

RESEARCH REPORT



EXPLORING FOOD WASTE IN THE AIRLINE CATERING INDUSTRY AND HOW IT IMPACTS OUR ENVIRONMENT AND FOOD SECURITY IN SOUTH AFRICA: A CASE OF AIR CHEFS SA

Research Methodology

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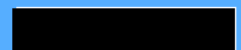


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Abstract/ Executive Summary

This research report used an exploratory aim through the interpretivists paradigm to explore food waste in the airline catering industry. The triple bottom line and food waste hierarchy was used as theories within this project and the brand chosen for this project was Air Chefs SA, a leading airline catering company in South Africa. The research problem was that the airline catering industry has a negative impact on the environment and food security in South Africa due to its food waste management systems. The data for this report was collected through in-depth interviews by understanding the brand's food waste management systems and exploring more sustainable food waste management systems that will have a better outcome on the environment and food security in South Africa. The study was done on the two Air Chefs units namely Cape Town and Johannesburg where three participants from the Johannesburg unit and two participants from the Cape Town unit were interviewed via Zoom. The participants were selected in terms of their positions and knowledge about the key factors namely corporate social responsibility, post and in-flight food waste management systems and meal preparation within Air Chefs SA. This data collection happened over a time-period of nine days. The scope of the study was mainly on food waste within the brand and looking at systems in which to improve and prevent food waste. It was founded that the brand has sustainable measures in place regarding the environment and aspects to help food security in South Africa, however international waste, meal ordering systems, new employee supervision and menu changes could be looked at as those were the major problems identified within the findings.

Introduction

Food wastage is and have been a global concern for years, especially in South Africa where 10 million tons of food gets wasted each year and 90% of the food gets dumped on landfill sites which causes more environmental issues according to the World Wildlife Fund (2017:8). Food waste is not only a disaster on an environment level, but also on a societal level (Hlengwa & Sambo, 2019). According to Labuschagne (2022) food insecurity are still rising in South Africa as one in ten people go to bed hungry on a daily basis. Food security is described by the UN Food and Agriculture Organization as “a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active healthy life” (FAO, 1996).

The airline catering industry produces a high level of food waste on a global scale, for example in 2016, 5.2 million tons of food waste ended up in landfills. When food ends up in landfill sites it causes pollution and money is wasted while millions of people are starving and thousands are dying because of malnutrition in South Africa and globally. According to Santeramo (2021) there's a definite link between food waste and food security, food insecure people are at 680 million and set to increase after Covid-19. Santeramo (2021) states that food waste needs to be minimised in order to reduce food insecurity and the resources used for food production. Jenner (2021) states that more serious measures should be put in place to achieve this goal as 17% of all food sold to consumers ends up as waste.

According to Mandisi Feni (GM HR at Air Chefs SA) food which aren't aesthetically pleasing, passed their expiry date or are damaged to a certain extend can't be served on airlines. The airline catering industry generates a lot of food waste due to flight delays, cancelations, miscalculated food preparation in terms of passenger numbers, food choices and dietary requirements (Hlengwa and Sambo, 2019). The IATA Cabin Waste Handbook which was published by WRAP in 2019 shockingly showed that 5.7 tons of cabin waste was brought back after a flight in 2017, where a quarter of the waste consisted of foods and drinks which weren't touched by passengers, but according to policy and law matters ended up in landfills, this especially happens if the food came from international grounds (Jenner, 2021). This study aims to explore how Air Chefs SA, which operates in the airline catering industry could adjust their food waste management systems in order to have a better and more positive effect on our environment and the issue of food insecurity in South Africa. Air Chefs

SA is the largest and leading airline catering company in South Africa, thus chosen for this research study. Air Chefs can produce over 44 000 meals daily, they have 1500 employees and are known for serving quality, world-class meals. They were selected as one of the top five brands for “best managed catering companies in the country chosen by the Top 500” (SAA Integrated Report, 2017).

Reals (2022) states that airline caterers are becoming more aware of the impact food waste has on the environment and how it contributes to the global issue of food insecurity. In Hamburg at the WTCE exhibition, products such as edible cutlery by Incredible Eats are being developed in order to lessen carbon footprints. Data derived from uneaten foods on airlines are being used through artificial intelligence by LSG, one of the biggest names in the catering industry to determine commonly wasted foods. Thus there are many ways in which catering companies like Air Chefs SA could look at alternatives in which to better their food waste management systems for a positive change (Reals, 2022)

According to Leedy and Ormrod (2013: 27) the research problem is ‘the heart of the research process, since the main aim of research is to find a solution to a problem’. The research problem derived from the secondary research indicates that: *The airline catering industry has a negative impact on the environment and food security in South Africa due to its food waste management systems*. This research study will follow an interpretivist paradigm approach and qualitative data collection method as in-depth interviews will be conducted with Air Chefs SA employees who understands and have knowledge about the systems that the company has in place regarding the food used for catering and food waste management systems.

The problem statement is further analysed by the criteria from Bless, Higson-Smith and Kagee (2006): The research problem is answerable as the study aims to only focus on Air Chefs SA as an airline catering company operating in South Africa, a solution/ solutions to the problem could be identified after the secondary research and primary research have been compared and analysed. The study is feasible as there are no costs involved, the interview process are done online which saves time and the sample size are small as the questions asked are detailed enough and asked to a sample group who works for the brand and witnesses these processes on a daily basis. The scope of the study is narrow enough for solutions to the problem to be uncovered. The study aims to contribute to the environment and food security of South Africa by finding solutions in which airline catering companies, specifically Air Chefs SA, but not limited to them could lessen their food waste

and better manage it. The study is relevant as it aims to explore a sustainable manner and positive outcome to planet and people.

Research Goal and Questions

The main research question derived from the problem statement would be:

What food waste management systems could be put in place by Air Chefs SA in order to positively impact the environment and food security in South Africa through the airline catering industry?

The central tenets or key factors which influenced the research questions are the following: Corporate social responsibility; Post and in-flight food waste management systems; Meal preparation. There are three objectives based on the key factors with three questions tied to each.

Objective 1: Exploring the corporate social responsibility measures based on the triple bottom line that Air Chefs could implement to ensure a more positive effect on the environment and food security in South Africa.

Q1: What corporate social responsibility actions can be/ has been made visible to airline passengers in order to explain/ make them aware of the effects food waste has?

Q2: What could Air Chefs SA do with their food waste and food surplus in order to help society and food security in South Africa?

Q3: What corporate social responsibility actions could be taken to ensure food waste are managed in a sustainable manner amongst Air Chefs SA employees and management within the company?

Objective 2: Exploring post and in-flight food waste management systems for Air Chefs SA that will ensure a positive outcome on food security and the environment.

Q4: What prevention, recycling, re-using or recovery methods according to the food waste hierarchy could be put in place by Air Chefs SA to eliminate landfill dumping?

Q5: What logistical methods could be put in place by Air Chefs SA to avoid food waste to and from the aircraft?

Q6: What in-flight food waste management methods can ensure a more sustainable post-flight food waste outcome?

Objective 3: What meal preparation methods could be implemented in order to reduce food waste and have a more positive effect on the environment and food security in South Africa.

Q7: What pre-flight calculation methods could be made by Airlines to Air Chefs SA to reduce food waste amongst passengers?

Q8: What dietary requirements based on religion, culture, allergies and intolerances does Air Chefs SA take into consideration and calculation?

Q9: What cooking and preparation methods are put in place by Air Chefs SA to ensure food freshness from meal preparation to food consumption?

Literature Review

This literature review was conducted through an inductive theorizing approach, which starts with the specific study, observation, findings and building of the theory and then lastly postulating the new theory, or confirming the existing theory (Plooy-Cilliers, Davis and Bezuidenhout, 2014). A scholarly theory approach and micro theory will be used in this study as this study will conduct research based on subjective understandings in a short period of time. Within this literature review the argumentation of theories between various authors will be considered (du Plooy-Cilliers et al., 2014:50).

This literature review will discuss the major themes within the study which are the following: Air Chefs SA Overview; Food waste Globally & in South Africa; Food waste in the airline catering industry; Food insecurity as a result of food waste generated; The impact of food waste on the environment; Air Chefs SA's food waste management system and criteria towards being a meaningful brand; Using the Food Waste Hierarchy and Triple Bottom Line theories to address food waste in the airline catering industry; Sustainable airline food waste management adoptions (du Plooy-Cilliers et al., 2014:38).

Air Chefs SA

Air Chefs SA is an airline catering food service company which originated in 1986 and is a whole-owned subsidiary of the South African Airways Group. They are the largest airline catering company in South Africa as they produce 44000 meals per day. They provide catering to SAA, SWISS International Airlines, SA Express, Mango and Zambia. They signed a contract with SWISS in 2016, making it their first international airline to cater to. They have foods of different sorts in order to cater for a larger audience with more requirements. They

also provide to corporate company clients as well as ready-made meals for contract caterers. The SAA Group makes up 80% of Air Chef's revenue. Air Chefs has operating units in Johannesburg, Cape Town and Durban closely located to the international airports. (SAA Integrated report 2017:22)

They also opened a large new catering facility at King Shaka airport in Kwazulu-Natal which are able to produce 7500 meals daily. These facilities are certified by ISO 22000 (global food safety management system standard), with this certification Air Chefs are seen as a high-quality company (Business essentials, 2016). As stated in the South African Airways Integrated Report of 2017, Air Chefs has a few hi-loader and refrigerated transport vehicles which allows for the food to be transported with ease. Air Chefs has 1500 employees, and all receive regular training in order to keep Air Chefs a top-quality catering company (SAA Integrated report 2017:22).

Air Chefs vision is to be "Africa's leading world-class catering company" and their mission is to "deliver commercially sustainable airline catering services in South Africa and Africa". Air Chefs falls under the same level of dependency as SAA Technical, Mango, SA Travel Centre and SAA Divisions (Pax airline, Cargo and voyager). Air Chefs prepare their food from bulk, blast chilling, assembling and plating. The left-over foods and galley waste are collected once the destination is reached either in Johannesburg, Cape Town or Durban. (SAA Integrated report 2017:22).

Food waste: Globally and in South Africa

According to Riley (2016) the United States Department of Agriculture states that there is a difference between food loss and food waste, they define food loss as "the amount of edible food, post-harvest, that is available for human consumption but is not consumed for any reason; it includes cooking loss and natural shrinkage (e.g., moisture loss); loss from mold, pests, or inadequate climate control; and plate waste". On the other hand, a study by Buzby (2014), also identified by Riley (2016) states that food waste "occurs when an edible item goes unconsumed, such as food discarded by retailers due to undesirable colour or blemishes and plate waste discarded by consumers".

Riley (2016) states that on a global scale food wastes and losses reached a total amount of 1295 million tons which is 30% of the production on a global scale, further divided into agriculture which amounts to 32%, 46,3% amounts to post-harvest and 21,7% to consumption. It's found that yearly the amount of food loss and food waste are higher in

richer countries than poorer. In less advantaged countries the loss and waste occur during post-harvest stage (Riley, 2016).

Over 800 million people don't have the correct amount of food to survive daily on a global scale while 1.3 tons of food are being wasted (World Wildlife Fund, 2017). In 2019, 256 million Africans experienced hunger, which increased with another 46 million by 2020 (Lujabe, Goliath, Pretorius and Sibanda, 2022: 1). Resources such as electricity and water are also wasted in high volumes. The main reasons for food waste are that more urbanization takes place, which requires more food produce and an expansion of the agricultural sector (World Wildlife Fund, 2017).

According to the World Wildlife Fund (2017:8), 10 million tons of food gets wasted each year in South Africa which equals to a third of all food produced annually. Most of the food gets wasted at Agricultural level which amounts to 50% and R61.5 billion is wasted on water usage for food that no one consumes. South Africa dumps 90% of their waste on landfills which leads to 2.8 – 4.14 t of greenhouse gasses. The most wasted foods are fruit and vegetables being at 44%, these fruits and vegetables does not even reach the supermarket shelves on various occasions. As all foods produced from orchards, fields, fisheries to greenhouses are intended to be used for human consumption, a lot of these food ends up being wasted. As the population keeps growing, more food will need to be produced causing a higher food waste rate (World Wildlife Fund, 2017:8).

In South Africa cereals and vegetables make up 70% of the waste loss. It's found that low-income households have the highest food waste rate, it could be due to a lack of storage. In SA R61.5 billion are lost due to food waste which is 0.8% to the GDP. Another R1 billion are lost on energy wasted, the wasted water could fill up 600 000 Olympic swimming pools, while SA is one of the 30 driest countries in the world. As 90% of food end up in landfills a lot of methane are generated, methane has a 28 - 36 times higher negative impact on the environment than CO₂ (World Wildlife Fund,2022).

In a guideline about the food waste prevention and management in South Africa done by the Department of environment, forestry and fisheries of South Africa, shows that food waste has a major impact on the environment such as the climate change, water security, economy and food insecurity. Households in South Africa generate an average of 6kg waste per week, these food waste generate an amount of R75 billion a year. A 7.6% of the total greenhouse gasses are released in South Africa because of food waste per year (Department of environment, forestry and fisheries. 2021). Molelekwa (2018) argues that food waste

happens in households due to an overbuy of products which ends up expiring before its used. Oeloftse (Principal Researcher in Waste for Development) states that the more food wasted the higher food costs rise as more food needs to be produced which makes the poverty number rise even more.

Food waste in the airline catering industry

According to the IATA Cabin Waste handbook from 2017 the airline industry will continue to grow as more passengers use airlines for business and pleasure. The airline industry is known for their cabin waste, but more and more airlines are actively trying to manage their waste in a sustainable manner. In 2017 cabin waste were 5.7 million tons which came to an amount of \$927 million. Looking at the catering waste, it includes in-flight meals and beverages which are either half consumed or untouched (IATA Cabin Waste handbook, 2017).

A study done by the IATA in 2012 featuring 44 airlines, found that short flights conducted of 0.52 kg waste per passenger and longer flights between 0.63 and 1.81kg per passenger. A waste composition analysis was conducted at Heathrow airport which looked at the cleaning and catering waste from 17 international flights between Sep 2013 and January 2014. The results were that 352.71kg waste was conducted during the flight, where 19.5% were to cleaning waste, 23.5% were to catering waste in the waste bins and compactor boxes and 57% were waste that was put back into the trolley carts (IATA Cabin Waste handbook, 2017).

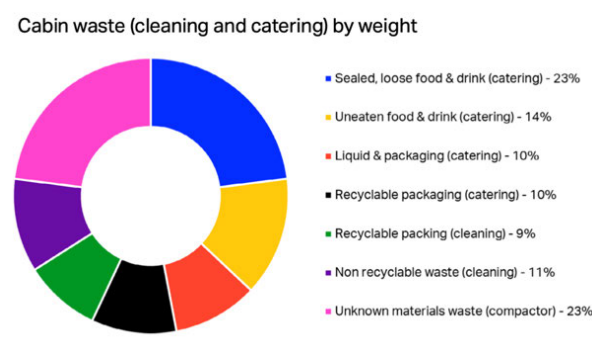


Figure 1: Sweet, Morris, Roberts and Patterson (2017:11)

The global flight catering industry is very large, the size is close to 12 billion euros as more than 1 billion passengers receives service every year (Megodawickrama, 2018). There's a lot of factors playing their part during the production of in-flight meals in the airline industry. The meals are prepared according to the type of aircraft (small, medium, large, jumbo), time of flight (morning, afternoon, evening), food requirements (culture, religion, ethnical), seat class (economy, business, first class) and the type of flight (short, medium, long). The

passenger amount per flight can change from the time the instructions are given to the catering company for the meal size preparation amount to 24 hours ahead of departure time (Megodawickrama, 2018).

Meal forecasting are difficult as the meal preparation takes time, because it includes the preparation of foods, cooking time, assembling, blast chilling and transporting the meal while making sure the right temperature are kept up until the passenger consumes the food. In the case of international flights a lot of international airlines depart within minutes of each other (Megodawickrama, 2018). Most food waste happens on long flights in the first class passenger section, where if each person wastes about 0.286kg it can easily be added up to a large amount of food waste. Food waste also happens when food needs to be sourced from other countries or are frozen meals which can easily result in waste (Wright, 2019). Food preparation are dependent on flight times and for instance if a flight is cancelled carrying 300 passengers, 300 meals go to waste. Meal planning needs to be very specific for buying foods and avoiding food waste (Wright, 2019).

Food insecurity as a result of food waste

South Africa is rated a food secure country, however thousands of South Africans are food insecure as South Africa has a major income inequality, high unemployment rate and high level of poverty. These residents rely on self-grown foods, however the amount of droughts and urbanisation has caused residents to go hungry as they can't rely on their own agriculture. While environmental and societal effects has an impact on their food security, food prices continue to increase leaving poorer people in hunger and malnutrition (Chakona & Shackleton, 2017).

A qualitative study done by Chakona and Shackleton at Rhodes University in the Agriculture and Science faculty investigated the measurement of household food access and food security in South Africa. The data for this study was collected via focus groups from residents living in South African towns along the agro-ecological gradient namely Richards Bay, Dundee and Harrismith. This study found that they mainly eat food that they grow themselves and others buy from markets, however there is a major problem as their households are food insecure and they rely on their own food production, donations and collecting foods from open spaces. The problem arises that they are mostly unemployed and have a low income which results in theft while drought and land shortages also plays a negative role (Chakona & Shackleton, 2017).

As COVID-19 hit South Africa the unemployment rate increased from February 2020 where 17 million people were employed according to the NIDS-CRAM 2020 Wave 1 data, to April 2020 where only 14 million people were employed (Lujabe, et al., 2022). It was recorded that 80% of low income households spend their money on food in order to survive (Bashir and Schilizzi, 2013).

According to the World Wildlife Fund (2017), around 800 million people still experience hunger while 1.9 billion adults are overweight or obese. The highest wasted foods are fruit and vegetables, which consists of high nutritional value, vitamins and minerals as well as lean proteins which are also wasted such as fish, poultry and meats. In South Africa 43.6% of children are deficient to Vit A, this causes low immune systems and 10% of the children suffers from anaemia. Children also experience IQ loss because of the poor nutrition they receive according to Prof. David Saunders. Adults are at risk of diabetes, cancers and heart diseases because of weak nutritional intake (World Wildlife Funds, 2017).

Malnutrition is a highly evident problem amongst lower class South Africans which leads to stunting and obesity. In 2018 there was a 27% stunting rate amongst children, making Africa the only continent where these numbers still continue rising. Obesity in women aged 15-24 rose from 29.6% in 1998 to 39.8% in 2016 and in women aged 45-54 the numbers rose from 72% in 1998 to 81.9% in 2016. Amongst children obesity rose from 10.6% in 2000 to 13.3% in 2016 which quite shockingly is twice the amount in relation to the global scale. Furthermore, heart diseases, strokes, cancers and diabetes account for 40% of deaths in South Africa which are all related to what you put into your body, nutrition (Labuschagne, 2022).

People in poverty regions consume more fats and high calorie meals which leads to obesity and health risks at a young age. It's said that by 2030 the United Nations wants to reduce the per capita food waste by half. In the United States it's found that 31% of the food are lost at consumer and retail level, this means that every hungry person, being 815 million people could get the correct amount of nutrients if it weren't wasted. If the food waste could be halved, a large amount of 1300 trillion kcal could be available by 2050. Thomson Reuters Foundation argues that the food waste will increase to 2 billion tons by 2030 if the populations keeps growing and the changes in developing countries continue to happen (Mensah, 2019).

The impact of food waste on the environment

Food waste has a tremendous effect not only on a sociological level, but also on the environment as it contributes to GHG emissions, water, land and electricity wastage. Climate changes and global warming has a massive effect on food production as it causes soil degradation and water stress to rise. This also includes storms and pests and it makes the work of the farmers harder in order to successfully produce crops (Chen, Chaudhary, Mathys. 2020).

All countries have a target to keep their emissions below 2 degrees, according to the UNFCCC agreement, although the temperatures are still increasing. In the UK the household food waste are an estimate of \$18.6 million where 3% are released as GHG emissions. The USA has 40% wasted foods which results in 25% fresh water wastage and 4% petroleum wastage. Food wastage continues to increase and has increased since 1961 by 3.5 times (Chen, Chaudhary, Mathys. 2020).

According to Move for Hunger, half of food waste in relation to the environment happens in the upstream direction and the rest is in the downstream direction. The more downstream the food gets wasted, the higher impact the food waste has on the environment as it went through all the processes beforehand which used energy and natural resources to get the food along the supply chain (Lewis, 2022). Developing countries such as South Africa wastes most foods during upstream phases as there are a lack of infrastructural issues (Lewis, 2022).

Food that ends up on landfills creates methane, chlorofluorocarbons and CO₂ which contributes to climate changes even more, as it makes the earth temperatures rise. The agricultural sector already makes use of 70% of the world's fresh water, these water are used for irrigation, spraying on fields for crops to grow and for cattle, poultry and fish, thus fresh water are wasted when food is wasted (Lewis, 2022). For instance if 1kg beef are wasted, 50 000 litres of water goes to waste. The food wasted accumulates to 1.4 billion hectares of land being used for waste (Move for Hunger, 2022). The Natural Resources Defence Council states that \$220 billion are spent on growing, transporting and processing \$70 million tons of food that gets wasted, ending up on landfills (Lewis, 2022).

According to the Consultative Group on International Agricultural Research a third of all greenhouse gas emissions contributed by humans are from food waste (Gilbert, 2012).

According to the United Nations (UNDP Human Development Report) the developing countries consists of 20% of the population and yet consumes 60% of the world's food, 70%

energy and 85% of the world's wood. They create almost 75% of all carbon dioxide emissions.

Darkoh (2009) states that South Africa already contributes 88.8% of the Southern Africa region's carbon dioxide emissions. According to the SADC (2005) the Southern African region makes up 1.8% of the world's carbon dioxide emission, South Africa contributing 112 million metric tons.

Air Chefs SA's food waste management system and criteria towards a meaningful brand

According to the SAA annual report of 2014, Air Chefs SA meals are prepared in portions and cooked accordingly, it then goes on a blast chiller which from there on are plated and put into the trolleys. It is then put into the refrigerators on the trucks transporting it to the flights where it needs to be loaded on. SAA has two wastage programs which ties into how Air Chefs SA plans their meals and orders, they are still not where they should be in terms of wastage. Air Chefs SA aim to however receive the IEnvA certification which is tied to their environmental impacts (SAA Annual report, 2014).

According to the SAA Service Standards Manual each flight, route, time and class at SAA has a different choice of meals. The meals are communicated to SAA on domestic, international and regional flights. There is a guide of the selected meals for each passenger on board in order for them to study the brochure as well as pictures. Different routes has different meals and there are meals available to those passengers with dietary meal requirements (SAA Annual report, 2014).

In relation to the wastage, they store the foods in chillers or use dry ice if there aren't chillers available, the food needs to be kept at a safe temperature for human consumption and served on certain times. Air Chefs collects all waste after a flight. According to the Air Chefs Management Policy Document (2014), Air Chefs employees will gather all the waste from the passenger, all the waste should be kept closed until it reaches the base where sanitation are at hand, it's then looked at to ensure all the waste are sealed properly. The waste bins are then given to the sorting table where the recycled items are given to the recycling contractor and those that are not recyclable are thrown to landfill. Recycled items must then be given to the containers, an Air Chefs employee with a licence collects the food waste and there should be a document which states the amount of waste that was gathered, the waste will be dumped at a landfill area where it is licenced and an indication that the waste were safely disposed are given to Air Chefs (Sambo, 2018).

A meaningful brand needs to serve three pillars, namely personal benefits, collective benefits and functional benefits. Functional benefits relates to how the brand delivers their products or services. Personal benefits relates to how the brand improves individuals lives and collective benefits relates to how the brand acts within the society (Havas group, 2021). Consumers say, that if 75% of brands disappeared they wouldn't care, 71% of consumers are done with brands who falsely makes promises and don't deliver and this makes for half of brands across the globe to be seen as trustworthy (Havas group, 2021).

From an collective benefits aspect, Air Chefs recycles their food waste and it is safely disposed at landfill. However, landfills are at the bottom of the food waste hierarchy.

In order for Air Chefs SA to have a positive impact on the environment, Air Chefs SA needs to manage their food prep and waste more sustainably (Hlengwa & Sambo, 2019). According to SAPA (2013) Air Chefs SA dumped an excessive amount of food due to poor planning and over ordering. They faced disciplinary action according to the Sunday Times (Times Live, 2013).

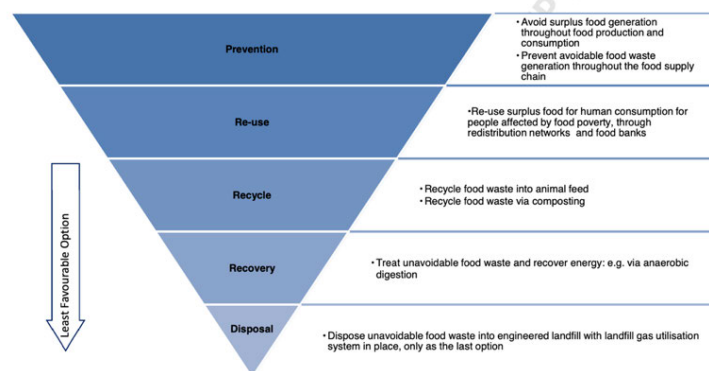
According to Mandisi Feni (GM HR at Air Chefs SA) the personal benefits related to Air Chefs would be that they aim to create world class meals for their passengers with high quality, they ensure this by being located 2km away from the ramps of the airports they operate in, across South Africa. Their meals are supported by an executive chef with the necessary experience in cuisine and in-flight catering. Air Chefs caters to domestic and international flights and ensures a range of meals specialised for dietary, ethnic and religious needs. Although according to Pijoos (2021) the pandemic has left Air Chefs employees with little to no income which puts the employees in heavy financial stress and many have lost their jobs and have been retrenched in a short period of time.

Using the Food Waste Hierarchy and Triple Bottom Line theories to address food waste in the airline catering industry

Food waste influences the economy, sociology and environment. Globally food waste ends up in billions of dollars being lost as food waste happens throughout the supply chain. The food waste hierarchy will be used in this study as a framework to help identify the most sustainable food waste management ideas for Air Chefs SA. Prevention at the top of the pyramid is the most preferred option, while disposal at the bottom of the pyramid is the least preferred option (Papargyropoulou, Lozano, Steinberger, Wright & Ujang, 2014).

Food waste can be used for multiple other sustainable outcomes than throwing it to landfill polluting the earth. Animals could be fed, it could be used for composting in order to nourish soil, improve water quality and generate healthy crops. Composting reduces chemical fertilizers, promotes better agricultural crops, helps along reforestation and restoration and composting helps water retention and carbon sequestration (EPA, 2022).

Figure 2: Adapted from European Parliament Council, 2008a



Another theory that will be used in this study is the triple bottom line, it shifts the perspective of businesses in order to take the environment and society into consideration and not just focus on profits. The triple bottom line thus focusses on the economy (profit), society (people) and environment (planet) in relation to one another. In 1994 John Elkington established the concept of a triple bottom line, these three elements need to overlap in order to create a sustainable outcome laid out in figure 3. The triple bottom line is a theory used within corporate social responsibility, which is defined as “a responsibility among organizations to meet the needs of their stakeholders and a responsibility amongst stakeholders to hold organizations accountable for their actions” (University of Wisconsin, 2021).

As companies become more aware of the limited natural resources in the world, the prevention actions that needs to be taken and the importance of stakeholder value, not just shareholder value, more business decisions have been made on the theory of the triple bottom line (Miller, 2020). Elkington states that “The triple bottom line wasn’t designed to be just an accounting tool. It was supposed to provoke deeper thinking about capitalism and its future” (Elkington, 2020).



Figure 3: BonCor (2018)

When conducting interviews with Air Chefs SA employees, questions will be formulated with these two theories in mind.

Sustainable airline food waste management adoptions

Multiple sources have claimed that the airline catering industry is accountable for food waste. In order to change that statement for South Africa, Air Chefs SA being the leading and largest catering company in South Africa needs to take charge and adopt a greener food waste management system. The following suggestions are ways in which other airlines have incorporated and identified solutions food waste.

Air New Zealand incorporated a “Project Green” waste management program which focuses on diverting 150 tons of landfill waste annually. They reused sealed and untouched foods and beverages such as cooldrink cans or packets of cookies, tea boxes and sugar sachets. They have repurposed 1 million items that was once used in 2019. They also partnered with “Twice” which made them biscotti edible coffee cups (basically n cookie) which reduced plastic cups landfill waste (Baxter, 2020). They have diverted more that 460 000 plastic bottles as part of the “Plastic Free July” campaign led by employees and were able to reduce their plastic cups to 55 million items (Baxter, 2020). They made their plastic cups from plants in 2019 and replaced 44.5 million plastic cups, plastic sauce packets were also removed and reusable dishes were used to serve the sauce as an alternative (Baxter, 2020).

When looking at dining facilities such as restaurants or catering companies like Air Chefs SA, corporate policies don’t allow unconsumed food to be served again which results in surplus food as the meals are all the same portion size and plate size for every person. Consumers generate food waste due to plate size, food taste, hunger level and food type preference, thus better planning or donations could be put in place (Ravandi and Jovanovic, 2019).

Halizahari, Mohamad, Aqilah and Husain (2021) found that airline passengers expect high quality food to match the flight cost especially on long haul flights, but when reaching a high-altitude, appetite and taste change, thus food needs to be kept tasty and easy to digest as long-haul flights can cause motion sickness, dehydration and slower digestion (Han, Lee, Chua, Lee and Kim, 2019).

Meals should be altered for all food allergies, sensitivities and intolerances and could be requested at booking time (Halizahari et al., 2021). It's important to not only have western meals, but meals according to the type of country and passengers flying to a certain destination (Hast, 2019). As meals, especially in First and Business class can determine customer loyalty, the catering company needs to keep food at high quality.

Another aspect to consider when looking at in-flight food waste is to use cooking methods in order to keep the food fresher for longer as well as packaging which are sustainable (Sel, Soysal and Cimen, 2017). These adoptions could prevent food waste and recycle food waste which is the two most preferred options on the food waste hierarchy. Food waste at production can also be used to recycle by creating another dish out of the leftovers and donating or consuming it (Nisakornkao and Mongkalig, 2022).

Leadership needs to take action in order to educate and inform employees of the brand about the impacts of food waste in order to save costs and save the environment and society (Wright, 2019).

Research approach and methodology

This research study explored the phenomena, being food waste in the airline catering industry. The brand being focused on was Air Chefs SA. An explorative study gave more understanding and insight into the consequences of the research problem as well as the conditions, situations, behavior and policies within Air Chefs and the problem being addressed (du Plooy-Cilliers et al., 2014:75). An explorative study also works best with a qualitative data collection such as in-depth interviews which this study has done.

This research study followed an interpretivist paradigm approach. Interpretivism is based on the fact that people are different from objects, thus needs to be studied different as appose to positivism which are conducted in laboratory conditions. It's believed that people are constantly influenced by their environment (du Plooy-Cilliers, Davis & Bezuidenhout,

2014:27). Interpretivism are influenced by three dominant traditions being, Hermeneutics which are referred to as the study of theory and the practice of interpretation. Hermeneutics requires the reader to look at the text through the eyes of the author in order to gain meaning (Intgrty, 2016). Interpretivism looks at data more subjectively.

The other two traditions are Phenomenology, which looks at how people make sense of their own and other people's actions around them, as human actions are meaningful (du Plooy-Cilliers et al., 2014:28). The last dominant tradition which influences interpretivism are Symbolic interaction which is the understanding and interpretation between humans, seeing reality in a symbolic and constructed way (du Plooy-Cilliers et al., 2014:28). It's the approach that humans understand each other as they share certain meaning systems like language or signs. Interpretivists wants to understand the behavior of humans.

When looking at the epistemological position of interpretivism, du Plooy-Cilliers et al. (2014) states that objective knowledge isn't always factual in social conditions, interpretivists don't believe to generalize their findings as every person's interpretation are different to a scenario (du Plooy-Cilliers et al., 2014:29). The ontological position of interpretivism states that reality is how people give meaning to their own experiences and those with other people. Thus, people don't experience reality the same as others do, because perceptions can change (du Plooy-Cilliers et al., 2014:29).

The metatheoretical position of interpretivism are that interpretivists tells a narrative of how people perceive things and there's a sense of detail and informality (du Plooy-Cilliers et al., 2014:30). The methodological position of interpretivism would be to gain an in-depth understanding, thus qualitative research methods are used to gather subjective information. This way of conducting information relies on empathy with the people being studied as they share a piece of their lives (du Plooy-Cilliers et al., 2014:30). Lastly, the axiology of interpretivism is that interpretivists incorporate the people being studied as well as their own interpretations and value how complex and special each reality is (du Plooy-Cilliers et al., 2014:31).

The interpretivism paradigm has been chosen for this research study as the objective was to find a solution to the problem. This approach was chosen in order to gain an in-depth understanding of the Air Chefs SA managers and employee's perspectives and knowledge about Air Chefs, regarding their food waste management. By taking the qualitative approach and using in-depth interviews as an instrument, gave greater insight to how this problem could be handled. The aim of this study was to gain an understanding of the brand in relation

to their food waste management, environmental and societal views. This research approach gave insight to human emotion rather than just statistical information in numeric form (Kaliyamurthi, 2021). This approach and method gave life to new themes, ideas and opinions from all employees which was later considered as a whole.

Qualitative research is used for phenomena that are difficult to measure quantitatively by numbers like this study. This method gave insights of the sample that was studied (see Fundamentals of Qualitative research – Yale University, 2015). Qualitative research focuses on the depth and is done in a natural environment. It's also done on a purposeful sample; those who have similar characteristics. In order to understand how the problem can be addressed, this method works best as the answers can be interpreted as it's answered through the beliefs and opinions of the selected sample being studied (see Fundamentals of Qualitative research – Yale University, 2015).

The data collection method for this qualitative research study was based on field research which originated in the 19th century. The Chicago school of Sociology used this method to meet three objectives being to study people in their natural environment, to repeat interactions with people over a period of time and to understand people in an in-depth manner to develop theoretical concepts referred to the perceptions of the people being studied (du Plooy-Cilliers et al., 2014:176).

The approach in field research that was used are ethnography as this approach deals with a certain selected culture of people that gives the researcher more insight into their perceptions of certain phenomenon. The research instrument that was used to collect data for this study was in-depth interviews. In-depth interviews are open-ended questions with the aim to understand the opinions, beliefs and views of the participants. It allows the researcher to receive more detailed answers. This study followed a standardized, open-ended interview process in order to analyze data more accurately and understand the opinions of the same set of questions to every participant in order to compare the findings (du Plooy-Cilliers et al., 2014:188).

The selected brand for this research study was Air Chefs SA, thus employees and management positioned members at the Air Chefs units being in Cape Town and Johannesburg, Johannesburg being the largest Air Chefs building were interviewed. One of the interviewee's stated that the Durban unit closed down during lockdown, thus only the Cape Town and Johannesburg units were interviewed. A careful selection was made for a sample based on the level of knowledge that was needed from the participants. This study

used non-probability sampling and a purposive sampling method. Non-probability sampling is based on the subjective judgement of the researcher, purposive sampling methods gathers a certain group of people based on similar characteristics. This method is helpful as the researcher can decide who they want to use in the sample from the population in order to answer the research question derived from the problem (du Plooy-Cilliers et al., 2014:143).

The sample frame at Air Chefs SA were employees on a management level across the Cape Town and Johannesburg units. The interviews were conducted with three Air Chefs SA management employees at the Johannesburg unit and two Air Chefs SA management employees at the Cape Town unit in order to get the views and perspectives of both operations at Air Chefs. Emails and phone calls were made to Air Chefs SA as soon as the research proposal and ethics of the study had clearance, however it wasn't easy to get hold of the participants immediately which led to conducting the interviews quite late in the process. The research was collected from the 19th of July to the 27th of July where the five participants were interviewed with 9 questions excluding the biographical or geographical questions, each interview had a 15-45min duration, depending on the participants knowledge, but was kept to the point in order to not waste their time and the researcher's time as transcribing and coding can be a tedious process.

Analysis of data

According to du Plooy-Cilliers et al. (2014) qualitative research is textual, iterative, hermeneutic, subjective, constructed and symbolic. Text is what can be studied as an interpretation of the meanings of things. Iterative is the cyclical analysis and interpretation of text repeatedly. Hermeneutic is the study of human actions by interpretation instead of quantitative objective observation. Subjective data are based on the experiences of the respondents; thus, no right or wrong answer can be expected. According to du Plooy-Cilliers et al. (2014), a statement from De Vos, Strydom, Fouche and Delport (2011:397) describes the qualitative analysis methods as the "reduction, organization, interpretation and substantiation of data".

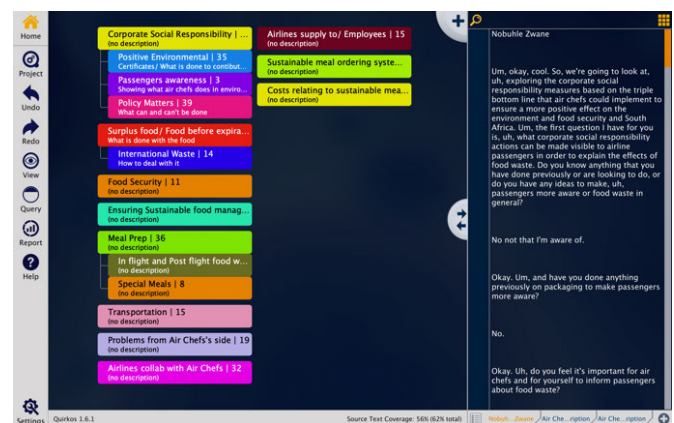
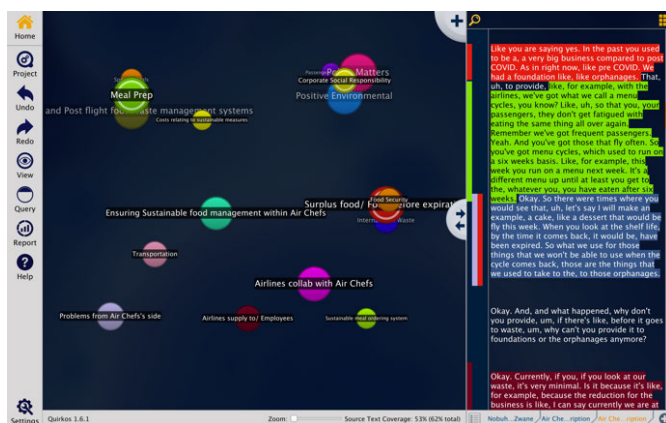
This study has analyzed the data through textual analysis where the collected data was transcribed. This study used in-depth interviews to collect data, which is words from participants that was transcribed to text (du Plooy-Cilliers et al., 2014:233). Zhang and Wildemuth (2009:309-311) states eight steps in du Plooy-Cilliers et al. (2014) to analyze the

content being: prepare data; develop coding unit to analyze it; develop categories and coding scheme or conceptual framework; code all the text; assess coding consistency; draw conclusions from coded data and report the findings and methods. This study has followed a conversation analysis as in-depth interviews was conducted, which is the talk-in-interaction between the researcher and participant (du Plooy-Cilliers et al., 2014:245). First the data was transcribed into text format from the recordings that were done via Zoom. Memoing was used in order to ensure trustworthiness of the data process.

The preferred sections or chunks of the data was selected and organized which gave answers to the central tennets and research questions. The different chunks of data were categorized based on terms or concepts and was structured with the help of the hierarchical conceptual framework (du Plooy-Cilliers et al., 2014:239). Labels were used to describe each theme and ensure exhausted, mutually exclusive and specific data. This study coded the data through thematic coding, as the research questions were already stated under three key themes derived from the literature review. New themes surfaced as the analyses process continued and was placed under categories based on their similarities. After the coding consistency were tested, the interpretation explained the relationships found, extraneous information was considered and relevant factors which could influence the problem were considered. This led to truthful findings and presentation of the data. This study used Quirkos to analyze the text as it was free and effective considering the time frame. According to Koonin (2014) in du Plooy-Cilliers et al. (2014) validity and reliability in qualitative research are referred to as trustworthiness which has components such as credibility, transferability, dependability and confirmability.

Credibility in this research study was achieved by accurately interpreting the data from the participants in the findings, so if they were to read it, it should be relatable and true in their eyes. This study should be dependable as data were carefully and truthfully analyzed from the selected participants and the confirmability was done by detailing the findings and interpretations in order for someone else to understand and find similar results when re-conducting this study (du Plooy-Cilliers et al., 2014:258

Quirkos is an app for qualitative data analysis with a free thirty-day period, thus chosen for the data analysis of this project. The five interviews that was conducted and transcribed were loaded onto the app. Codes were created by thoroughly reading through every interview and identifying themes. These themes were placed under leading categories, following a hierarchical conceptual framework. The themes were specific and exhaustive, all themes were considered by all five participants.



Screenshots as seen above indicates how the data were coded and analysed. On the right-hand side all the transcripts were loaded, the participants answers were then highlighted according to the themes that were created on the left-hand side. These themes were created and labelled whenever a theme within the transcripts surfaced and had a pattern. The different themes with similarities were categorized and placed together as a group. A clear indication of this approach can be seen on the right-hand side's screenshot which displays this system similar to the hierarchical conceptual framework. Once all the transcripts were coded according to their themes and categories, an overall report was created which had all the quotes from the participants under every theme, making it easier for the researcher to go through and analyse accurately taking every participant's answers into consideration.

The themes that were created were the following: Corporate social responsibility; Positive environmental methods; Passenger's environmental awareness; Policy matters; Surplus food/ Food before expiration; International waste; Food Security; Ensuring sustainable food management within Air Chefs; Meal preparation; In-flight and Post-flight food waste management systems; Special meals; Transportation; Problems from Air Chefs' side; Airlines collab with Air Chefs; Air Chefs general info; Sustainable meal ordering system; Cost related to sustainable measures. In total there were 17 themes and 350 codes assigned to those themes.

A mixture between a deductive and inductive approach was used to analyse the data as there were pre-conceive ideas of themes that were going to surface such as the three key factors being corporate social responsibility, post and in-flight food waste management systems and meal preparations. However, because this study followed an in-depth open ended interview process a lot of unexpected themes surfaced as well which led to different

outcomes. From the themes identified in the first round of coding, another round of comparing and reading displayed a narrower group of themes displayed in the table below.



After conducting the interviews with five Air Chefs SA employees, it was brought to my attention that Air Chefs SA isn't the largest and leading airline catering company in South Africa anymore. Before lockdown the company had 1500 employees and serviced 166 flights per day, delivering 25 000 meals. However after lockdown hit they had to close down their Durban unit and now only operates in their Johannesburg and Cape Town units. They only have 380 employees at the moment as Covid-19 had a tremendous effect on their finances with airlines that weren't allowed to fly, thus business ran low.

Air Chefs SA used to serve South African Airways, Mango, Sa Express, Zambia Airlines, SWISS Airlines, British Airways, Rwanda, Kenya, Air Peace and Lufthansa group, but now only serves South African Airways, Rwanda Airlines, Kenya Airline and Air Peace. The business reduced to 15% and competitors like New Rest and Food Directions took the place of Air Chefs SA. Air Chefs only has 12 flights a day at the moment, but are eagerly looking to increase business and welcome ex-employees back to work on fixed term contracts depending on whether airlines will increase in the amount of flights.

Looking at corporate social responsibility as a category, Air Chefs SA seems to have a lot of environmental-friendly methods in place such as saving electricity by not baking and cooking

at the same time, all of their packaging are recycled, the trucks used to transport meals only drive a speed of 40km/h to save fuel and their lights are motion sensitive which helps with electricity wastage. The safety measures they have in place include quality control which ensures that food products are used before the expiration date, employees working at wastage areas aren't allowed at meal preparation areas, oil tests are done to ensure food quality are up to standard, any defaults in food products ordered from their supplier are rejected, no preservatives or frozen methods are used in the food, vegetables are washed with a chlorine wash, equipment are washed before use and food temperatures are kept in place in order to reduce food contamination and meats are cut to use the most out of it. Air Chefs ensures that they advise airlines that they work with to choose more environmental friendly packaging.

Supporting quotes from employees based on above mentioned:

"The trucks that we use, there is a like for a speed limit that we cannot drive more than 40km/h so that we don't burn a lot of you fuel"

"For, for example, if I can make an example, we, we make sure that in our, for example, cooking schedule, right we stagger it in such an, a way that you aware that Eskom burns coal for example, to generate electricity. Right? So we sort of our cooking starting say at six o'clock in the evening so that we don't cook the meals and the baked products at the same time. Cause what will happen? Your electricity consumption will, will go up"

"We also like recycle all the material that let's say the foils, the plastic bottles that are coming out of the aircraft will recycle"

"lights, for example, some of, for the lights in the building they switch on when you walk in, they are not like left on"

"And then when we prepare the products, the staff is trained on how to, for example, if they are working in the butchery, how to cut the meat to reduce waste and how to process the meat to reduce waste"

"even for things like for our cooking oil, we do oil tests. We measure and see that the quality of the oil that we are getting is right. And even during preparation it's measured"

Air Chefs is ISO 14 001 certified which already indicates that they ensure a minimised carbon footprint within the company, their staff are trained in terms of food safety to understand how to work with food and gather more environmentally aware methods, they have a recycling contractor company (Environserve) which handles their recycling and safely disposes the waste at landfill sites by providing Air Chefs with a certificate of how the waste was disposed, they are audited by an International company and procurement assigns charities to Air Chefs to donate food before it expires. Previously stickers were placed on

food products to indicate a green image, but aren't seen on the products anymore. An employee stated that she believes passengers want to enjoy their flight and not worry about environmental issues, but rather trust that the food waste is handled in an environmental positive manner. Air Chef SA's website is currently under maintenance which was a spot where passengers could witness that they're ISO 14 001 certified and audited by an International company.

Supporting quotes from employees based on above mentioned:

"Okay. Um, firstly, we are ISO 14001 certified, which is like, uh, as you know, uh, ISO14001 is for environmental safety and management. So that's one of the things that we took as an organization as quite critical to ensure that we minimize any like, uh, carbon footprint on food waste and ensure that we contribute positively to the environment."

"We do provide training as well to our staff so that they can be more mindful of ensuring that we do not have any waste or reduced as much waste in during preparation of our meals"

"we work with companies like Environserve who are managing the waste when the waste at times our environmental team goes to landfill. Cause some of this waste can be used as, um, for example, manure to do things like that. So they do give us reports of what they have done with the waste that they took to the landfills and all that"

"Um, is not much except certain stickers talk about the ways the, what do you call this green, the green image. They, what you call this thing I think it's something they talk about the environment."

"So that is unfortunately for now our website is still, uh, being, um, maintained. It is clearly displayed on our website for, for all the like passengers that would travel to know that Air Chefs has taken a stance to ensure that we are ISO14,001 certified, we are audited by an international, um, service provider, an independent service provider"

"Because I believe that a lot of people, when they're flying, all they really want to do is just basically, um, eat. And then obviously the, the wastage that comes from the food, they know that is it's handled."

Looking at post and in-flight food waste management systems, two employees stated that it would be beneficial if flight attendants could have different waste bins in the airlines for different waste in order to avoid contamination for recycling purposes, however aircraft space could be limited. It's advised that non-perishable foods which are still sealed on domestic short flights could be re-served to customers as it wasn't contaminated or touched instead of dumping it on landfills. In terms of transportation of meals to the aircraft, the trucks have refrigerators in order to keep the food at a safe temperature, food trolleys are secured with a cargo belt and the truck has different compartments for the food waste from the

aircraft and the new food in transit to the aircraft. However, food could still get damaged or broken through bad driving or loading.

Supporting quotes from employees based on above mentioned:

"but then also I don't think it will ever happen on an airline because of space consuming. If they have different waste bins because it will help a lot, if like some items could go straight in this waste bin and the other items only in that, then you can use that stuff straight away and recycle it. You don't have to worry about any contamination with food or whatever."

"Cause we put those, we had a recycling where, because they used the boxes, it, the items that they had, it was mostly non-perishable, which is like, which is your, your muffin, let's say for breakfast, it's a muffin. So what you do, you keep it like the, the aircraft would go to Durban, right? Durban it goes to Cape town or come to Johannesburg. So you keep it on board for the entire time."

"but the standard is that all the meals that we are loading we secure them with a cargo belt so that when a truck moves, there is no damage to the product."

"Cause you 27and that sometimes on their way going to aircraft because of the driving it gets broken. Now it's a waste"

Food waste at Air Chefs happens as passengers can't be forced to eat foods, but even though it's untouched it has to be discarded as waste. Law states that once the foods are airborne it can't be re-served and has to be discarded as waste once the aircraft lands. Sometimes there are a miscommunication between the airlines and Air Chefs in terms of meal planning and ordering which ends up in an overorder or meals. Menu changes also affects food wastage as well as flights that gets cancelled or delayed. The meals would first be rolled over to the next flight if it's not yet expired and temperatures are kept safe, otherwise it needs to be discarded as waste or given to staff members before it expires. It can also happen that quality control don't advise Air Chefs when a food product is close to its expiry date which then leads to food waste.

Supporting quotes from employees based on above mentioned:

"But if we cannot roll them to the next flight, they're left with for example, seven hours, instead of throwing them away, we would give them to our staff to consume those meals."

"The most painful thing is to see what is coming out of the aircraft. Cause remember when, when a passenger 27flies, you cannot force, if a person says, okay, it's a standard, she has order the, the meal the ticket comes with a meal."

"Even in terms of ordering, it's also important to our systems and planning that do the planning and order to make sure that the right quantity and the right menus are ordered."

In terms of International flight waste, nothing can be recycled or reused as anything that came from another country could pose health risks such as diseases and contamination which leads to these waste being taken to landfill sites directly even though items are still sealed. There are also risks of food fraud and traceability, where disgruntled employees could have interfered with food items and when it's re-served or donated, Air Chefs could get a bad name for food poisoning or far worse reasons. An employee from Air Chefs states that on Turkish airlines a disgruntled employee put a snake head inside of a meal and in Australia an employee put needles in strawberries, thus Air Chefs can't take that risk. Donations are made to organisations in the incident where airline menus have changed, but there's still stock left from the previous menu or in the case of flight cancellation or delay as long as the products are within the expiry date.

Supporting quotes from employees based on above mentioned:

"if it's international flight you cannot take anything like not even the foils or anything because it would be contaminated."

"So yeah, in terms of items that are international waste, unfortunately we cannot, we have to dispose those items. We cannot reuse them."

"One, one we've got like anything that is over the border its regarded as international waste The international waste, there's nothing we do about it. It goes to the land28fill even the, the airlines, they want your safe disposal of the waste at the end of the day."

"there is an international waste. That is not being separated because of the, and maybe it may be having certain diseases from that."

"or example, recently, I think it was on Turkish. I don't know if you have read about that, where a disgruntled employee put a snake head on a meal."

"Food is seen as one of the most dangerous things that can basically kill a nation if I can put it that way. Hence you 28find that there are these tight like legislations and regulations that you cannot use anything that comes outside out of the borders and say, you are donating it to someone else because you don't know the facility that was prepared."

Looking at meal preparation methods, Air Chefs uses blast chilling. Once the meal is cooked it is then chilled to five degrees Celsius and maintained at that temperature until its plated, it's then dispatched to the airlines and kept at five degrees Celsius. A temperature check is done before the meals are loaded onto the truck as well as when its offloaded on the aircraft. The truck keeps the meals refrigerated/ dry iced to the aircraft. The hot meals are kept in the oven on the aircraft to be heated for serving and consumption. The meals are weighed and accurately calculated according to the aircrafts preference.

The airlines send the meal calculation forecast between 48 to 24 hours ahead of departure, leaving a 5% buffer time period for last minute passengers and the forecast are updated daily, thus Air Chefs don't order food blindly. Specific airlines has specific portion sizes, menus and meal preferences. The menus are also changed every six weeks in order to keep meals interesting for frequent flyers. For instance the Durban flight prefers more vegetarian meals and Nigerian flights have larger portions and prefer more starch such as rice in their meals. The menus are also calculated in terms of the costs the airlines are willing to pay or ask passengers to pay. Special meals are asked to the aircraft in advance, there are normally 19 special meals available to each flight and kosher meals are bought as Air Chefs don't make them.

Supporting quotes from employees based on above mentioned:

"No, what we do we use a blast chill not like blast freeze method, the chill method. You, you prep them, then cut your veggies, you cook them, you blast chill them."

"Okay you got fridges in the aircraft so like I said to you earlier on when the trolleys leave here there's a temperature check which is recorded and they load it on the truck, the truck then goes outside loads it on the aircraft, the engineers then switch on the fridges and then the temperature is taken by loading as well to make sure that we comply with our temperature regulation. Hot meals are put into the oven and then the crew takes cares of the rest."

"For example we don't produce kosher meals, but we buy kosher meals from a service provider"

"But those that special meals that we prefer in house, we've got a period of 24 hours in advance if you want a special meal. Um, and you indicate the type of special meal."

"I think we've got about 19 special meals"

All domestic packaging gets recycled before it ends up in landfill. Air Chefs also work with airlines in order to retrieve data from them in terms of what foods are popular and what needs to be replaced. For instance an Air Chefs SA employee stated that the Durban route liked vegetarian meals better, thus the menu change in terms of that. This collaboration also allows Air Chefs to create new presentations with the food and beverage department for the airlines new menus.

Supporting quotes from employees based on above mentioned:

"we recycled the bottles, we recycle the boxes, we recycle a lot of the like foils material"

"for Durban routes, you would have more vegetarian meals than your meat option."

Looking at problems that occur within Air Chefs, timing is a factor when working with food thus a lot of focus is needed as bacteria can easily grow when foods aren't kept at a safe temperature. Airlines pick packaging options which aren't always environmental-friendly. Employees are uneducated which leads to mishandling of food and thus food waste. Sometimes employees don't weigh food accurately leading to food imbalance and flights can't take off if there aren't enough food for every passenger on-board. When food orders aren't correctly placed or managed, a rushed environment occurs which leads to more mistakes. Mistakes such as burning food, dropping food or equipment can occur and sometimes food aren't up to standard such as an incident where a certain brand of lettuce wilted easily which led to passengers not consuming the meal.

Supporting quotes from employees based on above mentioned:

"here's lot of waste that ended up being incurred there's lot of burning of fuelling because they are rushing there's lot of also then using our gas if we are putting gas or electrical to accommodate the airline. "

"Lolarosa lettuce, that it wilts quickly when it's on board."

"look which lettuce we can use that can last longer so that we don't have those complaints again"

"in that hundred gram, everyone is advised to load two grammage. You understand? And then there's this person who's putting three."

"Maybe we're a chef by accident they burned your sauce."

Food waste reduction ideas amongst employees were to use lighter environmental-friendly packaging such as the bamboo boats they currently use for snacks and to use bread bags made from corn starch as well as bamboo cutlery. An employee stated that cold snack-like meals should be served on short flights, not hot meals in order to avoid food waste. The menus should be specifically catered to the type of passengers by looking at the flight history. Flights should close earlier in order for meals to be calculated more accurately. The rule that once food is airborne it can't be re-served should be re-looked at in order to help society. Fruit and vegetables should be bought as late as possible in order to reduce food waste. Instead of discarding international sealed waste, there could be a collaboration with New Rest for instance who has international footprint in order to donate those food as there is a form of trust in food preparation procedure amongst both catering companies.

An employee stated that why beer is not discarded if not opened, but biscuits and muffins for instance are. An employee at Air Chefs stated that airlines such as SAA are looking at better meal ordering methods such as choosing the meal you'd wish to consume or stating that you won't be having a meal on-board. They might try this method with business class first, Emirates are already giving passengers that option. More sustainable methods to use food waste instead of dumping it on landfill sites, such as, stated by an employee at Air Chefs are to donate it to a fly farm like they have done previously with the fruit and vegetables, give off cuts to animals or use it as a fertiliser for gardens. Give it to staff members before it expires and are still untouched or make food gardens.

Supporting quotes from employees based on above mentioned:

"Cause it's a 45min flight maybe instead of having things like hot meals, they, maybe you have a snack"

"like instead of plastic use now the bamboo spoons and, you know, things like this bamboo, there's all different product that come on all the time."

"unless you co collaborate with, let's say companies that are big, for example, you had, you do have catering companies that have international footprint like new rest, new rest is international"

"We actually brought it. It was a farm that used to breed flies."

"I just throw it in the garden to fertilize my soil."

"use it for my dog, which is mostly off cuts from vegetables"



Findings

After breaking every theme down, it brings me to the findings of this project. The main research question was: *What food waste management systems could be put in place by Air Chefs SA in order to positively impact the environment and food security in South Africa through the airline catering industry?*

Air Chefs SA already has good systems in place in terms of taking the environment into account. In a brief overview Air Chefs does the following: train their staff, make sure menus correlate with the type of passengers on each flight according to historical data from the airline, check the quality of their suppliers, are aware of how to cut meat and wash vegetables, check the oil quality, watch the temperatures to avoid contamination, keeping in-check with airlines about meal calculations and special meal orders, asking airlines to consider more environmental-friendly packaging, keeping the speed limit of trucks to 40km/h and food refrigerated or dry iced, recycle packaging, donate food before expiration date or provide it to staff members.

However the biggest threat to the environment and the most food ending up in landfill sites are those that come from international areas as these meals aren't trusted in terms of safety procedures used as it's difficult to trace down the person responsible for poisoning the food for instance or a disgruntled employee. However if the International flight service association and the Department of health could reconsider donating sealed food items that came from another country where for instance New Rest has a footprint in, a collaboration between Air Chefs and New Rest could be made where both catering companies follow similar food preparation procedures or they trust the procedures being followed in order to donate to those who are food insecure and less privilege instead of dumping perfectly good consumable food items to landfill, which is at the bottom of the food waste hierarchy, causing pollution and leaving more South Africans hungry.

Short domestic flights could have cold snack-like meals for passengers to consume who is taking a 45min flight or hour and a half flight. These passengers are more likely not to consume a full meal (starter/main course/ dessert) within that time-period. This is an opportunity to save not only on food waste, but electricity and time for Air Chefs too.

An employee stated that there were a workshop with SAA in order to implement a better meal ordering system where passengers aren't forced to consume a meal just because they bought a plane ticket, but to rather decide whether they are going to consume a meal on the

flight and if so, what their choice of meal would be considering the meal options available due to costs and popular choice. This will eliminate a lot of untouched food which needs to be thrown to landfill because of policy matters. This will also help to understand the type of passengers and their preferences to meals for future menus.

In order to avoid landfill as much as possible, expired vegetables or fruits could still be used for soil fertilizers, manure, given to fly farms or farm who'd benefits from foods that's not good for consumption. Off cuts could be given to SPCA dogs or dogs in bad health conditions in order to make a difference in their lives instead of throwing it to landfill, only causing harm to the environment.

Air Chefs could implement stricter supervision and training on new employees working with the weighing and plating of food in order to ensure a smoother outcome on meeting the calculations that airlines expect and to not waste any food or have missed meals resulting in airlines not being able to depart.

Conclusions and recommendations

This study according to the Belmont report, stating the “ethical principles and guidelines for human subjects of research” is a study done based on “practice” as it does not involve medical or behavior practice to have an outcome which results in preventing therapy or providing diagnosis and treatment. It also does not aim to test a hypothesis, but rather gain an understanding as the method of data collection is qualitative and uses in-depth interviews, derived from interpretivism (Belmont Report, 1979:3).

According to du Plooy-Ciliers et al. (2014) there should be informed consent between the researcher and the participants, this study sent out consent forms to all participants involved in the process of the data collection through the in-depth interviews which are attached as annexures. They were also informed on the requirements of their participation, how their identities will be protected and how their answers to the questions will be used. This was done by sending the consent forms to the participants via email stating all the necessary information on the form for them to read through and sign if they accepted. A gatekeeper's letter was also sent to the company, Air Chefs SA in order to explain the nature of the research study and request that it could be performed which is attached as an annexure.

Only the researcher and supervisor will have access to the recordings. The participants also had the right to withdraw from any questions that they felt uncomfortable answering and the interview was structured. As questions in this study refers to Air Chefs and their views on the environment and food insecurity as well as their food waste management systems which was asked to different management individuals from the Cape Town and Johannesburg and facilities, the data will be kept private.

This research study avoided any harmful questions as its kept to the topic. Confidentiality and anonymity were of high protection as the names of the participants aren't mentioned, only the location in which the participants find themselves working, interviews were categorized by number (du Plooy-Cilliers et al., 2014).

The researcher performed ethically by not falsifying information as the recordings of every interview are linked as an annexure. The information was interpreted in a non-bias and non-distorting manner in order to ethically conduct this study and build a trustful relationship with stakeholders (du Plooy-Cillier et at., 2014).

Limitations

The limitation of this study refers to those aspects that are beyond the control of the researcher, other than delimitations which the researcher specifically decides on such as the choices made during the research process (du Plooy-Cilliers et al., 2014). One of the limitations of this study gathered through secondary research was a lack of information as to how Air Chefs SA manage their food or have an impact on the environment and society, thus other more sustainable airline catering brands were being looked at on a global scale.

Time was a limitation as this study was a cross-sectional study which ranged over 4 months, if there were more time in this study a second round of interviews could have been done based on the first round of interviews to ensure credibility and gather more in-depth understandings. The availability and response of the Air Chefs SA employees also put a limitation on this study as not all selected interviewees responded which then ended up with a smaller group of interviewees to work with. Another limitation was that Air Chefs SA has decreased in size tremendously after lockdown, which had an influence on the number of units, employees, flights, meals per day and food waste in general. But this information couldn't have been known without having the interviews with Air Chefs SA employees. Bias can also creep in as the research that was done on the researcher's behalf already creates perceptions and views of the data but was kept to the interpretation of the participants views

as much as possible (see Research limitations examples: 5 common limitations in dissertations and theses (Qual + Quant) – GradCoach).

Recommendations

The recommendations for practice within Air Chefs SA as discussed in the findings could be to follow up with the airlines that Air Chefs SA work with in terms of implementing a better meal ordering system and trying it out with business class which has less passengers in order to see whether food could be prevented from landfills and waste if the passenger's had a say whether they would like a meal on-board and what their choice of meal would be. Shorter flights could have easy to eat meals. A collaboration with an international catering company such as New Rest could be implemented to reduce international waste. Employees could be supervised more strictly in order to accurately calculate and weigh food during meal preparations. And more sustainable ways could be implemented to use food waste such as garden fertilizers, donation to farms and to unhealthy animals.

Recommendations for further studies could be to get a more in-depth perspective on passenger's recommendations and opinions to in-flight foods, sustainable packaging alternatives and what airlines can do from their side to prevent food waste.

This study aimed to contribute a broader perspective of how more sustainable measures could be implemented in the airline catering industry to contribute a more positive effect on food security and the environment in South Africa.

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Appendices A – Link to transcripts; Interview Recordings; Consent Forms; Gatekeepers letter

https://drive.google.com/drive/folders/1nMicu_8uqQeQHEnNaRvgZTwYTBZP7cVE?usp=sharing