



Post-flight food waste and corporate social responsibility at South Africa Airways: Perceptions of employees at Air Chefs South Africa

N.P. Sambo
Durban University of Technology
South Africa
npsambo02@gmail.com

D.C. Hlengwa*
Durban University of Technology
South Africa
dumisileh@dut.ac.za

Corresponding author*

Abstract

Passengers seldom eat all the food that they are served in-flight, therefore food waste generally forms a large part of cabin waste amid food insecurity, starvation and poverty in a greater part of Africa and globally. Airline kitchens are tasked to deliver a wide variety of high quality meals on board as part of the competitive strategy in the industry. Previous academic research quantified food waste to understand social behavior of specified groups and address portion sizes. There is no known study that has looked at airline catering food waste management in conjunction with the Food Waste Hierarchy (FWH) and Corporate Social Responsibility (CSR). The waste hierarchy is a management tool that concentrates on giving guidance on how waste can be prevented, reused, recycled and recovered before disposal. CSR aims at ethical corporate governance considering the people, the planet and profits (triple bottom line) instead of focusing on just the bottom line. It is a voluntary integration of social and environmental concerns into management strategies and business operations. Air Chefs is the market leader in the Southern Africa airline food services and provides food services for South African Air Express, South African Airlink and Mango Airlines. Data was collected at Air Chefs Johannesburg (which is the main kitchen) using a questionnaire. The study looked at food waste from all the inbound flights on domestic, regional and international routes and discovered that much of post-flight food (in some cases even in sealed states) was disposed. While the majority of respondents would buy some post-flight food items, they seemed to know a lot about why post-flight food gets disposed as very few of them had asked for permission to eat such food.

Keywords: Post-flight food waste, Waste Hierarchy, Corporate Social Responsibility, multi-culturalism

Introduction

According to Boyd (The Guardian, April, 2017) airlines generated waste to the tune of 5.2 million tons (about weight of 2.6 million cars) translating to 400 million £ in 2016 alone. Boyd also stated that all this food ended up in either incinerators and/or landfill sites. The South African Press Association (SAPA) reported in a news publication in 2013 that Air Chefs was disposing 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 millefeuille desserts. This problem is unfortunately expected to grow (even double in the next 15 years) as the airline industry also grows. 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. Jacobs and Hoeller of the business insider (2015) highlighted that prepared meals for inflight services cannot sit for more than eight hours before getting loaded onto a flight. In the instance where a flight is delayed or cancelled, meals are to be disposed of even before being loaded onto a plane.

According to the Food and Yard Waste Plan for Hong Kong (2014) food waste is detrimental to the environment if it ends up in landfills. It recommends through the Hong Kong Food Waste Management Hierarchy (2014) for waste to be minimized, donated, recycled or recovered as energy or nutrients instead of land filling. The paper looked at the feasibility of using the food waste hierarchy and CSR in the context of post-flight food waste in airline catering.

As indicated by Bond *et al* (2013), the world population was above seven billion people in 2011 and it is constantly on the rise. It is estimated to potentially reach 9.3bn by 2050. The rise in population will cause increased food demand by between 50-70%. Population growth, global warming and resultant climate change lead to food scarcity and starvation. It is estimated that in 2011 over 868 million people worldwide were grossly under-nourished. This figure translates to one in every eight people being under-nourished in the same world where Lipinski *et al* (2013) estimate that one third of global food supply goes to waste. It is on this note that the European Commission (2016) decries food waste as unethical, uneconomic, and environmentally unsound.

The airline catering industry in South Africa can play a role in helping to curb huge social and economic problems (Rok and Mulej, 2014) as a way of playing a part in addressing some of the United Nations' 17 Sustainable Development Goals, such as hunger. Lindgreen and Hingley (2009) acknowledge the fact that while the hospitality and tourism industry has created a lot of jobs, it also accounts for big amounts of food waste. Business sustainability is an evolving corporate management exemplar which requires careful consideration and integration with all operational and CSR practices (Singh & Nicolaidis, 2014).

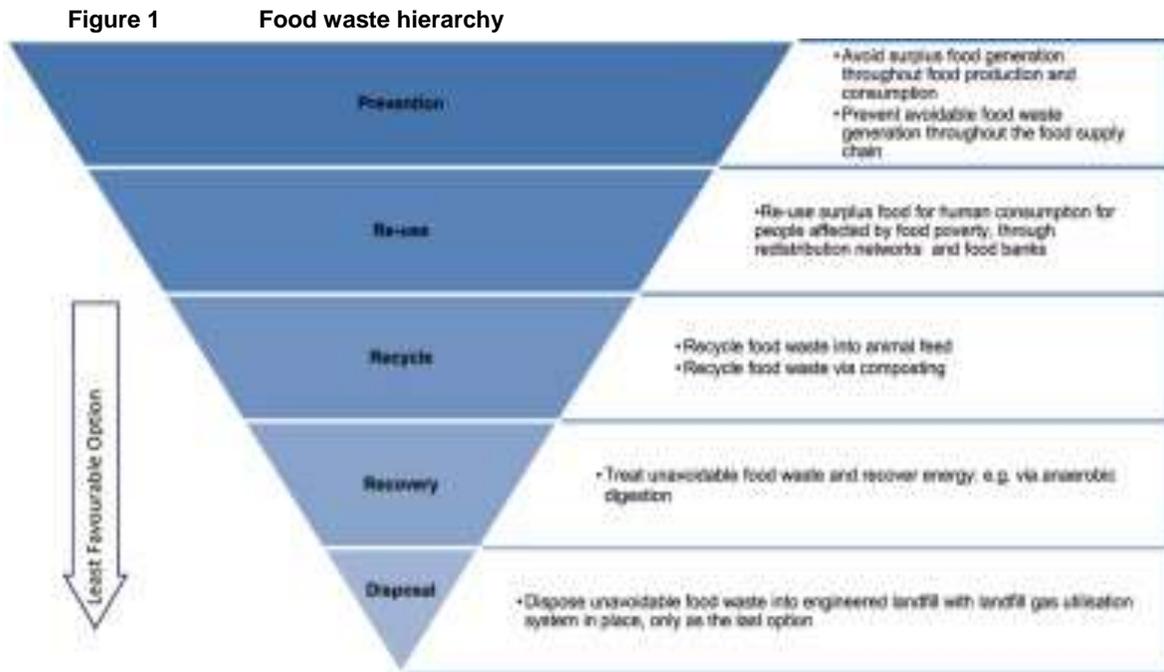
There is currently no economy class post-flight surplus food reuse policy in place at Air Chefs South Africa. Such a policy would govern the responsible reuse and recycling of post-flight food in South Africa where there are challenges in electricity supply (Asian Development Bank, 2010), food security (Schwabe *et al*, 2013) and where one in every five South Africans is not sure where their next meal would come from (FoodBank SA). Food wastage of any type or form is concerning, unsustainable and irresponsible from the environmental, social and economic points of view (Nahman *et al*, 2012).

Literature Review

The Food Waste Hierarchy (FWH)

The Food Waste Hierarchy (figure 1) is a management tool that recommends the procedures to be followed to manage food waste. It gives steps that can be used by food manufacturers, catering companies and homes to promote sustainability by finding ways to reduce the landfilling of food (Papargyropoulou *et al* (2014). The building blocks of the FWH are food waste prevention, food reuse, food recycling, energy recovery and as a last resort, food disposal.

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. Secondly, it recommends the reuse of surplus food for human consumption through donations to poverty stricken individuals, charity organizations and food banks. Thirdly, surplus food can be put back on the food chain through recycling for animal feeding or composting. Fourthly energy from food waste can be recovered through its use in fuel and as a last resort, disposal in land fill sites.



Source: Papargyropoulou, *et al* (2014)

According to Mejía *et al* (2014), fresh food products are often rejected by supermarkets and customers because they do not meet certain 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. Such food products are therefore viewed as unsellable and detrimental to corporate image are often rejected or discarded. While food donations are recommended in the food hierarchy, the establishment of food banks is avoided by governments as it can expose poverty and failure of a government to create jobs for people to feed themselves.

Corporate Social Responsibility (CSR)

When looking at academic studies on food waste such as those by Sonnino and McWilliams (2011), Whitehair (2013) as well as Vandermeersch *et al* (2014), it is clear 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 concept of CSR becomes a base of good corporate governance. CSR encompasses three major principles commonly known as the triple bottom line, aptly represented by figure 2.

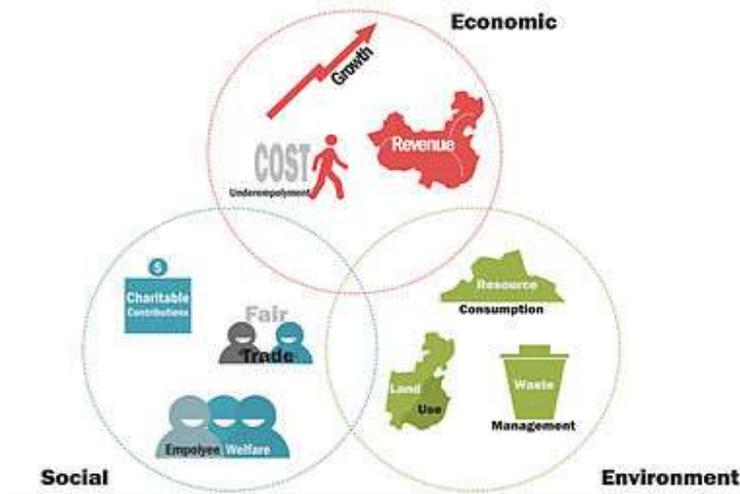


Figure 2: Triple bottom line Source: Slaper and Hall (2011)

As mentioned by Slaper and Hall (2011), the triple bottom line is an integrated reporting and accounting framework that demands for corporations to look beyond just profits or returns on investment, but to 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 organizational values, mission statements, policies on practice and operation procedures (Babiak and Trendafilova, 2011). When a company approaches CSR without depth and vision it can destroy its efforts to establish its brand and to enhance its reputation (Nicolaidis, 2017). It is through the use of the triple bottom line framework that private corporations have identified the need to align themselves with non-profit organisations to prioritize the wellbeing of the planet and its people (Slaper and Hall, 2011). Nicolaidis (2015) asserts that “Companies are obliged to develop strong cultures of CSR because it is the ‘right’ thing to do and not simply to enhance their strategic objectives. CSR should be based on a genuine virtuosity and a desire to engage with the moral values of society”.

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 (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 issue when they decry food waste as ‘shameful’. Schneider (2013) criticizes food waste as unethical due to negative social, environmental as well as economic impacts. Gill head of IATA environment is adamant that ‘donating uneaten food to charity is impossible’ (Boyd, 2017).

Parfitt *at al* (2010) posit that food waste is caused by many different factors depending on the economic standing of a nation. Evans *et al* (2013) on the other hand detest the very use of the word ‘waste’ when referring to food, stating that it carries the connotation that it must be disposed of. Mangena (2016) predicts that in the near future food will be like oil as wars may break out because of food scarcity. The more the world becomes a concrete jungle, the scarcer the food and the more expensive it will get. In Mangena’s view as urbanisation increases the poverty problem compounds because farming and food production become less attractive (Dubbeling *at al*, 2010) leading to rural-urban migration.

The Waste and Resources Action Programme's (WRAP) report (2009), Melikoglu *et al* (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) quantifies the amount of food that goes to waste to R32.5 billion each year in South Africa alone, while Inter-Parliamentary Union (2016) alerts about malnutrition being a 'silent emergency' with about 99 million people around the world being undernourished. The competitiveness of companies will progressively pivot on their social awareness and how they espouse CSR initiatives (Nicolaidis, 2017).

In a study by Kummu, *et al* (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 overemphasized in attempts to save the planet as per the principles of CSR and Sustainable Development Goals (SDGs). Assessing the actual food waste in mass and weight and in energy values is important, but food waste has a bigger impact than that. Weight and mass do not include the hidden costs of wasted resources, economic values of all waste and impact on the environment. Mason *et al* (2011) illustrate the hidden costs of food waste in figure 3. 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 lost if food is wasted. 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 often not included when quantifying food waste.

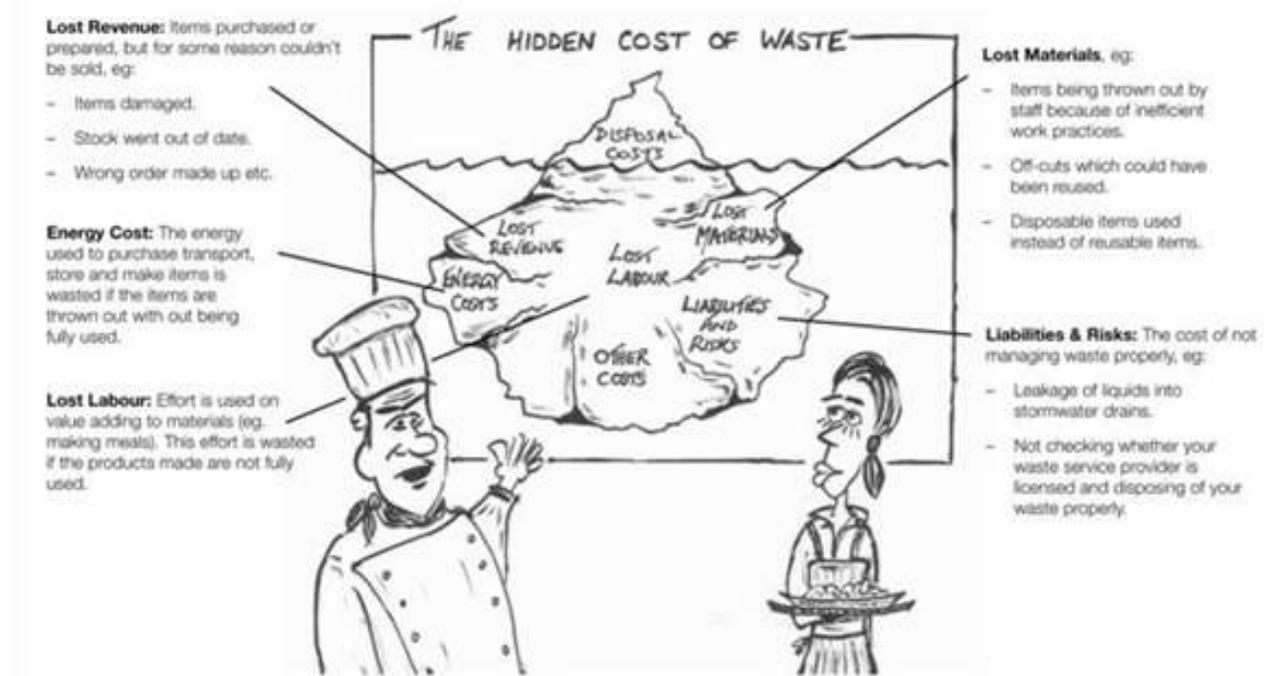


Figure 3: The hidden costs of food waste Source: Mason *et al* (2011:2)

Sloan *et al* (2013) observed that as much as the hospitality industry is becoming more aware of the need to better manage food to reduce waste, the implementation of food waste management initiatives is slow. The food waste hierarchy and CSR suggest that surplus food can be donated, and Garrone *et al* (2014) agree that donating surplus food to food banks can be a good management practice. Nicolaidis (2017) asserts that CSR is in essence a non-negotiable stance that should be adopted by all organisations which promotes their own sustainability as well.

CSR has thus been portrayed to have positive corporate benefits for all stakeholders (Singh & Nicolaidis, 2014). However, Assiouras *et al* (2013) investigated the relationship between the “product harm crisis” (PHC) and CSR and uncovered that food donation can have a negative impact on brand perception and corporate image. 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 that of donated food. Mohapatra (2014) is of the idea that the biggest fear that possible food donors have is being held responsible for food poisoning which they may not even be responsible for as food may be poisoned in the hands of charity organisations and those of the recipients.

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 reuse and recycling. This is happening in the same country where scores of people flock to residential areas on waste collection days to scavenge for food and other usable items from municipal bags. The Waste Act came into effect in 2008 with a strong intention to reduce the disposal of food waste into landfills in line with the waste hierarchy, however this act is yet to be seen in practice. The waste separation at source model which was created in 2015 is one such strategy that was designed to re-channel waste. This model identifies and categorizes waste management processes in the City of Johannesburg. Sadly though, food is regarded as a non-recyclable that has to go straight to landfill sites.

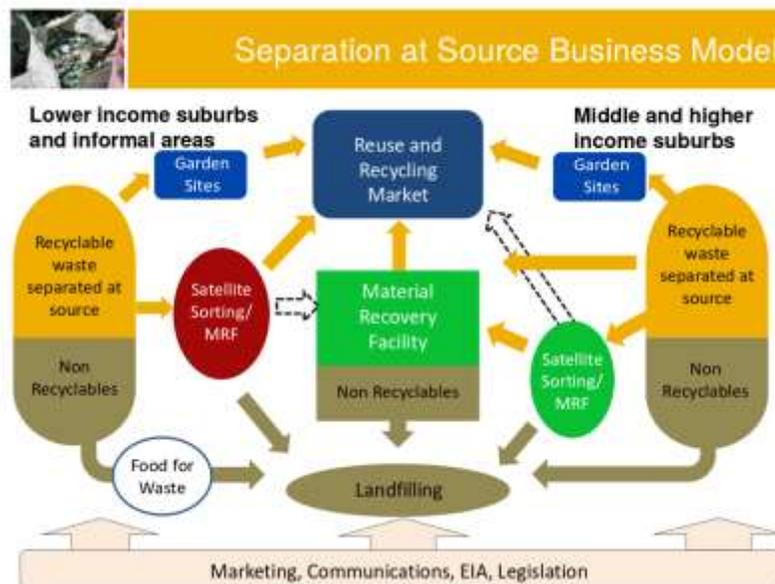


Figure 4: City of Johannesburg Separation at Source Business Model Source: de Beer (2015)



Food waste in the Airline industry

Beretta *et al* (2013) identified the food industry as the third largest contributor of waste. The industry's food and service are enjoyed by over one billion people worldwide. According to airport Lifestyle Online Magazine (2016) airline catering is dependent on the length of the flight. Jacobs and Hoeller (2015) pointed 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 with economy class getting meals on a standard tray and business and first classes served six to seven course high quality gourmet meals. Jacobs and Hoeller (2015) further estimated that in 2013 alone about 6.3 billion passengers traveled by air, producing more than 3.15 million tons of 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 *et al*, 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. It was shocking to discover that all food that returns from international flights is treated as potentially contaminated and burnt in large ovens upon arrival at a port of entry to avoid it from entering the country any further. 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 crisps, nuts and drinks not containing milk, not mixed with other food waste, within the expiry date and are individually wrapped are safe from burning.

Brown (2012) pointed 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, however due to the break in the cold chain it becomes a necessary evil to prevent food poisoning. 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 a science (that requires the understanding of the chemical and biological processes linked with perishability), a technology (that relies on physical means to insure appropriate temperature conditions along the supply chain and a process (it involves a series of tasks must be performed to prepare, store, transport and monitor temperature sensitive products).

According to Arnott (2006) the airline industry is governed by strict hazard analysis and critical control points (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. In spite of all these mechanisms, Hasachoo and Masuchun (2015) argued that the challenges in this 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.

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 is responsible to communicate the menu items to the cabin crew through the galley brief document. 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. In a study conducted by Barnett, *et al* in 2012 to understand the strategies used by international travelers with allergies, participants stated that airlines were inconsistent in their catering and that there was a lack of information on ingredients. In most cases, such passengers tended to take their own foods onboard to ensure their own safety resulting in the return of meals prepared for them.

Waste collection procedure at Air Chefs

Onboard food on South African Airways aircrafts is stored in galley chillers which are fixed in most aircraft. In instances where there are no chillers it is standard operating procedure to use dry ice to maximize food safety by keeping all food items within the cold chain.

The first point of food waste collection is done onboard the aircraft by cabin crew into meal trolleys and bins (SAA Service Standards Manual, 2014). According to the Waste and General Waste Policy (2014), Air Chefs then collects the waste from the aircraft after landing. It then follows a waste collection and handling process as illustrated in the waste process flow diagram (Figure 5).

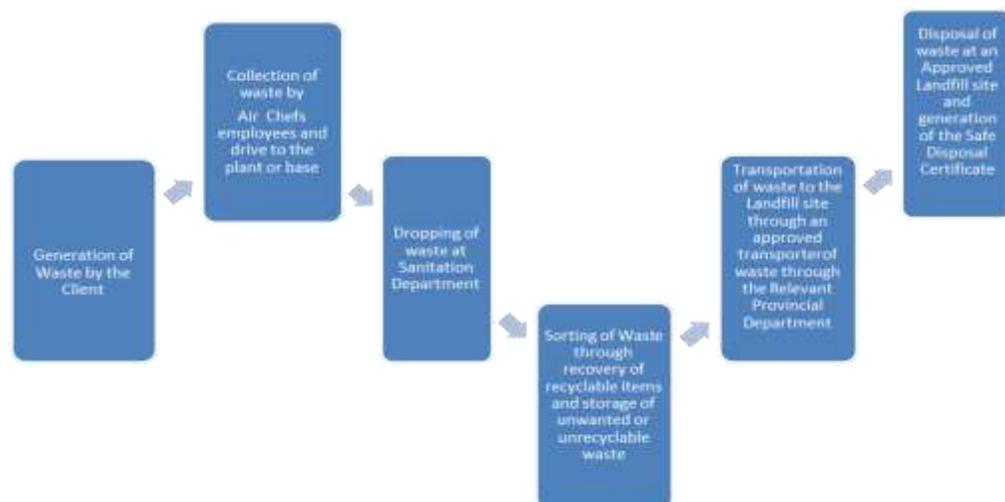


Figure 5: Waste process flow diagram (2016) Source: Air Chefs Waste and General Waste Policy (2014)

The Air Chefs Waste Policy (2016) states that general waste, including food waste, is collected by Air Chefs and taken to their base. Waste is then dropped off at the sanitation area where it is sorted for recovery of recyclable materials. None recyclable waste is thereafter transported by the authorized waste collector, Interwaste in this case, to landfill sites where it is disposed of. After disposal, a safe disposal certificate is generated at the approved landfill site.



Methodology

This study adopted a quantitative approach to data collection and analysis. Air Chefs South Africa was used as a case of study to investigate post-flight food management. Quantitative data were collected from the respondents using questionnaires designed to establish their knowledge, feelings and perceptions regarding the management of post-flight food waste at Air Chefs. Ethical clearance was obtained prior to the study. Non-probability convenience sampling was used as the researcher issued 200 questionnaires to employees that were present at work on the day chosen to collect the data. Air Chefs employs a total of 1175 employees, 1004 at the Johannesburg base, 107 in Cape Town and 64 employees in Durban (Air Chefs presentation, 2016). The total sample (200) formed about 20% of the employees of Air Chefs at the Johannesburg base and about 17% of the total number of employees of the company (1175).

The Johannesburg base was 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 of the total employees and has the biggest catering capacity (Air Chefs presentation, 2016).

The services of a statistician were sourced to analyze quantitative data and generate graphs, cross tables and inferential statistics (Kaplan *et al*, 2014).

Findings

This section presents and analyses data collected from the sampled employees of Air Chefs regarding their perceptions of post-flight food waste. As stated earlier, 200 questionnaires were issued to respondents. The questionnaire was designed to collect mainly quantitative data which was then cross-tabulated by the length of employment at Air chefs. Even though 200 questionnaires were issued, respondents did not answer certain questions meaning that some data were based on less responses than the expected 200.

Why would you eat post-flight left-over food?

Figure 6 presents the reasons for employees not eating post-flight food. Respondents were allowed to select more than one option to this question. An overwhelming majority (91.0%) would not eat it because they were provided with staff meals and there was always enough food to eat (100%), while 79.0% would not eat it because of company policy. Another significant number (80.0%) would not eat it because of the poor sanitation in the sanitation area. Interestingly, just below $\frac{2}{3}$ (60.0%) would not eat post-flight food waste for fear 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. Another 70.0% would not eat post-flight food waste for unspecified reasons. None of the respondents (100%) stated fear of humiliation as a reason for not eating post-flight food.

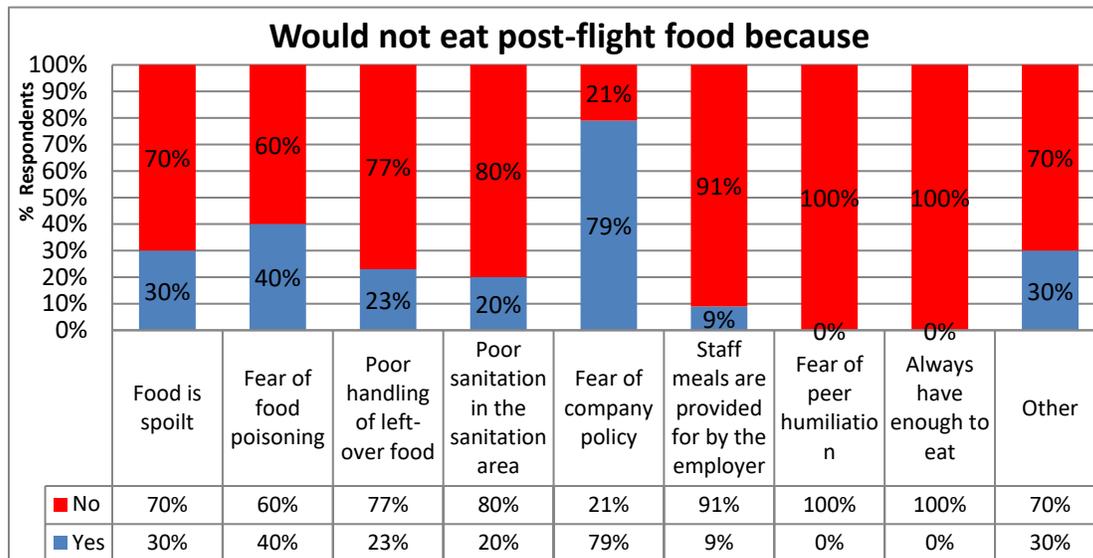


Figure 6: Why respondents would not eat post-flight food

If surplus post flight food was sold which would you buy and why?

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 feature in most questionnaires. Cold foods, cooked foods, sandwiches and cheese also featured even though not across most respondents as foods that they would buy if sold.

Questions Cross Tabulated by Length of Employment

Have you 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. The category that had the biggest number was the one that had worked at Air Chefs for 7mnts-2yrs (39.2%). This category was followed by 2-5yrs at 36.7%. The biggest number that had eaten post-flight food came from the 2-5yr category at 10.6% followed by the 7mnts-2yrs category at 9.0%.

Do you directly handle post-flight 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%. The majority of respondents had been with the company for a period of 7mnts-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 5yrs (15.1%).



Is post-flight food 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%. The majority of the respondents came from the two categories who had been with the company for 7mnts-2yrs (39.2%) and those that had been with the company for 2-5yrs (36.7%). It was noteworthy 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 7mnts- 2yrs category (29.1%) followed by the 2-5yr category at 21.6%. Some of the respondents (28.1%, n=56) across all the years of service in the company felt that post-flight food was often edible and only 9.0% across all the categories thought that post-flight food was never edible.

Are you comfortable 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 at least $\frac{1}{5}$ (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 0-6mnts of service were never comfortable (0.0%) and they also did not select always among the alternatives.

In response to the question of whether they would buy surplus food and post-flight food. The data reveals that employees generally didn't differ significantly in their responses. Of the 190 respondents who responded to this question, fascinatingly 94.7% (n=180) employees across all years of employment would buy it and only 5.3% (n=10) wouldn't buy it. Surplus food seemed to be understood differently to post-flight food, as food that did not even get onto the plane.

Post-flight food should be reused.

Another question was whether post-flight food should be reused. Almost all the respondents answered this question (n=191, 95.5%). Of the 191 respondents who responded, the majority of them, at 96.3% across all years of service (n=184) seemed to think that post-flight food should be reused, and an insignificant 3.7% responded thought it should not.



Table 1: Cross tabulation on whether post-flight food should be reused -Length employed at Air Chefs

		Length employed at Air Chefs				Total	
		0-6 months	7 months- 2 years	2-5 years	> 5 years		
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%	

Statistical Discussion

This section of data analysis discusses the patterns of scoring. Data grouping was used to discuss and identify patterns that were related. This analysis aimed to determine whether responses were significantly different in their different groupings. According to Bertram and Christiansen (2014: 170) the chi-square test is a procedure that is used to test relationships between different variables. Any scoring that is 0.05 and below is regarded as significant. Table 2 illustrates the Pearson Chi-Square test results to determine the relevance of each question cross-tabulated by the length of employment at Air Chefs, with the highlighted values showing either positive or negative significance in the relationship between the variables.

The chi-square analysis revealed a high level of significance for the in the cases of post-flight food being edible (0.018), whether the respondents were comfortable throwing away post-flight food (0.044) and whether post-flight food should be reused (0.007). This means that in the case of these questions there were some association (0.044) as the shorter the length of employment, the more uncomfortable they were throwing away post-flight food. The significance of association with length of period of employment was stronger in cases of post-flight food being sometimes edible (0.018) and even stronger in the case of reuse of post-flight food (0.007) as the fewer the years of employment, the more the respondents felt that post-flight food should be reused.

Table 2: Chi- square analysis

Cross tabulation Pearson chi-square analysis	
Question	Time Employed
Ever eaten post-flight food	0.221
Do you directly handle post-flight food waste?	0.272
Is post-flight food edible?	0.018*
Are you comfortable throwing away post-flight food?	0.044*
Employees take some of the food if given to them	0.234



Some food thrown away edible to donate to the poor	0.64
Employees request management's permission to eat some of the post-flight food	0.303
Would buy surplus food	0.464
Post-flight food should be reused	0.007*

Conclusion

Food waste of any kind is appalling when considering the levels of poverty, and starvation especially on the African continent. The respondents seemed to have been trained in handling post-flight food and quite knowledgeable about possible dangers of eating it. It was a consolation to find that at least about 20% (19.6%) were never comfortable throwing away post-flight food. The issue of post-flight food waste has been looked into from the lenses of the food waste hierarchy and corporate social responsibility.

If countries such as South Africa and their businesses especially those in the food industry are to play a role in helping achieve some of the Sustainable Development Goals and be socially responsible, food waste of any nature should be minimized. The separation at source business model needs to be reviewed so that it does not regard food as non-recyclable and recommend sending it straight for landfilling.

A new food separation and management model is required. This model treats food waste as reducible through selection of dietary requirements on booking, treats some food as recyclable and allows for rechanneling to areas of need before landfilling and composting. The airline catering companies together with the airlines that they serve should reduce waste through dietary selection on booking, sort unused food, re-channel food to cheap shops meant for this purpose and donate it to homes of people that require such relief (Figure 7 on next page).

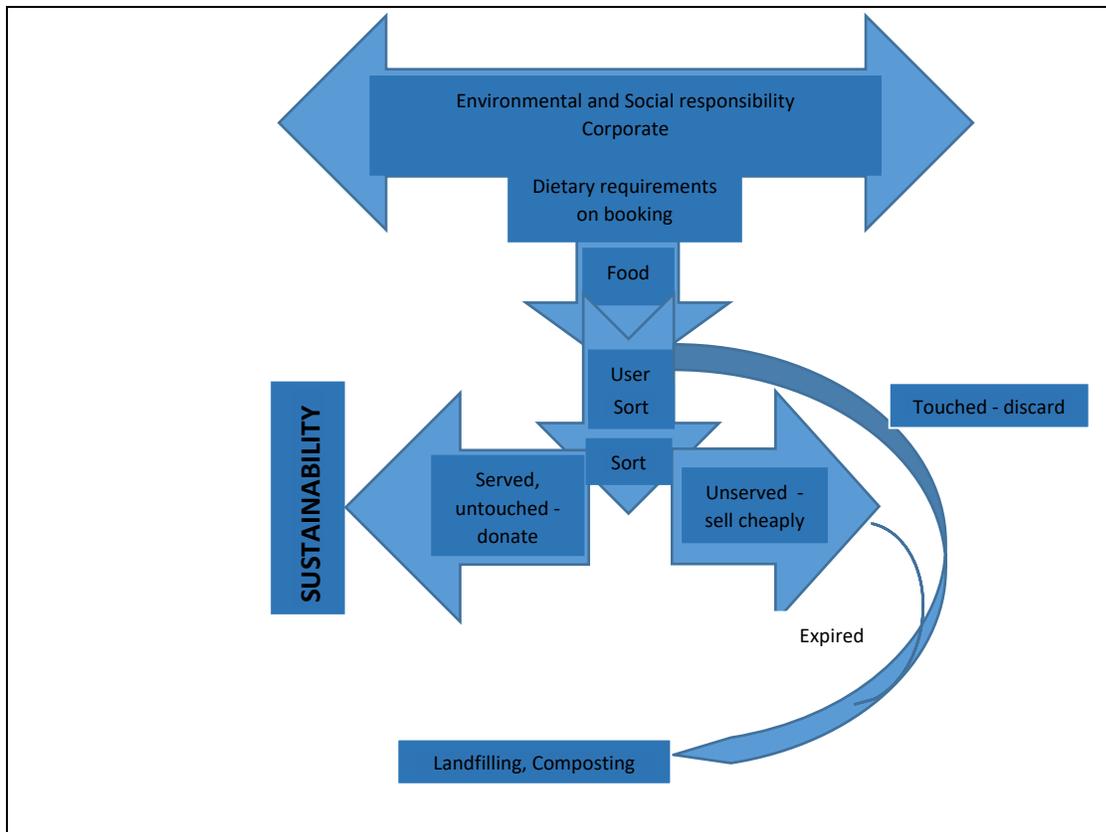


Figure 7: Waste prevention, separation and reuse model

References

- Air Chefs Waste and General Waste Policy. (2014). Internal documents. Available: [http://www.Air Chefs.co.za/](http://www.AirChefs.co.za/) [Retrieved: March 2017].
- Air Chefs Waste Management Policy. (2016). Available: [http://www.Air Chefs.co.za/](http://www.AirChefs.co.za/) [Retrieved: March 2017].
- Air Chefs presentation. (2016). Internal documents. Available: [http://www.Air Chefs.co.za/](http://www.AirChefs.co.za/) [Retrieved: March 2017].
- Arnott. E. (2006). *A New Beginning in Sight. Disposal of waste.* CRC Press.
- Asian Development Bank. (2010). *Key Indicators for Asia and the Pacific.* Available: <http://www.adb.org/publications/asia> [Retrieved: July 2017].
- Assiouras, I., Ozge, O. & Skourtis, G. 2013. The impact of corporate social responsibility in food industry in product-harm crises. *British Food Journal.* 115(1): 108-123.
- Babalola, E. (2013). Available: <http://environment.yale.edu/yer/article/valuing-south-africas-food-waste> [Retrieved: November 2017].



- Babiak, K. & 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.
- Barnett, J., Botting, N., Gowland, M.H. & Lucas, J.S. (2012). The strategies that peanut and nut-allergic consumers employ to remain safe when travelling abroad. *Clinical and Translational Allergy*, 2(12).
- Beretta, C., Stoessel, F., Baier, U. & Hellweg, S. (2013). Quantifying food losses and the potential for reduction in Switzerland. *Waste Management*, 33: 764-773
- Bertram, C. & Christiansen, I. (2014). *Understanding Research: An introduction to reading research*. Pretoria: Van Schaik
- Bond, M., Meacham, T., Bhunnoo, R. & Benton, T.G. (2013). Food waste within global food systems. A Global Food Security report. Available: www.foodsecurity.ac.uk [Retrieved: May 2017].
- Boyd, O. (2017). The ridiculous story of airline food and why so much ends up in landfill. The Guardian. Available: <http://www.theguardian.com> >... >Waste [Retrieved: March 2017].
- Brown, D. (2012). Behind the scenes: how Singapore airlines prepare its meals. Available from: <http://www.airlinereporter.com/2012/03/behind-the-scenes-how-singapore-airlines-prepare-their-meal-service/> [Retrieved: November 2017].
- Dubbeling, M., Zeeuw, H. & Veenhuizen, R. (2010). Cities, poverty and food: multi-stakeholder policy and planning in urban agriculture 2010.
- El-Mobaidh, A., Razeq Taha, M. & Lassheen, N. (2006). Classification of in-flight catering wastes in Egypt air flights and its potential as energy source (chemical approach) *Waste Management*, 26(6). Available: <http://doi.org/10.1016/j.wasman.2005.02.022> [Retrieved: July 2017].
- Environment Bureau. A food waste and yard waste plan for Hong Kong. 2014. Hong Kong. Available: <http://www.enb.gov.hk/en/files/FoodWastePolicyEng.pdf> [Retrieved: August 2017].
- Evans, D., Campbell, H. & 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).
- European Commission. (2016). Food waste. Available: ec.europa.eu [Retrieved: November 2017].
- Freedman, M. R. & Brochado, C. (2010). Reducing Portion Size Reduces Food Intake and Plate Waste. *Obesity Journal*, 8, 1864-1866.
- Garrone, P., Melacini, M. & Perego, A. (2014). Surplus food recovery and donation in Italy: the upstream process. *British Food Journal*, 116(9), 1460-1477.
- Hasachoo, N. & 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.
- Inter-Parliamentary Union. (2016). Available: archive.ipu.org > Inter-Parliamentary Union > English news2 [Retrieved: July 2017].



- Jacobs, S. & 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. Available: <http://www.businessinsider.com/airline-food-facility-tour-reveals-shocking-secret-about-waste-2015-10> [Retrieved: March 2017].
- Jones, P. (2004). Flight-Catering. Catering – Management. Hamburg Chpt 1: 39-55.
- Kaplan, J. J., Gabrosek, J. G., Curtiss, P. & Malone, C. (2014). Investigating student understanding of histograms: *Journal of Statistics Education*, 22(2).
- Kummu, M., de Moel, H., Porkka, M., Siebert, S., Varis, O. & Ward, P.J. (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, 477-489.
- Lifestyle Online Magazine. (2016). Available: www.onlinenewspapers.com/magazines/magazines-lifestyle.htm [Retrieved: August 2017].
- Lindgreen, A. & Hingley, M. K. (2009). The new cultures of food: Opportunities from Ethnic, Religious, and Cultural Diversities. Gower Publishing, (xix-xxi).
- Lipinski, R., Hanson, C., Lomax, J., Kitinoja, I., Waite, R. & Searchinger, T. (2013). Reducing Food Loss and Waste. Available: http://www.wri.org/sites/default/files/reducing_food_loss_and_waste.pdf [Retrieved: August 2017].
- Mangena, A. (2016). Forbes Magazine Africa, Issue February 2016.
- Mason, L., Boyle, T., Fyfe, J., Smith, T. & 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. & Agudelo, I. (2014). Food donation: An initiative to mitigate hunger in the world.
- Melikoglu, M., Lin, C. S. K. & 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.
- Mohapatra, T. (2014). Why Don't More Businesses Donate Excess Food? Available: <http://www.triplepundit.com/2014/10/day-city-harvest-dont-businesses-donate-excess-food/> [Retrieved: July 2017].
- Nahman, A., De Lange, A. & Oelofse, S. (2012). Quantifying and valuing post-consumer food waste in South Africa. Available: http://researchspace.csir.co.za/dspace/bitstream/10204/6339/1/Nahman1_2012.pdf [Retrieved: July 2017].
- Nicolaidis, A. (2017). Promoting ethical Corporate Social Responsibility in the Events Industry, *African Journal of Hospitality, Tourism and Leisure*, 6(1).
- Nicolaidis, A. (2015) The Events Industry Managing Corporate Social Responsibility in a Global Context, *Journal of Economics*, 6:1, 50-61, DOI: 10.1080/09765239.2015.11885016
- Papargyropoulou, E., Lazano, R., Steinberger, J., Wright, N. & 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. & Macnaughton, S. (2010). Food waste within food supply chains :quantification and potential for change to 2050. *Philosophical Transactions of the Royal Society B*, 365, 3065–3081.

Rodrigue, J. & Notteboom, T. (2013). *The Cold Chain and its Logistics*. Third edition, New York: Routledge.

Rok, M. & 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).

SAA Service Standards Manual: Revenue Accounting (2014). Available: <http://www.flysaa.com> [Retrieved: March 2017].

Schwabe, K., Albiac-Murillo, J., Connor, J.D., Hassan, R. & Meza González, L. (Eds). (2013). *Drought in Arid and Semi-Arid Regions: A Multi-Disciplinary and Cross-Country Perspective*. Springer Science and Business Media, Dordrecht.

Singh, C. & Nicolaides, A. (2014). "A Conceptual Framework for a Sustainable and CSR driven Enterprise" [online], *African Journal of Hospitality, Tourism and Leisure*, 3(2): 1-15. Available from <<http://www.ajhtl.com/archive.html>>

Slaper, T.F. & 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. C. & Chen, J. S. (2012). *Sustainability in the hospitality industry: Principles of sustainable operations*. New York: Routledge.

Sonnino, R. & Mc Williams, S. (2011). Food waste, catering practices and public procurement: A case study of hospital food systems in Wales. *Food Policy*, 36(6).

South African Press Association (SAPA) reported in a news publication in 2013. Available: <http://www.timeslive.co.za/local/2013/01/27/SAA-air-chefs-dumps-food-report> [Retrieved: September 2017].

The Food Bank SA. (2009). Available: <https://foodforwardsa.org/about-us/> [Retrieved: March 2017].

The Waste and Resources Action Programme's (WRAP) report. 2009. Available: Accessed from <http://www.wrap.org.uk/sites/files/wrap/WRAP%20Annual%20Report%202009-10.pdf> [Retrieved: July 2017].

Tielens, J. & Candel, J. (2014). Reducing food wastage, improving food security? Food & Business Knowledge Platform. Available: <http://knowledge4food.net/wp-content/uploads/2014/07/140702fbkpreport-foodwastageDEF.pdf> [Retrieved: September 2017].

Vandermeersch, T., Alvarenga, R., Ragaert, P. & Dewull, J. (2014). Environmental sustainability assessment of food waste valorization options. *Resources, Conservation and Recycling*, 87, 57-64.

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*, 113(1), 63-69.