procedures do not encourage the separation of unused food or meal trays from used food nor do they encourage the safe keeping of food in favorable temperatures after the meal service, this makes the cold chain to be broken and increases the chance of food contamination.

The reason for this could be due to lack of space, lack of knowledge or lack of instruction from the top. The cold chain is broken in many different points but if properly communicated and if there was a will to preserve post-flight food, this could be managed. When looking figure 4-32, 100% of the waste the data reveals that the most food waste from the economy class cabin is butter at 15%. This calls for a consideration to relook at necessity to have butter on these routes in economy class.

Out of the actual waste figures, butter, desserts, starters, filled rolls, cheese, crackers, yoghurt breads, jam and chocolates created above 5% of the total waste. These are the items that need to be studied in much attention to understand the root causes as to why they are not consumed by passengers. The other items form below 5% of the waste counted, this does not make them less important especially considering the total

number of items that get disposed of. The major question is the root cause of this food waste, could it be poor food pairing or is it a case of over catering?

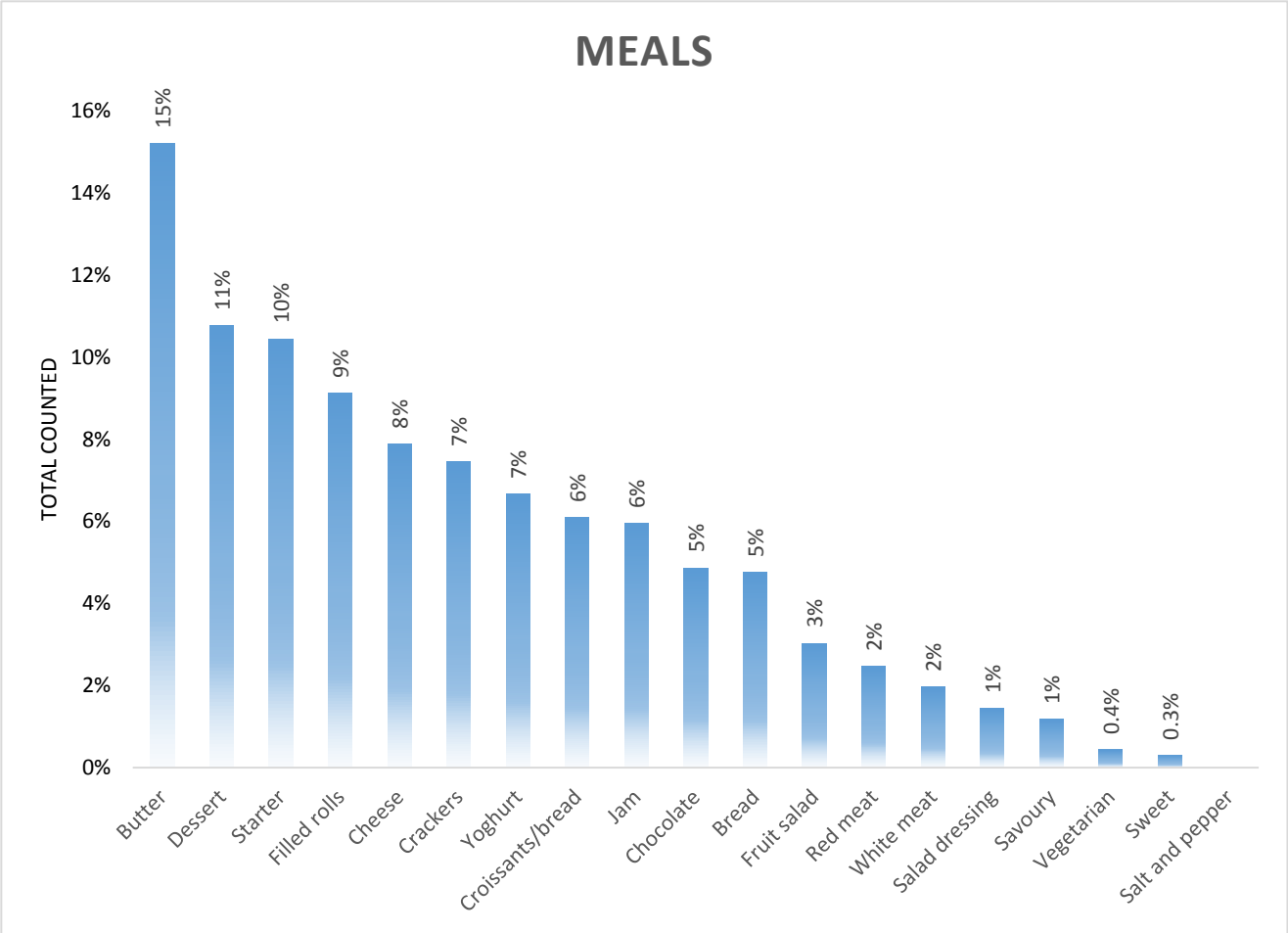


Figure 4-32: Post-flight food waste percentages across all routes

Looking at food safety policies and the responses from the HOD, one picks up that the airlines food safety policies are not mentioned or known by the caterer therefore they

cannot confirm the safety of food ones it has left the catering facility to the aircraft. One wonders if there are any measures or policies in place within the airline that monitor the cold chain onboard. There seems to be a lack of clear definitions of roles and a hand over system of food from the caterer to the airline. There is no mention of temperature records of food during flight thus the very safety of food cannot be guaranteed because there is a risk of a broken cold chain, which in itself is a major cause for concern.

It seems food safety procedures are only applicable in the catering company facilities during production and whilst the food is within the facilities but after it leaves the facility, the is not much care, let alone post the meal services. The responsibility of the airline is to safe keep food when it is onboard the aircraft, through the use of onboard food chillers; however no where do we hear of any food handling procedures, temperature control records onboard. Without these foods safety measures in place, there is a definite danger in consuming not only post-flight food but in-flight food.

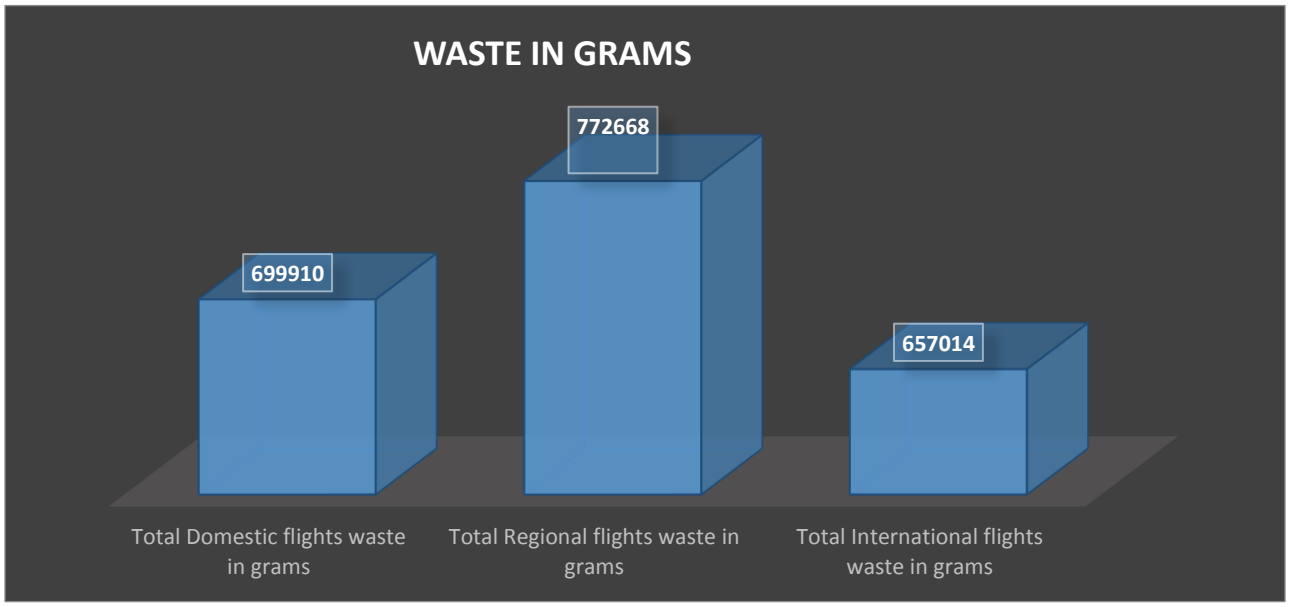


Figure 4-33: All routes food waste in grams across all routes

According to the findings on this study, as illustrated in figure 4-33, in a four day period domestic route food waste amounts to almost 700 kg. Regional route food waste

amounts to over 772668g and whilst international route food waste is 657014g. In totality all routes' waste was an average of 2129590g during the time of data collection.

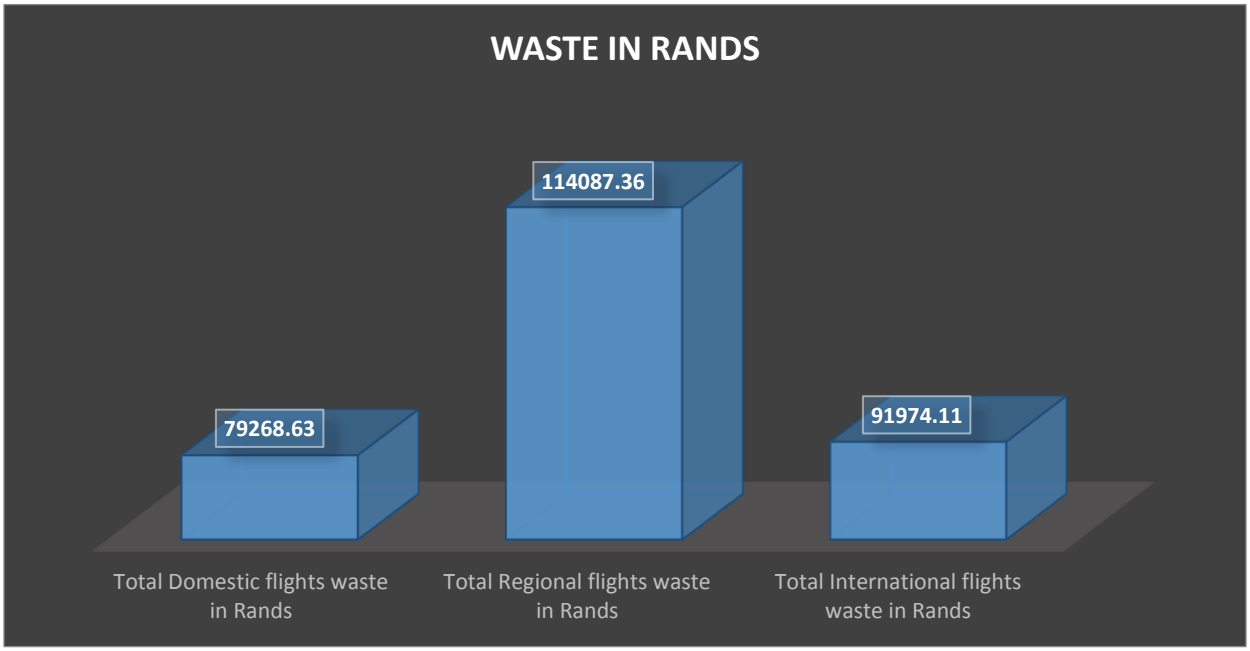


Figure 4-34: All routes food waste in cost (Rands) across all routes

As illustrated in figure 4-34, the rand values on the regional route was the highest. This could have been a result of back catering. On back catered flights it is assumed that all return legs of the flights would be full, which is seldom the case. This creates a case of deliberate over catering. This estimation and assumption is one of the causes of high volumes of food waste. In a four day period the rand value of food waste on all routes added up to R285330.10 across all sectors. This is a major concern no matter how one looks at it because if the catering was managed with CSR principles in mind, by now there would be strategies in place to bring it to its minimal. The people, planet and profits are evidently suffering because of these airline catering practices.

Table 4-45: Total 4 day waste actual weight and cost across all routes

Route	Total grams (g)	Total cost (R)
Domestic route	699910	R79 268. 63
Regional route	772668	R114087.36
International route	657014	R91974.11
Total	**2129592g (2129kg)**	**R285330.10**

According to table 4-45 illustrates, post-flight economy class post-flight food waste was at 2129 kg in a four day period. This makes one wonder if there is enough landfilling space and what is the environmental damage of this post-flight food waste. The amounts of food that goes to landfills are too high, dangerous and unsustainable as food waste is classified as hazardous waste (Nahman *et al*, 2012).

The data tabled in this chapter brings to the surface an urgent need for the airline catering industry and its stakeholders in South Africa to find ways to manage food waste. This can be done through the use of the guiding theories in this study in the creation of food waste handling procedures.

The total monetary value of food waste amounts to R286348.28, 63 in a four day period. Mason *et al*, (2011) pointed out that there are hidden costs of food waste. Some are generated from irrigation, harvesting, food preparation which this study does not look at. It remains important to understand, as stated in the interview response that post-flight food waste is not necessarily a financial loss to either of the companies, because the cost of catering is filtered into each passenger's flight ticket. Therefore it can be see waste, this could be the reason why not much attention is given to it because reducing the food offering will could mean reducing the flight tickets price and changing the status of the airline to being a low cost airline.

4.7 CONCLUSION

This chapter gave a variety of responses from both the quantitative and qualitative data sets. It brings to light the complexities and that there is no one size fits all approach to resolving the issue of food waste. These are different views, facts and practices about the phenomenon that are rightfully informed by different policies to achieve different things. As much as it is a fact that to eradicate waste is impossible, evidence and recommendations from different stake holders show that there are ways to re-use food waste either than disposing of it.

All the sources of data desire to uphold the values of food safety regulations, and recommendations of the food waste hierarchy and CSR however this data shows that it is impossible to hold regulations and these theories in the same esteem without compromising the other. To honor food waste regulations to their totality, means to dispose of food waste the way it is done now and ignoring all else. Unless otherwise there is a change in infrastructure, handling procedures, storage facilities and all that requires massive infrastructural investments and reviewed on processes.

The employees' knowledge of regulation played a role in how they responded to the questions. The food waste hierarchy and CRS are logic approaches to the food waste phenomenon that give practical solution that assume that such a practices are easy to practice. This is possibly true for new businesses that start off with a modern infrastructure that is thoroughly thought of to accommodate the food waste hierarchy and CSR. There is a risk of applying the recommendations of the food waste hierarchy and CSR, these include exposing people to possibly contaminated food thus leading to food poisoning which may lead to public liability law suits. It is also seen in the data that there is a fine line between food disposed because of people not eating and food waste disposed yet created by poor menu planning and over catering. The causes of food waste needs to be thoroughly investigated. Analysing the food waste phenomenon through literature, management responses and employee's responses, they are all in agreement that food waste should be reused at the same time all in agreement that it is

important to have food handling regulations to govern the food industry. The strictness of some regulations are though in question because they are perceived to be perpetuating the food waste problem.

This data may be evidence that there is some over regulation on food waste handling procedures. As much as there is need for regulation, there may be a need to relax some of it or an opportunity to challenge some of it, especially in developing countries such as in South Africa, where a third of the population do not know where their next meal would come from (Food bank SA, 2009), food waste management policies need not be so tight. There needs to be a differentiation in policy between the handling of international food waste domestic food waste, regional as well as international food. Simply because food was onboard an aircraft doesn't render it unfit for human consumption or animal feeding. It can be reused if the aircraft, the transportation vehicles and separation at source methods are applied to void cross contamination. However, the ultimate decision making power for food waste management lies with the airline, not the catering company.

In this data it is revealed that the core reason why the policy is the way it is, is because the mandate was simply to strip the aircraft, clean the catering equipment and then cater for the next flight. There were no clear instructions as to what should happen to the food from flights. That in itself is a problem for the catering company. In fear of not knowing on how food is handled in-flight, the catering company finds it safer to dispose of it.

Assiouras *et al,* (2013) in the literature section, equally warned about the danger of donating food due to the high risk of food borne illnesses and the potential threat of product harm crisis (PHC) which can see food donation harming the airline's brand should it accidentally poison a member of the public. There is also no post- flight food holding facilities, therefore all food goes to the sanitation area, which in itself is a unsanitary area. There is a sense of uncertainty as to who should create these facilities and buy vehicles that are fitted with cold storages for post-flight food? Who should build the infrastructure for post-flight food handling? Who ultimately benefits from it the charities, the airline or the catering company or the state? If such food is donated, sold

to employees or used in any other way, who should take ultimate responsibility for public liability and potentially product harm?

The study assumed the best way to deal with food waste is through the application of the waste hierarchy and CSR. The data presented above proves that the theories are ideal if there were no risks in applying them or if there was a law in the state that protects food donors and there was no product harm to be wary of. As much as the data uncovered that the current practice of food waste management is unsustainable and irresponsible as per the conclusion made by (Nahman *et al*, 2012). The study also brought to light the complexities and challenges that can come with the change of the current food waste management procedure.

The steps to take need to be deliberate, well planned and determined because it needs infrastructural investments, understanding of the travelers' mindsets as well as a change in regulation. In chapter 5 the researcher ties the research findings to the research objectives in order to make recommendations and conclusions.

CHAPTER 5

FINDINGS, RECOMMENDATIONS AND CONCLUSION

5.1 INTRODUCTION

This section of the study aimed to assess if the findings of the study as presented in chapter 4 in consideration to the research objectives. This chapter is crucial because it ties the whole project together and also identifies projects for further research.

This study aimed to determine the feasibility of the use of the food waste hierarchy and CSR in the management of post-flight food waste. It aimed to quantify post-flight food waste through conducting a waste audit. The study was also aimed at determining the perceptions of the employees of food waste observed within their organisation.

To fulfill these objectives, the data in Chapter 4, drew employees' views on the phenomenon of post-flight food waste, categorised food items that tended to end up in waste bins, quantified food that ended up as post-flight waste and estimated the monetary value of such waste.

5.2 RESEARCH OBJECTIVES AND FINDINGS

To meet the set objectives and to answer all research questions posed, the researcher collected both qualitative and quantitative data. Multiple findings emerged, some expected and others totally unanticipated. The study was built around the theoretical frameworks of the food waste hierarchy and corporate social responsibility. It assumed that the best way to deal with the food waste phenomenon is through the application of the principles of the above mentioned frameworks.

This research aimed to fulfill the following five research objectives. The findings of the study are discussed in relation to each objective.

Objective 1

To identify the policies and industry specific challenges that the airline catering industry faces that prohibits the reuse of economy class post-flight food waste at Air Chefs South Africa.

Findings

The study found through the review of literature that better management of food waste could address some grave social and environmental problems such as hunger and pollution both of land (through the reduction of landfilling of food) and air (through the decrease of gaseous emissions). It also discovered that there were mechanisms that organisations could adopt to prevent, manage and reduce food waste during preparation and serving than managing post-consumer food waste.

The study also found that as easy as it may sound, using the principles of CSR and the food waste hierarchy to manage and prevent post-flight food waste, there were numerous implementation challenges. Such challenges included liability lawsuits in case of food poisoning, image and brand tarnishment, malpractices by charity organisations and infrastructural investment. Another challenge was that the airline catering industry is highly regulated and operations are informed by certification bodies. Air Chefs is ISO22000 certified and compliant and this international standard of food safety management (ISO22000) dictates the workflow and flow processes within the catering company, which includes the food waste handling processes and procedures.

The data and literature revealed that the food industry is highly regulated and had to must adhere to the regulations to remain viable. Regulations such as the cold chain policy, food safety policy, HACCP policy, and unforeseen circumstances all inform the food waste policy. ISO22000 certification meant that Air Chefs meets all requirements to avoid food contamination that could affect public health (SABS, 2007). If food had to be donated and public health is compromised the company could forgo its certification and competitive advantage. Another challenge faced by airline catering companies such as Air Chefs is that food waste belongs to airlines that have paid for it and airlines

therefore determine what should be done with post-flight food waste. In addition the study uncovered that massive infrastructural investments were required to reduce the risk of food contamination and it was not clear who had to bear such costs between the airline and the catering company. With the process as it was at the time of study, disposal seemed to be to the safest and cheapest option.

There was a direct connection between the responses made by management and some of the literature in chapter 2. It is standard operation procedure in the airline catering industry for post-flight food not to be reused for human consumption. As seen in the literature, in the past airlines used to donate airline surplus food but due to cases of food poisoning and inherent lawsuits, this is no longer the practice (Jacobs and Hoeller, 2015). Surplus food is slightly different to post-flight food because surplus food is due to over production whilst post-flight food is food from flights, which is post-consumer food. This could be the reason for the majority (94.8%) of respondent-employees stating that they would buy surplus food if given an opportunity subsection 4.3.4.8.

Looking at the literature it is seen that a Good Samaritan law was created to protect food establishments, charity organisations and individuals from donor liability when donating food in good faith (Mohapatra, 2014). This act was also to improve interest in philanthropy and social responsibility by the catering industry and grocery stores. The study found that there was no similar law in South Africa aimed at protecting donor organisations from liability in cases of food poisoning. CSR has been portrayed to have positive benefits however, Assiouras *et al*, (2013) warns that there are “product harm crisis” (PHC) associated with food donations, especially if there in negative feedback such as food poisoning , this will have a negative impact on brand perception.

In the interview the only recommendations that were made with response to the reuse of post-flight food waste were for waste to be converted to biofuel, used in pig farming, used for composting and fertilizer. To prevent waste it is recommended that passenger tray set ups be looked at to remove items that contribute a lot to food waste, and a call for an infrastructural investment to ensure food safety during storage. Some of these recommendations are in line with what is already in practice in other international airline

catering facilities. It is seen in the literature that in the United Kingdom, airlines such as British Airways have introduced food waste management systems that reduce the amount of food that goes to landfills. They use a food waste drier. This is a new technology removes all moisture from food and reduces it to dry powder that gets mixed into compost or burned for fuel to avoid landfilling (the Animal and plant health agency and department for environment as well as food and rural affairs in the United Kingdom, 2014). It is undeniable that the volumes of food that goes to waste is high, this is an excellent way to put food back to the food chain however it requires massive infrastructural development as correctly pointed out in the interview.

Objective 2

To identify the categories of food that account for the post-flight biggest amount of return trays and oven racks food waste in the airline catering.

Findings

This objective required the researcher to collect, analyse and interpret quantitative data. A data collection sheet was used to classify the categories of food that accounted for the biggest amount of food waste. Table 4-45 was used to illustrate the categories of food that yielded the largest quantities of post-flight food waste across domestic, regional and international routes of South Africa Airways that Air Chefs catered for. A staggering total of 38 177 various categories of portions of food came back as post-flight food waste over the 4-day period that such data was collected. Disserts accounted for 11.2% of the total waste over the 4 days, followed by starters at 10.9% and cheese at 8.1%. The other categories of food that contributes significantly to post-flight food waste were crackers (7.7%), yoghurt (6.9%), croissants and bread (6.3%), butter (6.2%), jam (6.1%) and an assortment of other food categories such as chocolate, fruit salad, red meat, white meat and others. International flights accounted for most food waste followed by regional flights with domestic flights accounting for the least amount of food waste across all categories (Table 4-46).

Objective 3

To quantify the amount of economy class post-flight food waste at Air Chefs South Africa.

Findings

The study found that the cost of waste in the airline catering industry is very high. Food is perceived as a "value-add" item and a marketing tool and not the core business of the airline. While the airline may invest millions of Rands for this purpose, it may not be inclined to invest a lot in ensuring that post-flight food is stored well to avoid contamination. As much as it would assist the poor, reduce gas emissions and reduce pollution to the environment, food waste wouldn't save the airline money because all the food that gets loaded has in essence been paid for by the passenger.

Figure 4-20 estimated post-flight food waste from domestic routes to 700 kg over the four day period. Post-flight food waste from regional routes amounted to over 772 kg while post-flight food waste from international routes amounted to 657 kg. In total, post-flight food waste amounted to 2129, 59 kg of food that went to waste just over a four-day period in one of three Air Chefs kitchens. This is can also be translated to 15 971.925 kg of food per month.

In figure 4-21 the amount of food that went to waste over the four-day period translated to about R286348.28, about R71587.07 per day, monthly waste and yearly waste, it is evident that the this current practice is unsustainable by any measure. This is a lot of food in a country facing food insecurity and a lot of money in a country facing an unemployment rate of 27.7%. This could be as a result of back catering because it is assumed that all return flights would be full when coming inbound. This estimation and assumption may be one of the causes of high volumes of food waste.

The statistical data revealed that butter, dessert, starters, and bread rolls are amongst some the food categories that yield the most post-flight food waste in total count. This totals 699910g in every four-day period which totals R79 268. The scientific study that aimed to quantify the energy value of inflight waste on Egypt found that economy class

food waste equated to 41% of the food served per annum. This was equated to 2,410,227,000 kj of energy which is the equivalent of 669,561.1 kW-hr of electricity (El-Mobaidh *et al*, 2006). This is also in line with the recommendation that was made in the interview that post-flight food waste could be used as bio-fuel or energy. Considering the amounts of waste in this study, it can be said that, from SAA alone, waste at the time of the study would reach 15 972 kg per month and a total of R3 632 673.60 per month on post-flight food waste alone, that is if costed in South African Rands, not considering all other hidden costs of food waste as pointed out by Mason *et al* (2011) chapter 2. Considering all the costs of food waste, the monetary values do not reflect the real cost of food waste.

Objective 4

To draw employees and management views and perceptions on processes used to manage food waste in the company at Air Chefs SA.

Findings

Qualitative findings through questionnaires are that employees perceive certain post-flight foods from flights as still edible. Foods such as chocolates, dry snacks, butter, food from domestic flights such as sandwiches, yoghurts, fresh fruits, biscuits, and other food items that were sealed and within expiry dates were some of the food items that were regarded as still edible.

The findings of this data reveals that age, gender, length of time employed and highest education affected responses to some questions. These all affected the question of whether post-flight food was edible and whether they were comfortable throwing away post-flight food responses. This could be so because the older the people the less likely they see any danger to this post-flight food. It may even reflect that they may have tried and tested it and it was not harmful to them or they are aware of the realities of urban poverty and the quality of food that they already eat outside the airline catering facility. This means when addressing this question these factors must be considered. The responses to the question of whether respondents are comfortable throwing away food

response are affected by age, gender, length of time employed and highest education. This could be due to the exposure to the best practices in the food industry, not necessarily that it is a practice that they agree with.

In the literature it is seen that post-flight foods such as confectionery food items (candy bars, chocolate bars, gelatin candies, lollies, jelly babies, jelly beans, breads, cakes, pastries, etc.) crisps and nuts, drinks not containing milk if they are not mixed with other food waste, and were within the expiry date and individually wrapped were foods that could be recycled for human consumption (The Animal and Plant Health Agency and Department for Environment as well as Food and Rural Affairs in the United Kingdom (2014). This is a regulation in the United Kingdom but there is no similar regulation in the South African context. This regulation cannot therefore be assumed as relevant in South Africa so cannot be used.

Objective 5

To make recommendations about what can be done with surplus food and food waste in the airline catering industry to make the industry more environmentally, socially and economically responsible.

Recommendations based on findings

This study has raised more questions that need to answer through further research. The airline catering industry is generally under researched in South Africa, so there is little academic literature that gives a broad understanding of the industry. Through the findings, the following recommendations are forwarded:

- Food waste prevention strategies need to be created. Some leeway should be given to the catering companies to implement these strategies as they are the ones handling post-flight food waste. These strategies can include a review of the meals on offer, a change to catering briefs, and a change in meal service time frame to exclude food items that contribute more to tray food waste.

- Airlines need to work together with catering companies to reconsider the necessity to have each tray composition to be the same, especially because catering companies end up with the waste that airline companies do not see. Certain food items can be on request, thus loaded at a lower percentage as suggested in the literature (Jacobs and Hoeller, 2015) instead of having all food items standard loaded on every passenger tray at 100%. Items such as bread, butter, jams and cheese could be on request because we see in the data that those are the main waste items in numbers.

- The airline simplify food offering and focus on preparing food quality, to change passenger perceptions on airline food quality, this may encourage them to eat airline food. If customers are made aware of the amounts of money that they pay towards on-board catering, and the pricing strategy be revised. We could realised a reduction in food waste and a reduction in ticket prices for passengers who choose not to eat inflight.

- Airlines should be willing to change from what has always been and be brave to be more creative in the catering systems. Times are changing and in the interest of food waste management other airlines have reduced their food product offering. Some airlines serve meals on the international routes only whilst others sell food on-board. This may mean that the airline will lose its star rating, which is questionable if it is a necessity. However that would have to be a strategy driven by senior management and will need to form part of the airlines' strategy.

- To explore passenger food preferences is also strongly recommended. Knowing what passengers prefer to eat in-flight will assist and inform menu development. To align passengers catering needs with the actual product offering as there seems to be a disconnect there.

- There needs to be a route specific menu development plan that speaks to each route, because the data shows that the eating habits of international travelers is different to that of passengers on the regional routes yet the meal specifications are the same. It is therefore recommended that there be route specific menus.

- The study recommends that there be a creation of a food waste separation at source procedure that can be implemented on-board. This can address the knowledge gap between what happens onboard and how it can be connected to what happens in the catering company, there needs to be a continuation in procedures to ensure the food chain does not break. Food safety measures need to be put in place for on-board, without this we can say there is a definite danger in consuming not only post-flight food but inflight food.

- The study recommends that there be an investment in the catering company's infrastructure and technology that would enable food drying technologies, food conversion to bio-fuel, so that post-flight food can be converted to go back to the food chain.

- It is recommended that food from domestic flights be handled differently from international post-flight food. There is no evidence that shows that post-flight food is inherently contaminated. With proper handling domestic post-flight food can be donated.

- The needs to be a post-flight food receiving bay which is separate to the sanitation area. This bay would be for the sole purpose of receiving clean unused food items from domestic and some regional flights which need not be handled as international waste. Food items such as foods that are sealed, and never went to the passenger, not plate waste. Food within expiry dates and individually wrapped tray items could be delivered at this bay and could be donated or given or sold to staff. This is provided all on-board food handling procedures are in accordance to of food safety policies and the food reaches base without having have broken the cold chain.

- The study recommends that there be collaborations with food banks, composting firms and animal breeding farms to create direct channels to work out a way to reuse post-flight food to their benefits.

- This study recommends that better governmental regulations and policies be detailed. Policies and regulations that enable the ease of food donations and detail specifically the handling of post-flight or food waste from different catering industries in South Africa. These regulations and policies need to be supported by infrastructural to support

- The study recommends that there be a conversation on the feasibility of creating a law that protects potential food donors from law suits, considering urban poverty and the fact that a third of people do not know where their next meal would come from.

- The demand for airline catering in South Africa is undeniably growing as more and more airlines land in the country due to the airport infrastructure. This calls for a review and adjustments on the strategies in the handling of waste to befit the increasing volumes. The same strategies that have always been used when this was a small industry are still in use, this does not reflect any accommodation of the increased food waste. The study therefore recommends a proportionate growth in all aspects of airline catering, especially in the management and handling of food waste.

5.3 CONTRIBUTIONS OF THE STUDY

The primary aim of this research was to determine the relationship between economy class post-flight food waste and waste management policies and procedures in in-flight catering, using Air Chefs South Africa as a case study. This aimed at categorising and quantifying the food that returns uneaten from flights. It aimed to look at the food hierarchy and CSR as guiding theories and to come out with recommendations that would assist in the evolution and improvement of post-flight food waste management.

Currently most studies have focused at food waste from a nutrient composition point of view and in other industries, but not so much in the airline catering industry.

This study therefore has numerous unique contributions which are wide and immense. It encourages a way of thinking that promotes the incorporation of incorporates

sustainable policies in policy and process developments of food waste handling procedures. The study was done in such a way that it promotes the practice for all stakeholder involvement i.e. the caterers, the airline, as well as the employees, are all considered when procedures are developed. The study acknowledges and understands what had initially informed the current food waste handling procedures, be that as it may it highly stresses that the needs to be a somewhat new or improved approach that considers sustainability, especially after observing the changes in the airline industry. The study outlines that airline catering food waste procedures in South Africa need to be updated to be more befitting to the growing aviation industry by improving on technology and infrastructure.

It contributes to the body of new academic knowledge which will benefit the scholarly articles on food waste management within the airline catering industry. This study gives the actual food waste quantities, categories of food waste, identifies food items that yield the mist food waste which is unique information that benefits the airline catering industry in by giving actual quantities of food that goes to waste in the airline catering industry.

This study creates an awareness and a useful basis by actually quantifying food waste so to be able to put into perspective the magnitude of the problem. This can assist the airlines and airline catering industry to develop up to scale tools to address the problem. The figures, weight and financial value of food waste were also put into perspective in this

The study was able to directly link the food waste hierarchy and corporate social responsibility, this was a view point that was previously not considered in the past. It pulled together two theories that aim to promote sustainability and aligned them to work together to solve an unsustainable practice. There were clear disconnects in the actual practices and the desired income in creating a sustainable catering company.

The study identified the challenges in applying CSR policies and the food waste hierarchy policies and in the same breath apply the HACCP and cold chain policies whiles satisfying ISO requirements.

The study uniquely found that organisations do not have industry specific targets on how to achieve sustainability. The study plants a seed that encourages airline catering companies to find a way to evaluate sustainable practices, to create strategies and achievable targets that aim to improve on sustainable practices. It identifies the food waste hierarchy and CSR principles as theories that should be driven by top management just as HACCP, the cold chain and ISO is. CSR and the food waste theories are currently seen to be voluntary practices, therefore they do not form part of the catering companies strategy.

The study also added the view of employees, as they are the ones who handle the food waste in practicality. This is an angle that has not been looked at in the past. The interesting outcome is that employees see some of the post-flight food as still edible. So much so that they are willing to take and even buy some of the post-flight food waste because they don't view it as damaged or spoilt. This is new knowledge because it would be assumed that employees that carry out the food waste handling procedure would be in agreement that disposing of it is necessary.

In this study it is also discovered learnt that airline catering companies has no power in reducing food waste because they cater according to the airlines' specifications. This brought about the understanding that the decision on what gets catered for the passenger lies with the airline thus the reduction thereof also lies with the airline.

5.4 LIMITATIONS OF THE STUDY

Research study limitations are the characteristics that impact the findings through the design or methodology used on a study. They may be viewed as constraints that may limit the application in practice of the recommendations that are this study (Miles and Huberman, 1994). This study had the following limitations:

- It is cross-sectional study so it provides a snap shot view of the situation in the economy class cabin of SAA flights.
- It is a case study using an airline catering company which caters for the biggest airline in South Africa. It is therefore not exhaustive because it does not

investigate other airline catering companies or other airlines that Air Chefs caters for.

- While Air Chefs caters for other airline companies as well, the focus of the study was SAA excluding other airlines. SAA alone generated so much data that the researcher would find it too cumbersome to study.
- Through the use of an interview, the qualitative findings of this study makes use of self-reported data which is data that is difficult verify. However, this limitation was countered through triangulation of data collection as already discussed.

5.5 CONCLUSION

As already stated, to implement the food waste hierarchy and CSR requires infrastructural and financial investments. In 1998 Bates and Phillips concluded that food waste solution programmes that highly benefit food service establishments financially and environmentally can be enforced with little to no cost, but this study has proven that, that is not possible in the inflight catering industry, unless if it's a new business that is developed with a clear plan and built in strategy of managing food waste through the use of the food waste hierarchy and CSR. This would also require and require a separate budget on its own as well as new approvals from certification bodies.

The study was conducted in the interest of the people, the planet and profits. The findings reflect that the people in the establishment would generally appreciate the reuse of post-flight food whether to their benefit or the benefit of others. The planet would undoubtedly benefit from better management of post-flight food waste through the reduction of toxic fumes from landfills. There would be an increase in profits if there was a reduction in the production of food waste thus the reduction pf post-flight food waste. The study identified some gaps in the separation at source model, for food waste the City of Johannesburg recommends it its model that food waste must be landfilled. This is a missed opportunity to incorporate the food waste hierarchy recommendations.

The findings displayed in chapter four and recommendations in chapter five are important to inform direction on how to best to deal with this phenomenon. It is clear that there is no immediate quick solution to the current practice. It is a phenomenon that requires top management to address as part of the airline catering company's business management strategy.

The data collected and displayed in this study is important and captured the magnitude of the phenomenon. Data, together with literature reveled that other airline catering companies as well as other sources of food waste have acted on the food waste management problem by taking the necessary initiatives to limit, mitigate or avoid landfill disposal of food waste. With the necessary will power and investments, this is possible in any food production environment. By creating sanitary post-flight food receiving areas, food waste can be perceived as surplus food that can be donated to the poor. By having separate receiving bays for domestic and international food, post-flight food from domestic routes could be used for animal feeding. By investing in infrastructure, post-flight food waste could be dried and used as bio-fuel.

It is seen in this study that landfilling of post-flight food waste is an unsustainable practice. It is not suitable for a developing country where there is urban poverty, unreliable electricity supply and the realities of food insecurity are undeniable. The study then concludes that post- flight food waste causes a lot more harm than previously understood.

The study shows that currently as things stand, it is impossible for the food industry to be HACCP and ISO certified and also be considerate of the food waste hierarchy and CSR. These certifications in their design directly encourage food waste and food disposal. As caterers need to be commercially attractive, it is imperative for them to be certified for food safety management systems and to comply to the requirements of the food safety schemes in fear of losing their marketability and commercial appeal. As much as food safety is important, this raises the question on the role such schemes play in creating food insecurity and possibly the cost of food thus creating issues of poverty. By managing cold chain breaking points as critical control points, by including that step

in the onboard food handling procedure can assist in maintaining the cold chain, thus enabling post-flight food to be reused.

If only certification bodies would be mindful of the impact the certification has on the management of food waste, only then perhaps can there be a change in food waste management procedures.

As the airline industry grows, and by virtue of having one of the best aviation infrastructures in Africa, South Africa becomes an attractive destination for airlines to land, thus the need for catering into and out of SA, the post-flight food waste problem also grows. Without set regulations by the state that inform the management of post-flight food waste, the problem can escalate and become unmanageable. It is in this realisation that the study calls for urgent measures to be put in place to manage the problem before it gets too big and unmanageable. As per the quote in the beginning of the way in which what gets measured gets managed, the study has given a starting point to enable the management to understand the extent of post-flight food waste by quantifying it.

5.6 AREAS FOR FUTURE RESEARCH

The areas of future research are based on the findings and the research limitations of time and resources there is study could not cover all aspects of the airline catering food waste, thus left more questions for future investigation. This study focused on the management of post-flight food waste generated from SAA flights in the economy class cabin. The researched questions were answered however more questions arose during the dudy. The natural direction for future studies on this topic is to study the following:

- A count of total waste in all classes of travel in all airlines that land in SA, to give a snapshot of all post-flight food waste that enters South Africa through inflight catering.
- Total waste generated by other airlines catered by other airline catering companies in South Africa.

- Investigate the cost of establishing the necessary infrastructure for food waste management procedures.
- A study to investigate why passengers do not eat what is catered for them.
- A scientific study can be conducted that can measure the gas emission and measure the environmental damage caused by post-flight food waste.
- A study to assess the role International Standards Organisations (ISO) schemes play in creating food insecurity and how they influence the cost of food thus creating of poverty.
- A study to establish what the airline catering industry means by sustainability, and how it work together with airlines to create set reachable sustainability targets.
- Conduct a study that can link the impact of marketing to product development and how marketing creates pressure to develop airline products that are not needed by the customer and how airlines can cut less appreciated products without losing passengers and their prestigious star ratings.

REFERENCES

Abdi, H. and Willians, L. J. 2010. Principal components of analysis. Influuent: Purpose, Partnership, Progress [Online]. Available: https://utdallas.influuent.utsystem.edu

Acharya, A.S. Prakash. A.; Saxena. P and Nigam. A. 2013. Sampling: Why and How of it?: Indian Journal of Medical Specialties. 4(2):330-333

Acheson, D. 2016. Patient education: Food poisoning (foodborne illness) (Beyond the Basics). [Online]. Available: http://www.uptodate.com/contents/food-poisoning-foodborne-illness-beyond-the-basics

Air Chefs .2016. General Waste Policy. Internal documents

Air Chefs presentation. 2015. Internal document

Air Chefs South Africa .2014. [Online]. Available: http://www.Air Chefs.co.za/

Airport corporate research program (ACRP). 2014. Advancing recycling from aircraft cabins: Strategies for Flight Kitchens Transport Research Board of The National Academies.

Anfara, V. and Mertz, N. 2015. Theoretical Frameworks in Qualitative Research. SECOND EDITION. Sage publication

Arnott. E. 2006. A New Beginning in Sight. Disposal of waste. Pg 535 CRC Press.

Assiouras, I.; Ozgen, O. and Skourtis, G. 2013. "The impact of corporate social responsibility in food industry in product-harm crises", British Food Journal, Vol. 115 Iss: 1 pp. 108 - 123

Babalola, E. 2013. [Online]. Available: http://environment.yale.edu/yer/article/valuing-south-africas-food-waste

Babiak, K. and Trendafilova, S. 2011. CSR and environmental responsibility: Motives and pressures to adopt green management practices. *Corporate Social Responsibility and Environmental Management*, *18*(1), 11-24. DOI: 10.1002/csr.229

Barker, M. 2013. The politics of food banks. Counter Punch, 2 May 2013 [Online]. Available: www.counterpunch.org

Barnett, J.; Botting, N.; Gowland, M.H. and Lucas, J.S. 2012. The strategies that peanut and nut-allergic consumers employ to remain safe when travelling abroad. Clinical and Translational Allergy 2012, 2:12

Bates, M. and Phillips, P. 1998. "Waste minimisation in the food and drink industry", Nutrition & Food Science, Vol. 98 Issue: 6, pp.330-334, doi: 10.1108/00346659810235260

Bell, J. 2010. Doing Your Research Project: A guide for first-time researchers in education, health and social science. Berkshire: McGraw-Hill.

Beretta, C.; Stoessel, F.; Baier, U. and Hellweg, S. 2013. Quantifying food losses and the potential for reduction in Switzerland. Waste Management. 33: 764-773

Bertram, C. and Christiansen, I. 2014. Understanding Research: An introduction to reading research. Pretoria: Van Schaik

Bidyarthi, D,; Krishnapada, M. and Sen, B.K. 2008. Classification of keywods extracted from research articles published in science journals. Annals of Library and Information Studies. Vol. 55, December 2008, pp. 317-333. New Delhi

Bird, S. 2014. Unpalatable truth about food banks the left finds so hard to swallow: Political football and undeserving claimants distract from the many who are in genuine need. Mail Online, 13 March 2014. [Online]. Available: www.dailymail.co.uk>article-2579715

Blengini, G. 2008. Applying LCA to organic waste management in Piedmont, Italy. Management of Environmental Quality, 19, 533-549.

Bond, M.; Meacham, T.; Bhunnoo, R. and Benton, T.G. 2013. Food waste within global food systems. A Global Food Security report. [Online]. Available: (www.foodsecurity.ac.uk).

Brown, D. 2012. Behind the scenes: hoe Singapore airlines prepare its meals. [Online]. Available: http://www.airlinereporter.com/2012/03/behind-the-scenes-how-singapore-airlines-prepare-their-meal-service/

Business for Social Responsibility (BSR). 2013. Food waste reduction alliance: Analysis of U.S. Food Waste Among Food Manufacturers, Retailers, and Wholesalers. United States of America.

Centrell. M. A. 2016. Theoretical frameworks: The foundation of research study design [Online]. Available: www.nursinglibrary.org>vhl

Coldwell, D. and Herbst, F. 2004 Business Research, Juta and Co Ltd

Creswell, J. and Plano-Clark, V. 2007. Designing and Conducting Mixed Methods Research. Thousand Oaks, CA: Sage

Creswell, J. 2013. Research design: Qualitative, Quantitative and Mixed Methods Approaches. Sage publications.

da Silva J.G. 2013. 'If we all do our part, together we can achieve zero hunger during our lifetimes´ [Online]. Available: http://www.fao.org/3/a-i5009e.pdf

deBeer, R. 2015. [Online]. Available: http://suedafrika.ahk.de/fileadmin/ahk_suedafrika/Dokumente/Presentations/12_City_of_Joburg_and_PIKITUP.pdf

Denzin, N. and Lincoln, Y. 2003. Strategies of Qualitative Inquiry. SAGE Publications

Department for Environment, Food and Rural Affairs (DEFRA). 2006. Food Industry Sustainability Strategy. Crown. London

Drucker, P. F. 1959. Long-range planning: Challenge to management science. Management Science, Vol.5, No.3. 238-249 [Online]. Available: http://www.jstor.org/journal/informs.html.

Dubbeling, M.; Zeeuw, H. and Veenhuizen, R. 2010. Cities, poverty and food: multi-stakeholder policy and planning in urban agriculture 2010 pp. 152 pp. ISBN 9781853397097

El-Mobaidh, A. Razek Taha, M. and Lassheen, N. 2006. Classification of in-flight catering wastes in Egypt air flights and its potential as energy source (chemical approach) Waste Management Volume 26, Issue 6, Pages 557-686 [Online]. Available: http://doi.org/10.1016/j.wasman.2005.02.022

Ennis, C. D. 1999. A theoretical framework: the central piece of a research plan. Journal of Teaching in Physical Education, 1999, No. 18, 129-140 [Online]. Available: http://libres.uncg>uncg>listing

Environment Bureau. A food waste and yard waste plan for Hong Kong. 2014. Hong Kong. [Online]. Available: http://www.enb.gov.hk/en/files/FoodWastePolicyEng.pdf

Evans, D.; Campbell, H. and Murcott, A. 2013. A brief pre-history of food waste and the social sciences. The Social Review. The editorial board of sociological review. John Wiley & Sons LTD. Oxford USA. 60(2): 6.

Færgemand, J. and Jespersen, D. 2005. ISO 22000 to ensure integrity of food supply chain: ISO Management Systems. Denmark.

Fenton, K. 2001. Waste Reduction for the Food Service Industry. [Online]. Available: https://www.google.co.za/search?tbm=bks&hl=en&q=Fenton+food+waste+and+farming#q=waste+reduction+in+the+food+industry+Fenton+(2001)&hl=en

Findley, T.; Daum, M. and Stineman, M. 1990. Research in physical medicine and rehabilitation. VII. The role of the principal investigator. *American journal of physical medicine & rehabilitation/Association of Academic Physiatrists*, *69*(1), 39.Denzin,

Foss, R. 2015 Food in the Air and Space: The Surprising History of Food and Drink in the Skies. Rowman & Littlefield.

Freedman, M. and Brochado, C. 2010. Reducing Portion Size Reduces Food Intake and Plate Waste. Obesity journal. 8: 1864–1866. Nature publishing group.

Garret, P. and Heal, G. 2004. Professor of Public Policy and Corporate Responsibility, Columbia Business School.

Garrone, P.; Melacini, M. and Perego, A. 2014. Surplus food recovery and donation in Italy: the upstream process. British Food Journal, 116 (9): 1460 – 1477

Garth, A. 2008 Analysing data using SPSS (A practical guide for those unfortunate enough to have to actually do it.). Sheffield Hallam University

Gill, P.; Stewart, K.; Treasure, E. and Chadwick, B. 2008. Methods of data collection in qualitative research: interviews and focus groups. British Dental Journal VOL. 204 NO. 6

Gomm, R. 2009. Key concepts in Social Research Methods. England: Palgrave MacMillan

Haley, J. 2013. The Legal Guide to the Bill Emerson Good Samaritan Food Donation Act: [Online]. Available: http://media.law.uark.edu/arklawnotes/2013/08/08/the-legal-guide-to-the-bill-emerson-good-samaritan-food-donation-act/

Hasachoo, N. and Masuchun, R. 2015. Factors affecting schedule nervousness in the production operations of airline catering industry. 2015 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM). DOI: 10.1109/IEEM.2015.7385697.

Hediger, W. 2000. Sustainable Development and Social Welfare. Ecological Economics, Vol. 32, No. 3, pp. 481-492.

Heiser, W. and Meulman, J. 1995. Nonlinear methods for the analysis of homogeneity and heterogeneity. In: Recent Advances in Descriptive Multivariate Analysis, W. J. Krzanowski, ed. Oxford: OxfordUniversity Press, 51–89.

Hussein, A. 2009. The use of triangulation in social sciences research: Can qualitative and quantitative methods be combined? Journal of Comparative Social Work, Vol 4, No 1 (2009).

Interwaste. 2014. [Online]. Available: https://www.interwaste.co.za

Israel, G. 1992. Determining Sample Size. Program Evaluation and Organizational Development, IFAS, University of Florida. PEOD-6.

Jacobs, S. and Hoeller, S. 2015. I saw how airplane food gets made from start to finish — and I learned a shocking secret about food waste and delayed flights. [Online]. Available: http://www.businessinsider.com/airline-food-facility-tour-reveals-shocking-secret-about-waste-2015-10

Jacobs, S. and Hoeller, S. 2015. I saw how airplane food gets made from start to finish — and I learned a shocking secret about food waste and delayed flights. Business insider 24 October 2015.

Jones, P. 2007. Flight-Catering. Catering – Management. Hamburg Chpt 1.4.1, p. 39-55

Jones, P. 2012. Flight catering. Elsevier Butterworth Heinemann

Jones, P. 2004. Introduction to flight catering. Elsievier

Jones, P.; Comfort, D. and Hillier, D. 2006. "Reporting and reflecting on corporate social responsibility in the hospitality industry: A case study of pub operators in the UK", International Journal of Contemporary Hospitality Management, Vol. 18 Issue: 4, pp.329-340, doi: 10.1108/09596110610665339

Kansas City. 2012. [Online]. Available: http://www.vmrtechnologies.net/mwawma/documents/m121912presentation.pdf

Kaplan, J.; Gabrosek, J.; Curtiss, P. and Malone, C. 2014. Investigating student understanding of histograms: Journal of Statistics Education, 22(2), 1-30

Kings, S. 2013. How food waste eats away at natural resources. Mail & Guardian, 11 September 2013 [Online]. Available: http://mg.co.za>article>2013-09-11

King, A.; Burgess, S.; Ijomah, W. and McMahon, C. 2004. Reducing waste: repair, recondition, remanufacture or recycle? John Wiley & Sons, Ltd. and ERP Environment. 14 (4): 257-267.

King, T. 2001. Inflight catering. *Tourism and Hospitality Research.* Vol. 3, No. 2 pp. 181-184. Sage Publications.

Kiran, E.; Trzcinski, A. and Liu, Y. 2014. Glucoamylase production from food waste by solid state fermentation and its evaluation in the hydrolysis of domestic food waste. Biofuel Research Journal 3 (2014) 98-105

Kummu, M.; de Moel, H.; Porkka, M.; Siebert, S.; Varis, O. and Ward, P. 2012. Lost food, wasted resources: Global food supply chain losses and their impacts on freshwater, cropland, and fertiliser use. Science of the Total Environment 438 (2012) 477–489

Leedy, P. and Ormrod, J. 2010. Practical research: planning and design. Upper Saddle River, NJ.

Li, X.; Poon, C.; Lee, S.; Chung, S. and Luk, F. 2002. Waste Reduction Strategies for the inflight services in the airline industry. Environmental Engineering unit Dep. Of civil and structural Engineering. The Hong Kong polytechnic University. Hong Hom, Kowloon, Hong Kong.

Lindgreen, A. and Hingley, M. 2009. The new cultures of food: Opportunities from Ethnic, Religious, and Cultural Diversities. Gower Publishing, (xix-xxi)19-21

Lipinski, R.; Hanson, C.; Lomax, J.; Kitinoja, l.; Waite, R. and Searchinger, T. 2013. Reducing Food Loss and Waste. [Online]. Available: http://www.wri.org/sites/default/files/reducing_food_loss_and_waste.pdf

Mangena, A. 2016 Forbes Magazine Africa Issue February 2016: Page 46

Maree. J. 2012. Complete your thesis or dissertation successfully: Practical guidelines. Cape Town: Juta.

Mason, L.; Boyle, T.; Fyfe J.; Smith, T. and Cordell, D. 2011. National Food Waste Assessment: Final Report. Institute for Sustainable futures. University of technology Sydney. Australia.

Mejía, G.; Mejía, C.; Rangel, V.; Garcia-Diaz, C.; Montoyo, C. and Agudelo, I. 2014. Food donation: An initiative to mitigate hunger in the world.

Melikoglu, M.; Lin, C. and Webb, C. 2013. Analysing global food waste problem: pinpointing the facts and estimating the energy content. Central European Journal of Engineering, 3(2), 157-164.

Mena, C.; Adenso-Diaz, B. and Yurt, O. 2011. The cause of food waste in the supplier-retailer interface: Evidences from the UK and Spain. Resources, Conservation and Recycling 55, 648-658.

Miles, M. B. and Huberman, A. M. 1994. Qualitative Data Analysis (2nd edition). Thousand Oaks, CA: Sage Publications.

Mohapatra, T. 2014. Why Don't More Businesses Donate Excess Food? [Online]. Available: http://www.triplepundit.com/2014/10/day-city-harvest-dont-businesses-donate-excess-food/

Murray, A.; Haynes, K. and Hudson, L. 2010. "Collaborating to achieve corporate social responsibility and sustainability?: Possibilities and problems", Sustainability Accounting, Management and Policy Journal, Vol. 1 Issue: 2, pp.161-177, doi: 10.1108/20408021011089220

Nahman, A.; De Lange, A. and Oelofse, S. 2012. Quantifying and valuing post-consumer food waste in South Africa, [Online]. Available: http://researchspace.csir.co.za/dspace/bitstream/10204/6339/1/Nahman1_2012.pdf

Newman, I. and Benz, C. 1998. Qualitative - quantitave research methodology: Exploring the interactive continuum. Carbondale: Southern Illinois University press.

Nilsson, J. 2011. Service in the Air: A century of hospitality aboard passenger airlines: Research In Service Studies. Working paper No 2, Lund University, Campus Helsingborg.

Opdenakker, R. 2006. Advantages and Disadvantages of Four Interview Techniques in Qualitative Research: Qualitative Social Research. Volume 7, No. 4, Art. 11

Papargyropoulou, E.; Lazano, R.; Steinberger, J.; Wright, N. and bin Ujang, Z. 2014. The Food Waste Hierarchy as a Framework for The Management of Food Surplus and Food Waste. Journal of cleaner production. 76: 106-115

Parfitt, J.; Barthel, M.; & and Macnaughton, S. 2010. Food waste within food supply chains:

Pautasso, M. 2013. Ten simple rules for writing a literature review. PLoS Comput Biol 9(7): e1003149. doi:10.1371/journal.pcbi.10031149

Pellissier, R. 2007. Business research made easy. Juta: Cape Town

Plano-Clark, V.; Huddleston-Casas, C.; Churchill, S.; O'Neil Green, D. and Garrett, A. 2008. Mixed Methods Approaches in Family Science: Educational Psychology Papers and Publications. Paper 81. University of Nebraska - Lincoln

Polit, D. and Hungler, B. 1995. Nursing Research, Principles and methods, Philadelphia PA, JB Lippincott.

Powers, J. 2016. Special report: America's food banks say charity won't end hunger [Online]. Available: http://issuu.com>whyhunger>docs

Rambaree, K. 2014. Three Methods Of Qualitative Data Analysis Using ATLAS.ti: 'A Posse Ad Esse'. Digital Repository of Technische Universität Berlin, 1-15

Randburg Sun, June 2015 [Online]. [Online]. Available: randburgsun.co.za

Ramlagan, S., Peltzer, K. & Matseke, G. 2010. Epidemiology of drug abuse treatment in South Africa 16(2):40-48.

Rockinson-Szapkiw, A.J. n.d. The importance of the literature and the theoretical framework [Online]. Available: www.amandaszapkiw.com

Rodrigue, J. and Notteboom, T. 2013. The Cold Chain and its Logistics. Third edition, New York: Routledge. ISBN 978-0-415-82254-1

Rok, M. and Mulej, M. 2014. CSR-based model for HRM in tourism and hospitality. Faculty of Tourism Studies. University of Primorska, Portoroz˘, Slovenia. and Faculty of Economics and Business, IRDO Institute, University of Maribor, Maribor, Slovenia. 43 (3/4):347

Romli, F.; Rahman, K. and Ishak, F. 2016. In-flight food delivery and waste collection service: the passengers' perspective and potential improvement.

Ross, J. 2015. Food Waste in an Airline Caterer's Production Kitchen. University of Otago, Dunedin New Zealand.

Rowe, A. 2015. Climate Change: Restaurant and Employee Awareness through the use of Tutorials. Department of information and design technology. Suny Polytechnic Institute. State University of New York.

Rowley, R. and Slack, F. 2004 "Conducting a literature review", Management Research News, Vol. 27 Issue: 6, pp.31-39, doi: 10.1108/01409170410784185

Ruston, L. 2003. Health hazards and waste management. Br Med Bull, 68, 183-197.

SAA time table, 2015. [Online]. Available: https://www.flysaa.com/plan-book/travel-information/timetables

SAA Service Manual, 2014. [Online]. Available: m.flysaa.com>Documents>pdf

South African Bureau of Standards (SABS). 2007. Food safety systems certification: Understanding and implementation of Food safety sustems certification 22000 (FSSC22000)

Samoei, J. 2015. The influence of kass fm in the promotion of food security among the Tugen in Perkerra sub-location: a case study of marigat division of Baringo County. The school of journalism and mass communication, university of Nairobi

Schneider, F. 2013. The history of food waste. Institute of Waste Management. BOKU-University of Natural Resources and Life sciences. Vienna, Austria

Schwabe, K.; Albiac-Murillo, J.; Connor, J.D.; Hassan, R. and Meza González, L. 2013. Drought in Arid and Semi-Arid Regions: A Multi-Disciplinary and Cross-Country Perspective. DOI 10.1007/978-94-007-6636-5

Sihlobo, W. and Kapuya, T. 2015. Drought-resistant maize key to food security. Mail and guardian 6 November 2015.

Simon, M. 2011. Assumptions, Limitations and Delimitations. [Online]. Available: http://dissertationrecipes.com/wp-content/uploads/2011/04/AssumptionslimitationsdelimitationsX.pdf

Singh, A.S. and Masuku, M.B. 2014. Sampling techniques and determination of sample size in applied statistics research: An overview. International Journal of Economics, Commerce and Management. Vol. II, Issue 11, Nov 2012.

Slaper, T.F. and Hall, T.J. 2011. The Triple Bottom Line: What Is It and How Does It Work? Indiana Business Research Center, Indiana University Kelley School of Business

Sloan, P.; Legrand, W.; Chen, J. and Chen, J. 2012. Sustainability in the hospitality industry: Principles of sustainable operations. Routledge, 2: 13-38. New York

Smiley, D. 2012. Waste Audits. [Online]. Available: https://www.google.co.za/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact

=8&ved=0ahUKEwjYqLygq6bTAhVTFMAKHanCAlQQFgghMAA&url=http%3A%2F%2Fwww.vrarecycles.org%2FLinkClick.aspx%3Ffileticket%3Dp8EXO0nlbIw%253D%26tabid%3D146&usg=AFQjCNHLm61vZFOiqr5N5KyTZ_NS_vNSTA&sig2=_Y9TJDiJwkVvJkJ862RDxg

Smith, J. 2009. The Woolworths Good business journey: Corporate Governance In Africa Case Study Series. South Africa (5)

Soiferman, L. 2010. Compare and Contrast Inductive and Deductive Research Approaches. University of Manitoba

Sonnino, R. and Mc Williams, S. 2011. Food waste, catering practices and public procurement: A case study of hospital food systems in Wales. Food Policy. Volume 36 Issue 6 Pages 823–829.

South African Airways group integrated annual report. 2014. [Online]. Available: https://www.flysaa.com/documents/51855150/51859528/SAA+Annual+report+2014.pdf/89fba6a8-5fe8-412d-8ee0-f659f92f5471

South African Airways service training manual. 2016. Internal document

South African Press Association (SAPA) reported in a news publication in 2013. Accessed from: http://www.timeslive.co.za/local/2013/01/27/SAA-air-chefs-dumps-food-report

The Animal and Plant Health Agency and Department for Environment as well as Food and Rural Affairs in the United Kingdom. 2014. Accessed from: https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs

The Food Bank SA. 2009. Accessed from: https://foodforwardsa.org/about-us/

The Food Waste and Yard Waste Plan for Hong Kong. 2014. Environmental Bureau [Online]. Available: www.enb.gov.hk >files > FoodWastePolicy

The Waste and Resources Action Programme's (WRAP) report. 2009. Accessed from http://www.wrap.org.uk/sites/files/wrap/WRAP%20Annual%20Report%202009-10.pdf

The World Bank. 2013. India: Corporate Social Responsibility. [Online]. Available: http://www.worldbank.org/en/news/feature/2013/08/27/india-corporate-social-responsibility

The World Bank Annual Report 2005 year in review. World Bank Group [Online]. Available: siteresources.worldbank.org>Resources

Tielens, J. and Candel, J. 2014. Reducing food wastage, improving food security? Food and Business Knowledge Platform. Available: http://knowledge4food.net/wp-content/uploads/2014/07/140702_fbkp_report-foodwastage_DEF.pdf

Tight, M. 2010. The curious case of the case study: a viewpoint [Online]. International Journal of Social Research Methodology. Vol.13, No. 4, October 2010, 329-339. Available: www.informaworld.com

van Teijlingen, E. and Hundley, V. 2001. The importance of pilot studies. Social Research Update. University of Surrey

Vandermeersch, T.; Alvarenga, R.; Ragaert, P. and Dewull, J. 2014. Environmental sustainability assessment of food waste valorization options. Resources, Conservation and Recycling. Volume 87 pages 57-64

Varkevisser, C.; Pathmanathan, I. and Brownlee, A. 2003 Designing and Conducting Health Systems Research Projects. World Health Organization / International Development Research Centre 2003

Wagner, C.; Kawulich, B. and Garner, M. 2012. Doing Social Research: A Global Context. McGraw-Hill Education - Europe, United States

Warshawsky, 2011. "Urban Food Insecurity and the Advent of Food Banking in Southern Africa." Urban Food Security Series No. 6. Queen's University and AFSUN: Kingston and Cape Town.

Air Chefs Waste and general waste policy, 2014.

World Drug Report. 2008. United national office of drugs and crime. [Online] Available: https://www.google.co.za/?gws_rd=ssl#q=unodc+2008+world+drug+report .

Whitehair, K.; Shanklin, C. and Brannon, L. 2013. Written Messages Improve Edible Food Waste Behaviors in a University Dining Facility. Journal of the academy of nutrition and dietetics. Volume 113 issue 1 pages 63-69

Wright, L. 1995. Qualitative International Management Research. Handbook for international management research. Blackwell, Oxford.

ANNEXURES

Annexure A

AIRCHEFS

20 Jones Road
Jet Park
Boksburg
1620

To: Durban University of Technology, the Institutional Research Review Board

This letter serves to grant Miss Nompumelelo Priscilla Sambo permission to conduct research at Airchefs South Africa. The institution is aware of the research project topic to be provisionally accepted as "Investigating post flight food waste management policies and procedures within the airline catering industry- a study at Airchefs South Africa." The proposed research, is understood to entail the counting of post flight food waste, conducting an interview and completion of questionnaires for a period of 10 days.

I, [redacted] (General Manager, Operations) do hereby grant Miss Nompumelelo Priscilla Sambo permission to conduct this research project at Airchefs South Africa

[redacted]

Signature

9/11/2015

Date

Annexure B

SAA Economy class meal cost breakdown _ Breakfast

Menu items		Price_ excl VAT and disposable equipment
Savory Breakfast Hot meal		**R19.36**
Meal composition	**Portion size**	
Plain omelet	80g	
Grated cheddar cheese	20g	
Back bacon	40g	
Tomato wedge	30g	
Sweet Breakfast Hot Meal		**R22.32**
Meal composition	**Portion size**	
Cinnamon and butternut flapjacks	80g	
Goose berry compote	40g	
Grilled back bacon	40g	
Breakfast tray set up		
Butter portion	8g	**R1.67**
Wrapped croissants	30g	**R4.28**
Wrapped bread roll	30g	**R2.76**
Fruit Salad	60g	**R4.81**
Jam portion	15g	**R2.39**
Yoghurt	80ml	**R2.81**

SAA Economy class meal cost breakdown _ Dinner

Menu items		Price_ excl VAT and disposable equipment
Red meat Hot meal		**R32.52**
Beef curry	100g	
Parsley rice	60g	
Chunky mixed vegetables	60g	
		R29.89

White meat Hot meal		
Chicken Crock Pot	100g	
Herbed mashed potatoes	60g	
Vegetable stir-fry	60g	
Vegetarian Hot meal		**R27.52**
Herbed pancakes with creamed spinach stuffing	180g	
Tomato sauce	60g	
Crispy basil leaf	10g	
Parmesan shavings	10g	
Cocktail tomatoes	2 each	
Dinner tray set up		
Wrapped bread roll	30g	**R2.76**
Butter portion	8g	**R1.67**
Simonsig cream cheese		**R4.73**
Chocolate portion	48g	**R13.31**
Wheatsworth crackers	3 in 1	**R2.19**
Dessert (Choco caramel layered cake)	60g	**R9.50**
Salad dressing		**R1.47**
Starter		**R5.42**
Pasta salad	30g	
Cucumber slice	10g	
Red, yellow and green peppers	10g	
Cocktail tomato	1 each	
Herbed vinaigrette	1ml	
Mid-flight snack _ Wrapped filled rolls		**R14.92**
Ciabatta roll	70g	
Peppered beef slice	20g	
Pepper dew rings	5g	
Mustard mayo	5g	
Cheddar cheese slice	20g	

Annexure C

INVESTIGATING POST FLIGHT FOOD WASTE MANAGEMENT POLICIES AND PROCEDURES WITHIN THE AIRLINE INDUSTRY: A STUDY OF AIR CHEFS SOUTH AFRICA

Interview questions

Questions on policy

1. What flight specific meals does the airline catering company cater on board SAA?
2. Whose responsibility is it to channel post flight food waste in this establishment, the customer or the catering company?
3. What informed the current food waste management policy?

Questions on CSR and the food waste hierarchy

4. Air Chefs is the catering wing of South African Airways (SAA). In 2013 SAA was acknowledged by the International Air Traffic Association (IATA) as one in six airlines globally, and the only airline in Africa to achieve a stage one environmental assessment status. This achievement essentially means that the SAA group manages waste responsibly in its operations, it has reduced carbon emissions, reduced its use of energy and it displays an environmentally conscious attitude in the running of its departments. How does Air Chefs contribute to this environmental assessment status?

5. The South African Press Association reported that Air Chefs was no longer donating surplus food because of lack of transparency on the criteria used to select charities. Is that the reason why food donations are not a part of food waste management at this establishment or what is the real reason?

6. In a newspaper article in 2013 it was reported that Air Chefs dumps thousands of kilograms of food per day. Food companies such as Woolworths have surplus food management programs in place. These ensure the donation, reusing as compost and for animal feeding of surplus food to the poor. What industry specific challenges restrict the airline catering industry from adopting such strategies?

7. What practical mechanisms does this establishment have in place to reuse food waste?

Recommendation questions

8. Considering the waste hierarchy and CSR, what can practically be done with post flight food waste as a means to improve on profits, the planet and the people's wellbeing at this establishment?

Annexure D

INVESTIGATING POST FLIGHT FOOD WASTE MANAGEMENT POLICIES AND PROCEDURES WITHIN THE AIRLINE INDUSTRY: A STUDY OF AIR CHEFS SOUTH AFRICA

Please tick (√) or cross (X) the number next to the response applicable to you
Questionnaire for employees

---

1. Gender

Male	1	Female	2

2. Ethnic group

Black	1	White	2	Coloured	3	Indian	4	Asian	5

3. Age

18-24 yrs[**1**]	25-29 yrs[**2**]	30-34 yrs[**3**]	35-39 yrs[**4**]	40-44 yrs[**5**]	45-49 yrs[**6**]	50-54 yrs[**7**]
					55-59 yrs [**8**]	60+ yrs [**9**]

4. Number of dependents_____

5. Highest education

Matric	1	Diploma	2	Undergraduate	3	Post Graduate	4

6. Department:

Sanitation	1
Tray Set Up	2
Cold Belt	3
Equipment Set Up	4
Storage	5
Preparation	6
Hot Belt	7
Other	

7. How long have you been employed at Air Chefs?

< 1 yr	1
1 - 2 years	2
3- 5 years	3
> 5 years	4

8. Do you directly handle food waste?

Please make

Yes	1	No	2

a cross ***(X)*** in the relevant box

How often	Never	Sometimes	Often	Always
9. Post flight food is edible	1	2	3	4
10. I feel comfortable throwing away post flight food	1	2	3	4
11. Employees take some of the food if I given to them	1	2	3	4
12. Some of the food that is thrown away is still edible to donate to the poor	1	2	3	4
13. Employees request management's permission to eat some of the post flight food	1	2	3	4

14a. Have you ever eaten post flight food?

Yes	1	No	2

14b. If yes to **14a** above, please, indicate the type of foods

(i)_____

(ii)_____

(iii)_____

15c. If yes to **14a** above, please explain, why you have eaten each type of food?

(i)_____

(ii)_____

(iii)_____

16	I would **NOT** eat post flight food because of	Yes	No
a	Food is spoilt	1	2
b	Fear of food poisoning	1	2
c	Poor handling of left-over food	1	2
d	Poor sanitation in the sanitation area	1	2
e	Fear of company policy	1	2
f	Fear of peer humiliation	1	2
g	I always have enough to eat	1	2
h	Staff meals are provided for by the employer	1	2
i	Other, Specify……		

17a. If surplus post fight food was sold by the company, would you buy it?

Yes	1	No	2

17b. If yes to question 17 a, which food items would you buy and why?

(i)_____

(ii)_____

(iii)_____

18a. Do you think post flight food should be reused?

Yes	1	No	2

18b. If yes to Question 17a, how would you recommend it be used?

_____
_____
_____

19. Any additional comments.

_____
_____
_____
_____
_____
_____
_____

Annexure E

INVESTIGATING POST FLIGHT FOOD WASTE MANAGEMENT POLICIES AND PROCEDURES WITHIN THE AIRLINE INDUSTRY: A STUDY OF AIR CHEFS

Economy Class Waste Audit Forms

1. Date:_____

2. Route:

Domestic	1
Regional	2
International	3

3. Flight number:_____

4. Flight arrival time: _____

:

5			**Total Count**			
	Dinner Service Hot Meals	**Weight**	**Day 1**	**Day 2**	**Day 3**	**Day4**
5.1						
5.2						
5.3						
5.4						

:

6. Dinner Service Trays

*Data collector to **weigh** and **count** each left over item*

6	**Items**	**Individual weight**	**Total count**			
			Day 1	**Day 2**	**Day 3**	**Day 4**
A	Starter					
B	Dessert					
C	Cheese					
D	Crackers					
E	Butter					
F	Salad dressing					
G	Bread					
H	Chocolate					
I	Salt and pepper	-				

7. Snack (*If applicable*):

7			**Total Count**			
	Snack (*If applicable*):	**Weight**	**Day 1**	**Day 2**	**Day 3**	**Day 4**
7.1						
7.2						

8			**Total Count**			
	Breakfast Service : Hot Meal (If applicable):	**Weight**	**Day 1**	**Day 2**	**Day 3**	**Day 4**
8.1						
8.2						

7. Breakfast Service Trays

Data collector to **weigh** and **count** each left over item

	Items	**Individual weight**	**Total count**			
			Day 1	**Day 2**	**Day 3**	**Day 4**
a	Fruit salad					
b	Yoghurt					
c	Croissants / bread					
d	Butter					
e	Jam					
f	Salt and pepper	-				

8. Notes:_____
_____
_____
_____
_____
_____
_____
_____

Annexure F

AIRCHEFS

MENU SPECIFICATIONS

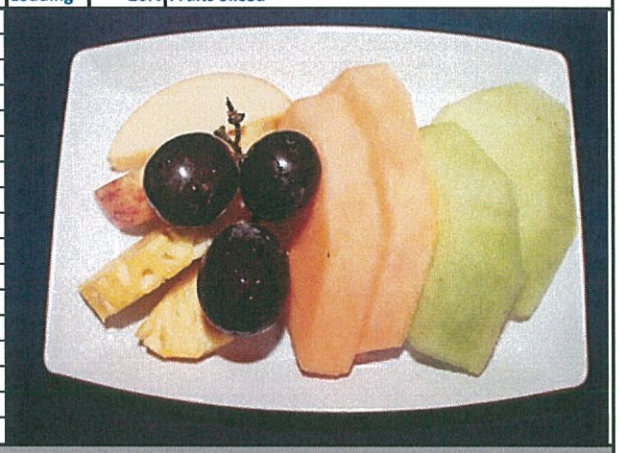
Meal Service	*Hot Breakfast*
Class	Economy Class
Cycle	1
Effective Date	07-Apr-16

Items (Mafs)	QTY		Flight No
Plain Omelette	80	gm	CPT
Beef Sausage	40	gm	HRE
Ratatouille	30	gm	LVI
Cheddar Grated	10	gm	VFA
			NLA

Loading 80% Economy Class Hot Breakfast

Items (Mafs)	QTY		Flight No
Fresh Seasonal Fruits Slices	120	gm	CPT
			HRE
			LVI
			VFA
			NLA
			DUR

Loading 20% Fruits Sliced



Items (Mafs)	QTY		Flight No
Airline Half Tray	1 x 1	ea	CPT
Airline Tray liner	1 x 1	ea	
Airline Cutlery Pack	1 x 1	ea	
Fruit Yoghurt Portion	80	ml	
Health Breakfast(Tray Set Up)	**20**	**%**	

Loading 80% Economy Class Tray Set Up(Cape Town)

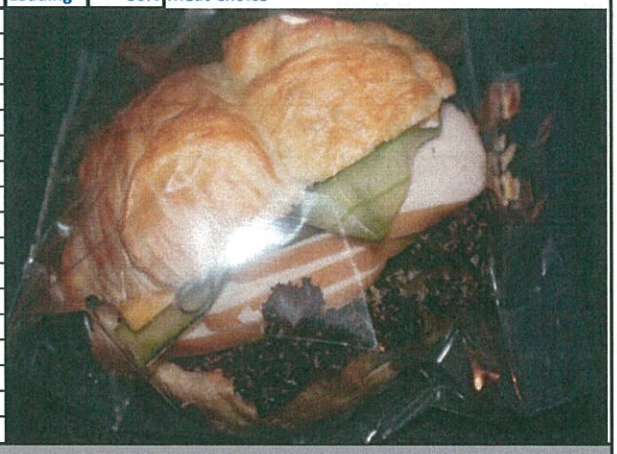
AIRCHEFS

MENU SPECIFICATIONS

Meal Service	*Am Snack*
Class	Economy Class
Cycle	1
Effective Date	07-Apr-16

Items (Mafs)	QTY		Flight No
Knotted Croissant filled with:	70	gm	HRE
Smoked Chicken Breast Slice	10 x 3	gm	LVI
Gouda Cheese Slice	20	gm	VFA
Pesto Mayo	10	gm	MPM
Cucumber Ribbon	10	gm	CPT
Lettuce Liner	5	gm	PLZ
Disposable Poly Prop Bag - Local Stock	1	ea	DBN
			ELS
			NLA

Loading 80% Meat Choice



Items (Mafs)	QTY		Flight No
Knotted Croissant filled with:	70	gm	HRE
Gouda Cheese Slice	20	gm	LVI
Pesto Mayo	10	gm	VFA
Cucumber Ribbon	10	gm	MPM
Lettuce Liner	5	gm	CPT
Disposable Poly Prop Bag - Local Stock	1	ea	PLZ
			DBN
			ELS
			NLA

Loading 20% Non Meat Choice

AIRCHEFS

MENU SPECIFICATIONS

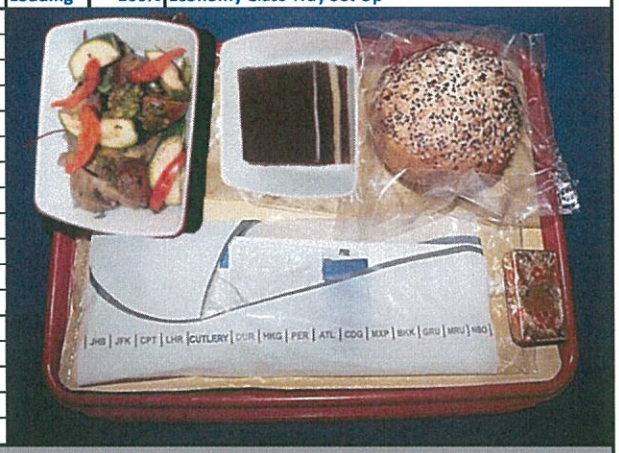
Meal Service	*Lunch/Dinner*
Class	Economy Class
Cycle	1
Effective Date	07-Apr-16

Items (Mafs)	QTY		Flight No
Chocolate Cake Layered with Choc Mou	60	gm	

Loading 100% Dessert

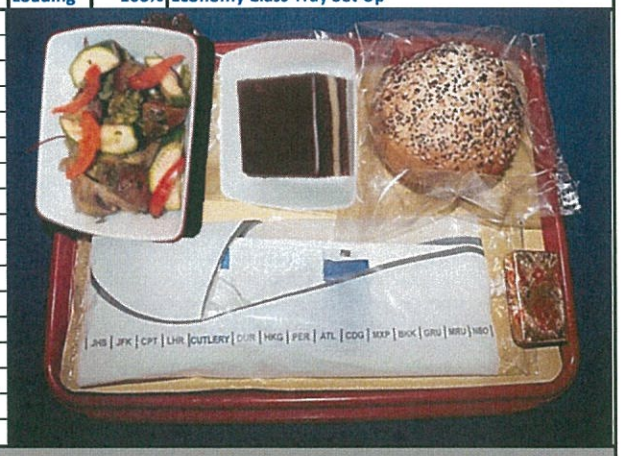
Items (Mafs)	QTY		Flight No
Airline Half Tray	1 x 1	ea	Cape
Airline Tray liner	1 x 1	ea	Town
Airline Cutlery Pack	1 x 1	ea	
Salad on Cycle	1 x 1	ea	
Dessert	1 x 1	ea	
Butter Portion	1 x 1	ea	
Multi Seeded Roll	35	gm	

Loading 100% Economy Class Tray Set Up



Items (Mafs)	QTY		Flight No
Airline Half Tray	1 x 1	ea	LUN
Airline Tray liner	1 x 1	ea	HRE
Airline Cutlery Pack	1 x 1	ea	
Salad on Cycle	1 x 1	ea	
Dessert	1 x 1	ea	
Multi Seeded Roll	35	gm	
Butter Portion	1 x 1	ea	

Loading 100% Economy Class Tray Set Up



AIRCHEFS

MENU SPECIFICATIONS

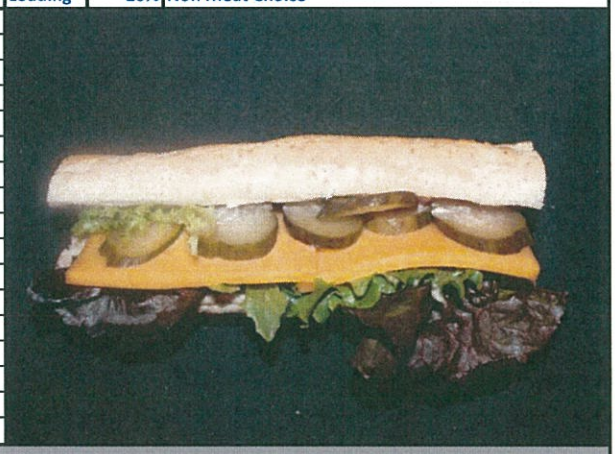
Meal Service	*Pm Snack*
Class	Economy Class
Cycle	1
Effective Date	07-Apr-16

Items (Mafs)	QTY		Flight No
French Loaf White filled with :	70	gm	PLZ
Roast Sirloin Slices	20	gm	ELS
Onion Marmalade	10	gm	CPT
Cheddar Cheese Triangles	20	gm	DUR
Mozzarella Triangles	20	gm	MPM
Sundried Tomato Mayo	20	gm	LVI
Lettuce Liner	10	gm	VFA
Disposable Poly Prop Bag - Local Stock	1	ea	HRE
			NLA

Loading 80% Meat Choice

Items (Mafs)	QTY		Flight No
French Brown Loaf filled with :	70	gm	PLZ
Cheddar Cheese Slices	40	gm	ELS
Dill Cucumber Slices	20	gm	CPT
Peppadew Mayo	20	gm	DUR
Lettuce Liner	10	gm	MPM
Disposable Poly Prop Bag - Local Stock	1	ea	LVI
			VFA
			HRE
			NLA

Loading 20% Non Meat Choice



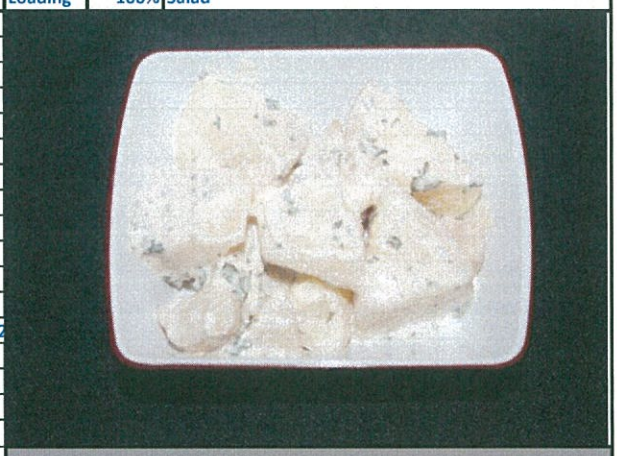
AIRCHEFS

MENU SPECIFICATIONS

Meal Service	*Regional Lunch/Dinner*
Class	Economy Class
Cycle	2
Effective Date	22-Sep-16

Items (Mafs)	QTY		Flight No
Feta Creamy Potato Salad with Parsley	60	gm	SA 050
			SA 058
			SA 074
			SA 076
			SA 082
			SA 084
			SA 086
			SA 160
			SA 180
			SA 182
			SA 184
			SA 186
			SA 190/192
			SA 090
			SAA 052
			SAA 056
			SAA 054
			SAA 060
			SAA 088

Loading 100% Salad



Items (Mafs)	QTY		Flight No
Creamy Penne Pasta	80	gm	SA 050
Garlic and Chilli Creamy Beef Strips	120	gm	SA 058
			SA 074
			SA 076
			SA 082
			SA 084
			SA 086
			SA 160
			SA 180
			SA 182
			SA 184
			SA 186
			SA 190/192
			SA 090
			SAA 052
			SAA 056
			SAA 054
			SAA 060
			SAA 088

Loading 50% Beef Strips

Items (Mafs)	QTY		Flight No
Chicken Curry	120	gm	SA 050
Savoury White Rice	60	gm	SA 058
Roast Butternut Cubes	30	gm	SA 074
Brocolli Florets	30	gm	SA 076
			SA 082
			SA 084
			SA 086
			SA 160
			SA 180
			SA 182
			SA 184
			SA 186
			SA 190/192
			SA 090
			SAA 052
			SAA 056
			SAA 054
			SAA 060
			SAA 088

Loading 40% Chicken Curry

AIRCHEFS

MENU SPECIFICATIONS

Meal Service	*Regional Lunch/Dinner*
Class	Economy Class
Cycle	2
Effective Date	22-Sep-16

Items (Mafs)	QTY		Flight No
Airline Half Tray	1	ea	SA 074
Airline Tray liner	1	ea	SA 076
Airline Cutlery Pack	1	ea	
Dessert on cycle	1	ea	
Salad on Cycle	1	ea	
Mini Baguette Roll	30	gm	
Creamy Salad Dressing	1	ea	
Assorted Cream Cheese 20gm	1	ea	
Wheat worth Cracker (3 in 1)	1	ea	
Butter Portion 8gm	1	ea	
SAA Thank You chocolate	1	ea	

Loading 100% Tray Set Up

Items (Mafs)	QTY		Flight No
Fresh Milk 500ml **(Load 1- 18 pax)**	1	ea	SA 050
2 Bagsx4kg per ice bin as per load for aircraftype			SA 058
Lemon Slice half **(Load 10per Cup)**	2	ea	SA 074
Toothpick Wrapped **(Load 10 per Cup)**	2	ea	SA 076
			SA 082
			SA 084
			SA 086
			SA 160
			SA 180
			SA 182
			SA 184
			SA 186
			SA 190/192
			SA 090
			SAA 052
			SAA 056
			SAA 054
			SAA 060
			SAA 088

Loading 100% Standard Uplift

AIRCHEFS

MENU SPECIFICATIONS

Meal Service	*International Lunch/Dinner*
Class	Economy Class
Cycle	3
Effective Date	27-Mar-17

Items (Mafs)	QTY		Flight No
Pasta Salad with:	30	gm	SA 234
Cucumber Slice	10	gm	SA 236
Red and Yellow Pepper	10	gm	SA 260/264
Green Pepper Julienne	10	gm	SA 280/282
Cocktail Tomato	1	ea	SA 222
Herbed Vinaigrette	1	gm	SA 203/207
			SA 286
			SA 209

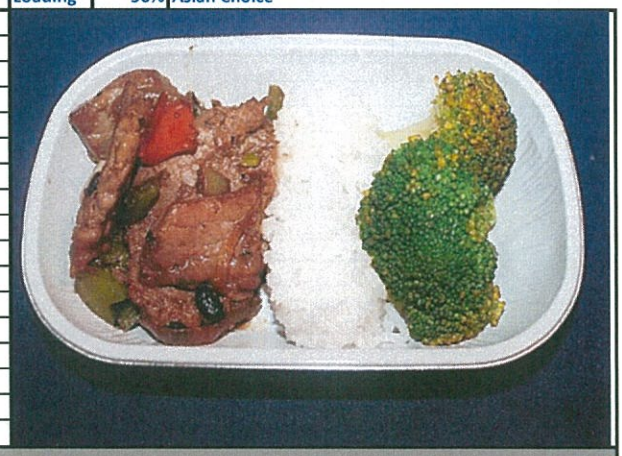
Loading 100% Salad

Items (Mafs)	QTY		Flight No
Beef Curry	100	gm	SA 234
Parsley Rice	60	gm	SA 236
Mixed Chunky Vegetables	60	gm	SA 260/264
			SA 280/282
			SA 222
			SA 203/207
			SA 209

Loading 50% Beef Curry

Items (Mafs)	QTY		Flight No
Stir-fry Beef in Preserved Black Bean Sauce:	90	gm	SA 286
Mushrooms	10	gm	
Green Pepper	10	gm	
Yellow Pepper	10	gm	
Red Pepper	10	gm	
Jasmine Rice	60	gm	
Sautéed Broccoli Florets	40	gm	

Loading 50% Asian Choice



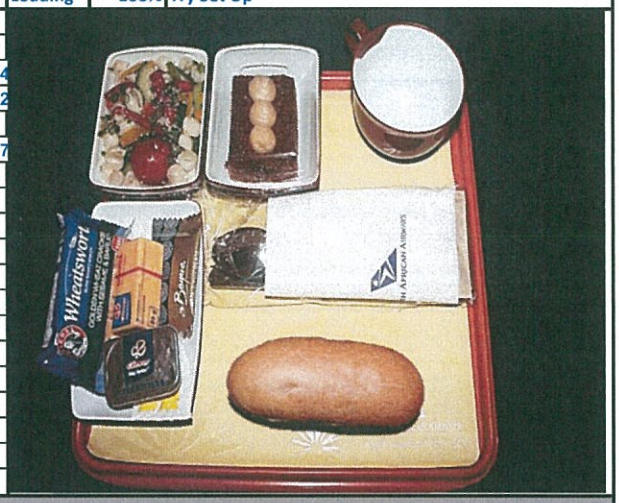
AIRCHEFS

MENU SPECIFICATIONS

Meal Service	*International Lunch/Dinner*
Class	Economy Class
Cycle	3
Effective Date	27-Mar-17

Items (Mafs)	QTY		Flight No
Airline Tray liner	1	ea	SA 234
Airline Cutlery Pack	1	ea	SA 236
Airline Cup	1	ea	SA 260/264
Cheese Plate On Cycle	1	ea	SA 280/282
Dessert on cycle	1	ea	SA 222
Salad on Cycle	1	ea	SA 203/207
Light Oval Rye Roll	35	gm	SA 286
			SA 209

Loading 100% Try Set Up



Items (Mafs)	QTY		Flight No
Fresh Milk 500ml **(Load 1- 18 pax)**	1	ea	SA 234
2 Bags x 4kg per ice bin as per load for air-craft-type			SA 236
Lemon Slice half **(Load 10per Cup)**	2	ea	SA 260/264
Toothpick Wrapped **(Load 10 per Cup)**	2	ea	SA 280/282
			SA 222
			SA 203/207
			SA 286
			SA 209

Loading Standard Uplift