UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

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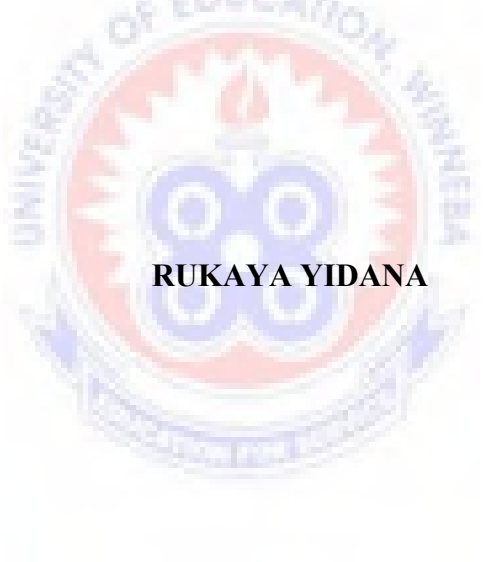

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APRIL, 2021

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A Dissertation in the Department of HOSPITALITY AND TOURISM EDUCATION, Faculty of VOCATIONAL EDUCATION, submitted to the School of Graduate Studies, University of Education, Winneba, and in partial fulfillment of requirement for the award of the Master of Technology (Catering and Hospitality) degree.

APRIL, 2021

DECLARATION

STUDENT'S DECLARATION

I, RUKAYA YIDANA, declare that this Dissertation, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

SIGNATURE…….....……

DATE…….....…….....

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of Dissertation as laid down by the University of Education, Winneba.

NAME OF SUPERVISOR: DR. DOREEN DEDO ADI

SIGNATURE:.....…….....

DATE:…….....

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DEDICATION

This project is dedicated to my lovely husband Mr. Ayuba Akurigu Bukari, my children Hashmat and Suguru my dearest mother Mama Safuura Salifu and the entire family

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ABSTRACT

Food waste has always been an issue in kitchens of all sizes. It is, however, seen a lot more in commercial kitchens where there are high volumes of food waste generated. The generation of food waste in the kitchen causes a significant financial loss for the educational institutions and also contributes to natural resource depletion, Green House Gas (GHG) emissions during final disposal in landfills. The study aimed at assessing food waste management in the kitchens of Senior High Schools (SHS) in the Bolgatanga Municipality. The research design adopted for the study was survey. The population of the study included 64 kitchen staff identified at the four (4) boarding senior high schools in the Bolgatanga Municipality. Fifty-six kitchen staff were sampled using simple random sampling technique. Questionnaire was used for collecting the necessary information. The data gathered were processed using the statistical software packages, SPSS version 23.0. The finding indicated that leftovers foods, discarded food items, and purchasing ingredients more than needed are the type of waste generated. The finding showed that the kitchens does not have control over purchasing of food items, and have poor practice towards proper preparation of food to avoid waste generation. The study found that the kitchens had poor practices towards management of food wasted generated. The result showed that developing a food waste management policy ensures better planning of purchases by 78%, and better knowledge on how to use leftovers by 69.3%. The study concluded that proper strategies can reduce food waste generations towards sustainable food waste management. It was recommended that the school authorities should establish internal audit team and audit food waste generation by measuring the present food waste levels and identify the key sources of food waste generation.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Food waste is an unsustainable, economically negative, environmentally wrong and morally unacceptable phenomenon (Barr, 2017). According to the report by Food and Agriculture Organization (2013), food waste exacerbates the inefficiency of the food chain, thus contributing to food and nutrition insecurity. Food waste lead to a major squandering of resources including water, land, energy, labour and capital. The potential that lies in the elimination of waste along the food chain thus making more food available to consumers should be highly considered by policies and research agendas related to the agri-food sector (Barr, 2017).

Food waste has become a hot issue in recent years (Mashad & Zhang, 2010). The food waste includes uneaten food and food preparation from residences, commercial establishments such as restaurants, institutional industrial sources like school cafeteria and factory lunchrooms (Mashad & Zhang, 2010). Most foodservice operation throw out a massive amount of garbage, most of which could be diverted. Seventy five percent of material in today's landfill is recyclable or compostable, while 50-70 percent of the weight of a foodservice operation's garbage consists of compostable food items. Food waste is a growing issue, and the disposal of it is controversial, causing increased food prices and the resources required (Mashad & Zhang, 2010*;* Alvarez et al. 2000; Wang et al*.,* 2005).

Food and Agriculture Organisation (2017) reported that with the remarkable growth of the food service industry in developing countries like Ghana, the issue of food waste management has received increased attention, both in practice and in the

scientific literature. Data suggests that this growth will continue, and as with any increase in the business sector, increased waste is inevitable. Adu-Boahen et al. (2014) reported that in Ghana, millions of families, work places, schools, restaurants and food marts waste food on a regular basis. Adu-Boahen et al. mentioned that raw, or processed foods are thrown away for a "lack" of consumers or expiration of products. According to the Global Food Security (2014), over 5.6 million people in developing countries like Ghana live in poverty and cannot afford basic food, yet 15 million tonnes of food go to waste annually. The Ministry of Food and Agriculture (MOFA) (2013), reported that Ghana lost $8.9 billion to both avoidable and unavoidable food wastage with the highest occurring with the distribution and consumer level of food supply chain. This wasted food finds way into landfills, creating the greenhouse gas methane and other heterogeneous gases which is a significant concern for society. Economic concern is that this does not account for the wasted energy, water, labor, and other inputs that go into growing, processing, and transporting food from farm houses to consumers.

The amount of food generated and disposed by kitchen staffs varies significantly, with waste increasing as disposable incomes rise. Kitchen waste consisted of vegetable peels, spoiled fruits, food remains after consumption, spoiled food and other eatable items, meat waste, fish waste etc (Simon et al., 2013). Vegetable peels, cereal remains, cooked food remains and spoilt food are the most regularly generated kitchen waste (Simon et al., 2013). A study in Ghana by Kodwo, et al., (2015) affirmed that food waste arguably causes a significant financial loss for the entire institution; with improved management, this loss can be substantively decreased. Indeed, with operating profit margins falling to 4.2%, the financial benefit

of reducing food waste is apparent. It is possible and desirable for the food service industry to reduce food waste in order to optimize cost reduction and sustainability.

1.2 Statement of the Problem

Today, the cry of environmental pollution is heard from all nooks and corners of the globe and pollution has become a major threat to the very existence of mankind. Households, educational institutions and business outlets like hotels, restaurants, and resorts are left with large quantities of foods after daily business activities. With this situation, almost all the food wastes generated in Ghana from different sources such as households, commercial activities (e.g., restaurants, food courts and supermarkets) beverages industries are disposed of to landfills, which is the traditional disposal system for long time due to the availability of vast disposal lands. This is because landfill is the most common disposal method for developing and even developed countries, due to the fact that it is simple to manage and economical as well.

Food waste has always been an issue in kitchens of all sizes. It is, however, seen a lot more in commercial kitchens where there are high volumes of food. Commercial kitchens focus on different types of food, which means different ways of preparing food and ultimately should minimize food waste. The generation of food waste in the kitchens of educational institutions are caused by over or non-appropriate purchasing, bad storage conditions, over-preparation, portioning and cooking as well as confusion between the terms ‘‘best before’’ or ‘‘use by’’ dates. The generation of food waste in the kitchen causes a significant financial loss for the educational institutions and also contributes to natural resource depletion, Green House Gas (GHG) emissions during final disposal in landfills.

It becomes irritating to say that the food waste generated by kitchen staffs at the various educational institution are dump any how at the various bushes in the school as if "it is no one's business to ensure that the environment ought to be clean at all times to guarantee good health. The problem of food waste management has been articulated and is not only a problem at various households, hotels and restaurants in Ghana but as well has kitchens of educational institutions in Ghana. Meanwhile, documentation in the kitchen of educational institution practices towards sustainable food waste management have not been specifically given great attention by previous researchers and hence, the need for this study to examine current practice of senior high schools towards sustainable food waste management from purchasing of food resources to food wastes disposal.

1.3 Main Objective

The main objective of this study is to assess food waste management in the kitchens of Senior High Schools (SHS) in the Bolgatanga Municipality.

1.4 Specific objectives of the Study

The specific objectives of the study were:

1. To investigate the type of food wastes generated by kitchens of SHS in the Bolgatanga Municipality.
2. To assess the practices by kitchens of SHS towards sustainable food waste management.

1.5 Research Questions

The following research questions guide the study

1. What are the type of food wastes generated by kitchens of SHS in the Bolgatanga Municipality?
2. What are the practices by kitchens of SHS towards sustainable food waste management?

1.6 Significance of the Study

The contribution of this study can provide a comprehensive description of the current practices of food waste management in the kitchen of senior high schools in the Bolgatanga Municipality and most of the wasteful processes could be identified. This can evidently guide the waste minimisation strategy by informing where the focus should be and which recommendations could have a greater impact in reducing food waste in the kitchen.

From the study, the other stakeholders may use the findings in strengthening policies related to waste management. The findings of the study may provide information on the food wastes generated by kitchens of senior high schools. Finally, the research would serve as essential source of reference to future researchers who would be researching into this problem and its related studies.

1.7 Scope of Study

Geographically, the study area covered senior high schools in Bolgatanga Municipality. Contextually, the study focused on food wastes generated by senior high schools, practices towards sustainable food waste management in senior high

schools, and integrated strategies for reducing food waste generations towards sustainable food waste management.

1.8 Organisation of the Study

The research work is presented in five (5) chapters. Chapter one provides a general introduction to the research. It analyses the extent of the problem, objectives of the study, research questions, scope of the study and addresses the significance of the study. Chapter two examines existing literature on food waste management. That is concepts, processes and methods of managing food waste.

Chapter three describes the methodology employed in gathering data from the field. These included the study area, research design, population, sample size and sampling technique, data collection instrument and data analysis. Chapter four analyze the findings gathered from field and chapter five summarises the key findings of the study, recommendations and conclusion.

CHAPTER TWO

LITERATURE REVIEW

2.1 Theoretical Foundation of the Study

This study is anchored on four theories that includes, resource-based view, institutional theory, resource dependence theory, and stakeholders' theory.

2.1.1 Resource Based View (RBV)

The resource based view holds that firms can earn supra-normal returns if they have superior resources and the resources are protected by some form of isolating mechanism preventing their diffusion throughout the industry (Hibbets, Albright, & Funk, 2003). According to resource based view, organizations that own "strategic resources" have important competitive advantages over organizations that do not. A strategic resource aid in improving the organization's effectiveness and efficiency while neutralizing the opportunities and threats of competitors (Muhittin & Reha, 1990). Jay Barney who is considered as the father of modem RBV suggests that, there can be heterogeneity or firm level differences among firms that allow some of them to sustain competitive advantage. Therefore, the RBV emphasis on strategic choice, changing the firm's management with the important tasks of identifying, developing and deploying key resources to maximize returns (Razzaque & Sheng, 2009). Although the hotel industry is extremely competitive, hotels that practice waste management practices turn a profit virtually every year. The capacity of a firm to cooperate and coordinate resources is seen as an intangible resource and earning positive returns on the value of resources depends on its sustainability.

Although many food service operators offer similar products, the resource

competencies of brand image, waste management, human resources and information technology can differentiate each from its competitors (Hibbets et al., 2003). This theory is of relevance to the study because the current situation in the hotel industry is characterized by increased competition and consequently demands effective operational decision-making processes based on sufficient performance information. As a result, the hotels need to use the scarce resources efficiently, analyze and measure the performance of all services that play a crucial role in hotel organizations. In any case, there is an increased need for performance measurement and waste management tools that facilitate the development of organizational waste management strategies and the assessment of the success of organizational operational performance (Cruz, 2007). To measure the performance of hotel organizations, traditional measures such as cost reduction have been valued as an important control tool (Brander & Atkinson, 2001). In these traditional measures, tangible resources are well recorded because they meet criteria such as the flow of benefits to the company and the accurate determination of historical costs (Zambon, 2002).

2.1.2 Institutional Theory

Institutional theory of organization provides a rich complex view of the organization. The theory states that, organizations are influenced by normative pressures, sometimes arise from external sources such as state, other times arising from within the organization itself. The theory further argues that, under some conditions, these pressures lead the organization to be guided by legitimated elements from standard operating procedures to professional certification and state requirement, which often have the effect of directing attention away from task performance. Delmas and Toffel (2003) developed a model of institutional pressures on

environmental management which integrated institutional pressures with characteristics of organization to explain the adoption of waste management practices at a facility. Based on the Institutional theory, Delmas and Toffel model illustrated that, stakeholders' actions are moderated by the firm's own characteristics to adopt waste management practices.

The application of the institutional theory to waste management is an area that is currently in its infancy (Ketchen & Hult, 2007), particularly when the attention of focus is on sustainability of the environment and greening supply chain in food service operators (Etzion, 2007). The strength of institutional theory in this study is it has been used extensively in studies exploring environmental management organizations (Delmas, 2004; Bansal 2005) and it offers explanations of why certain practices are chosen without an obvious economic returns (DiMaggio & Powell, 2003). The theory is key to this study because it will be used to explain how changes in social values, technological advancements and regulations affect decisions on "green" sustainable activities (Ball & Craig, 2010) and waste management (Hoffman &Ventresca, 1999, Fowler & Hope, 2007).

2.1.3 Stakeholders' Theory

As stated previously, organizations are redefined by stakeholder's theory as a grouping of stakeholders and purpose of the organization should be to manage the interests, needs and viewpoints of these diverse stakeholders. In order to ensure stakeholders rights and participation in decision making, the management of organizations has responsibility to manage the organizations to benefit all stakeholders (Freeman, 2004). Business need to identify the needs of their stakeholders and strive to meet their maximum expectations (Kotter, 2006). Therefore success of any company depends on how the management manages the relationships

with stakeholders. Thus without support of stakeholders, there is no reason for a firm to exist (Libido Ten, 2007). According to Freeman (2004), stakeholders are those groups who are vital to the survival and success of the corporation.

Waste management issues are regarded as a part of the overall social responsibility of firms and are best approached by stakeholders' theory (Crespedes, 2003). Gurumurthy (2011) argued that, stakeholders monitor and enforce regulatory, economic and social license requirements to seek leverage by exploiting a variety of license terms. This implies that organizations performance on waste management is influenced by regulatory, social and economic licenses granted. The implication of the stakeholder theory in this study is that hotels should put additional emphasis on the dimensions of waste management and hotel performance in the analysis of the interests of the stakeholders because the interests of the organization can be nurtured by an interactive symmetrical two way communication with the stakeholders (Madsen & Uihoi, 2001). Hotels need to communicate constantly with all stakeholders on waste management strategies it has put in place to a conducive work organizational operation environment.

2.1.4 Resource Dependence Theory

This theory is concerned with how organizational behavior is affected by external resources the organization utilizes, such as raw materials. The theory is of great importance to this study because the success of any organization is determined by its ability to gather, alter and exploit-raw materials faster than competitors. Resource dependence theory is underpinned by the idea that resources that are controlled by organizations are key to organizational success and that access and control over resources is a basis of power. This means that organizational strategies must be carefully considered in order to maintain open access to resources (Pfeffer &

Salancik, 1978).

Resources dependence theory (RDT) maintains that organizations are resource - insufficient; they strive to acquire and sustain resources from their external environment that are controlled by external actors who exert demands on organization. These actors perceive certain advantages in their relationship with the organizations and exercise power through control over resources. The heavier the dependence on external resources, the more the demands of particular actors controlling these resources are influential (Oliver 1991).

2.2 Food Waste in the Kitchen

Food waste is commonly described as any food originally intended for humans to consume that remains uneaten, ending in non-food outcomes such as ploughed-in crops, anaerobic digestion, compost, incineration or disposal to landfill, sewer or sea (Lipinski et al., 2013; Herszenhorn et al., 2014). The term food supply chain (FSC) describes the linked series of activities undertaken from producing raw food material to final food consumption (Stuart, 2009). The term food waste can apply to all FSC stages from farmer to end consumer, or as distinguished from the wider concept of food loss (production, postharvest, processing) to apply only to food waste created during FSC end stages (retail, consumer consumption) because of human behaviour (Lipinski et al., 2013; Gustavsson et al., 2011). Waste generated during these end stages incurs a greater negative effect than earlier in the FSC, as food products accumulate additional costs and resource input during preparation before consumption (Lipinski et al., 2013).

Waste from the kitchen consists of both wet (organic/ biodegradable) and dry waste. The wet waste consists primarily of food waste (Wagh, 2008), which can

account for more than 50% of the hospitality waste (Curry, 2012) and up to one third of all the food served within the hospitality sector (Marthinsen et al., 2013). Operation in the kitchen are one of the major sources of solid waste generation, for reducing the volume of the waste, Kirk (1995) focused on purchasing policies (develop partnership, products with sensible packing), waste management (minimize waste in the operation, reuse and recycle) and waste disposal (partnership with disposal companies, sound disposal methods) by hotel to meet environmental responsibility and reduce the burden of waste. Considering the significant role of the hotel industry in terms of waste generation(half a pound to 28.5 pounds of trash per day per room) and the fast growth of the industry, adopting a number of environmental best practices with quantifiable measures, including areas of benchmarking and auditing, financial analysis to facilitate informed decision making, and operational training, becomes important due to certain factors such as increasing regulation and rising utility costs (Goldstein & Primlani, 2012).

A British study of hospitality foodservice sub-sectors reported food waste generated in the kitchen equated to 23% of total food purchased by weight, most of which is avoidable (Oakdene, 2012). Allocating total kitchen food waste to the generation area found 45% was preparation, 34% was customer plate waste and 21% was spoilage (Oakdene, 2013). Another British study of ten commercial restaurants reported higher preparation waste at 65%, similar plate waste at 30% and minimal spoilage waste at 5%. Total food waste was reported as averaging 480g per customer (Sustainable Restaurant Association, 2010). Furthermore, a study by Papargyropoulou et al (2016) found 56% of total food waste generated in the kitchen was considered avoidable. A considerably higher average for daily food waste per customer (1.1 kg) was found, although this may be a consequence of the buffet-style service.

Additionally, food waste may still be under-quantified as drink and liquid food waste is often excluded from the study scope.

2.2.1 Types of food waste

To understand and measure the issue of food waste it is essential to distinguish preventable food waste from that which is not. The literature frequently does this by employing the terms ‘avoidable' and ‘unavoidable’, occasionally including ‘potentially avoidable’ as further differentiation (Monier, 2011). Avoidable food waste is any food suitable for humans to eat at some point within the FSC, but ends up discarded or disposed of, even if inedible by this time (Lipinski et al., 2013; Monier, 2011). Product and hygiene regulations, quality specifications, technological processes, and eating behaviours are identified as reasons this may occur (Betz, Buchli, Gobel & Muller, 2015).

Unavoidable food waste is deemed to be food parts (by-products) never intended for humans to eat and considered inedible, such as meat bones, banana skin, egg shells, fruit cores, coffee grounds and slaughter waste (Lipinski et al., 2013; Monier, 2011). Additionally, potentially avoidable food waste is used to reclassify food that may be eaten in some situations but considered inedible in other situations (Monier, 2011). Examples include fruit and vegetable skins, bread crusts, animal organs, seeds and peels. Furthermore, these situations and definitions are subjective due to the way they are influenced by culture, religion and social practices (Derqui, et al., 2016).

Kirk (1995) revealed aluminum, plastics, glass, steel, cardboard and food waste as the main components of hospitality food service waste in some studies. As per another study by Zein et al. (2008), the components of hospitality food service

waste along with their sources are shown in Tables 2.1, which show non-hazardous types of waste.

Table 2. 1: Types of non-hazardous waste in the hotel industry

Non-hazardous Waste Type	Components	Source
Household wastes	Food/kitchen waste, used or dirty paper and wrapping, plastic wrapping or bags, composted wrappers	Hotel's different departments
Cardboard	Packing	Hotel's purchasing and other departments
Paper	Printed documents, brochures, menus, maps, magazines, newspaper	Administration, reception, guests room, restaurants
Plastic	Bags, bottles (hat did not contain hazardous material), household goods, individual portion wrappers for various products	Kitchen, restaurants, bars, guest room, Administration
Metal	Tin cans, jar lids, soda cans, food containers, mayonnaise, mustard and tomato puree tubes, aluminum packing	Kitchen, restaurants, bars, guest room
Glass	Bottles, jars, flacks	Kitchen, restaurants, bars, guests rooms
Cloth	Table cloth, bed-linen, napkins, clothes, rags	Kitchen, restaurants, bars, bathrooms, guests rooms
Wood	Wooden packing pallets	Purchasing department
Organic waste	Fruit and vegetables peelings, flowers and plants, branches, leaves, grass	Kitchen, restaurants, bars, guests rooms, gardens

Source: Zein et al. (2008)

It is also clear from Table 2.1 that multiple types of waste tend to be generated at individual locations. The relative percentage of each of these different waste types also varies by establishment.

2.3 Implications of Food Waste

The implications of food waste can be categorised as economic,

environmental, or social (Aschemann-Witzel et al., 2015). Each implication is not mutually exclusive, as one often affects the other. The following sub-sections will address these three implications.

2.3.1 Economic Implications

When food is wasted, it contributes to an economic loss. Such losses are incurred at each stage of the food supply chain. Food waste occurring at the consumer end has utilized more resources, leading to greater economic loss (Parfitt, et al., 2013). Estimating the costs associated with food waste are challenging. Food production requires numerous inputs and multiple step processes before food reaches the plate for consumption (FAO, 2017). These costs also include transporting food waste to landfill and the costs involved with disposal (Vogliano & Brown, 2016). Labour hours of chefs add an additional cost to the foodservice sector (Sundt, 2012).

A recent report looked at a business case for reducing food waste (14). A range of food sectors was captured as they analysed 1,200 business sites including food manufacturers, food retail, hospitality sites, and food services. Champions concluded for every $1 invested in food waste reduction, the business received a $14 return (Hanson & Mitchell, 2017). The companies with the highest return tended to be restaurants (Hanson & Mitchell, 2017). This is the first time a monetary value has been placed on the profit of food waste reduction strategies. In conclusion, a reduction in food waste is ultimately of economic benefit to a business (Hanson & Mitchell, 2017). The foodservice sector, specifically restaurants and cafes, is a for-profit, competitive market. The customer experience is often a key performance indicator. Balancing customer satisfaction with economic gain can be a challenge in itself, without the added pressure of reducing food waste.

2.3.2 Environmental Implications

To date, there has been a wide range of research carried out into the environmental implications of food waste. Throughout the food supply chain, every input is wasted when a food item is discarded. These inputs include a range of natural resources such as water and land, along with resources used to export food around the world (Parfitt et al., 2013; Kallbekken & Saden, 2013). At each stage of the food supply chain, there are a number of environmental implications if that food is not consumed (Vogliano & Brown, 2016).

On average, it is expected food production accounts for 20-30% of global greenhouse gas emissions (Kallbekken & Saelen, 2013). In 2007, this was equated as 3.3 G tonnes of C02 emissions (Food Agriculture Organization of the United Nations, 2013). WRAP'S report calculates avoidable food waste from the U.K. alone, is contributing 2.7 million tonnes of carbon emissions (Parfitt et al., 2013). Agriculture is estimated to be accountable for 92% of the global water footprint (Food Agriculture Organization of the United Nations, 2013). The food supply chain is where the largest amount of greenhouse gases are produced (Hertwich, & Peters, 2009). This indicates that by the time food is wasted in the foodservice sector, a majority of these greenhouse gas emissions are produced for no apparent reason. With an increasing focus on sustainability and lowering carbon emissions, new ways to create energy from waste are being researched and implemented (De Meester et al., 2012). Utilising food waste is more sustainable and beneficial than land fill disposal. However, decreasing the quantity of food waste produced is a first step resolution, proving to be more sustainable than waste disposal (Quested et al., 2013).

2.3.3 Social Implications

The social implications of food waste can be viewed as a motivating factor for reducing this waste. Food is a necessity for life, and is often taken for granted by those who have easy access. Food insecurity was previously viewed as an issue of developing countries (Vogliano, & Brown, 2016). Increasing population levels are contributing to increased rates of food insecurity amongst developed countries, such as New Zealand (Tostivint et al., 2016). Alongside increased food insecurity, current obesity rates are some of the highest seen throughout history (Hanson & Mitchell, 2017). Both issues related to food intake, these contrasting health outcomes question current social integrity.

Within the food supply chain, some of the highest rates of carbon emissions and food waste are occurring at the consumption end (18). This indicates targeting the general population to implement change (Hanson & Mitchell, 2017). A desire to live sustainably seems to be increasing throughout the world, including New Zealand (Hertwich & Peters, 2009). Social image is important within the foodservice sector for attracting new, and return customers (Quested et al., 2013). The foodservice sector has a social responsibility to local community. Adapting sustainable practices is a step in the right direction for reducing the social implications of food waste.

2.4 Food waste management in the Kitchen

Food waste epitomizes an unsustainable system of food production and consumption. Although food waste is a major global problem, there is not a consistent definition of food waste in the research literature. For the purpose of this study, food waste is defined according to the Food and Agriculture Organization of the United Nations (FAO) as the amount of food wasted in foodservice chains, with ‘food'

referring to “edible products going to human consumption" (Gustavsson et al., 2011).

In food value chains, food can be lost or wasted during acquisition and storage, preparation, during and after serving (plate waste) (Betz et al., 2015). There is little agreement concerning the different categories of food wastage. Silvennoinen et al. (2015) divide food waste between originally edible and originally inedible, the latter referring to, for example, vegetable peelings, bones and coffee grounds. Beretta et al. (2013), divide food losses in avoidable, partially avoidable and unavoidable. Eriksson et al. (2017) distinguish source reduction (at the production level) and handling or management of “unplanned" food waste.

Food loss and waste occur at each stage of the global food value chain, from agricultural production to final consumption, or what Papargyropoulou et al. (2016) define as the food waste hierarchy. Food production is linked to land conversion and biodiversity loss, energy consumption and greenhouse gas emissions, water and pesticide use (Cardinale et al. 2012; Tilman et al. 2001). At the post-harvest and processing stages, there is also waste in each step of the transport, storage, processing and distribution stages. Retail represents a considerable amount of waste in the food supply chain. Yet, as Filimonau and Gherbin (2017) observe it is not seen as being of critical importance for grocery retailers. At the end of the food supply chain, final consumption including commercial and household accounts for as much as 40% of total food losses (Beretta et al., 2013). Current research on commercial activities focuses on the drivers of food waste generation and management (Betz et al., 2015; Eriksson et al., 2017; Silvennoinen et al., 2015).

2.5 Causes of food waste generated in the kitchen

Food waste reduction may be achieved with different means, among which prevention (reduction at the source) has the highest priority as indicated in the waste hierarchy; this may be achieved by reducing food losses in the Food Supply Chain (including households) and, therefore, by decreasing the demand for food production/supply. A number of studies have looked into different prevention options, (Gustavsson et al., 2011; Bemstad, Saraiva, Schott & Andersson 2015) but, to identify the prevention measures with the largest potentials, the causes of food waste have to be identified for each specific case. Experts name a variety of causes of food waste generation. Most of them are caused by certain behaviours of actors (i.e. producers, distributors, retailers, consumers), the need to follow regulations or for problems in food supply chains. In particular, problems associated with financial and technological aspects and/or related to the existing waste policies and legislation, have a major influence on the extent to which food waste is produced. It would be wrong to say that food waste is a product of the 21st century. In the 1940s researchers listed the following causes of food waste: spoilage as a result of improper food handling, later, packaging, and transportation, overstocking, plate scraps and increased portion sizes (Kantor et al. 1997; Griffin et al., 2009).

Food waste is caused by different reasons, e.g. quality or size standards (food items that do not fit with the required shape or appearance), food items damaged during transport, over/non-appropriate purchasing, as well as confusion between the terms “best before” or “use by” dates (Schneider 2013). A study by Teuber and Jensen (2016) indicated that food waste is caused by lack of appropriate planning, lack proper management causes of food waste, and over-merchandizing and over-ordering in the food service industry.

2.5.1 Lack of appropriate planning

Gustavsson et al. (2011) indicated that one of the top contributors to food wastage is because of lack of appropriate planning on the consumer part. Sometimes people buy lots of food without appropriately making plans on when and how the food will be prepared for consumption. Coupled with the contemporary schedules of work and appointments, people therefore tend to change food preparation plans or fail to remember using it on time. At times it's out of most people's control which leads to expiry of the foods after which they are thrown as waste. Also due to lack of appropriate planning, people find themselves having badly prepared food that just does not taste great. It all ends up as waste (Bemstad et al., 2015).

2.5.2 Purchase and preparation of too much food

According to Schneider (2013) food is wasted because of purchasing or preparing too much. If one purchases or prepares too much food than is needed, then it's obvious the excess food on the plate will go to waste. In such scenarios, leftovers and partially used food account for the food that goes to waste. Alternatively, the partially used food is at times put at the back of the fridge and is never reused. The same applies to excess purchases that end up passing their expiration dates and therefore looks, tastes, and smells bad. At the end of it all, all the excess ends up as waste food (Stenmarck et al., 2011; Schneider 2013).

2.5.3 Errors in industrial processing and keeping up with food safety policies

Griffin et al. (2009) indicated that another biggest driving factor for food wastage is the protocol on food safety. The food safety protocols give no room for error in industrial processing or any other compromise that diminish quality of the

final food products. As such, the confusions and errors during industrial processing of food mean that all food items that don't meet the set standards are wasted. Food processing companies have to comply with high food safety regulations and must thus establish no error margins. In complying with the food safety policies, the companies in the sector end up creating waste as any small error means the food will be rejected even if it's simply due to imperfection in appearance or shape. Overcooking, production trials, packaging defects, trial runs, and wrong sizes and weights are some of the aspects resulting in imperfection and the eventual rejection of the foods (Griffin et al., 2009).

2.5.4 Managerial, financial and technical constrains

This is mainly a challenge contributing to food wastage in the developing countries. The wastage takes place because of the constraints to do with lack proper management, inadequate finances, and technical difficulties in the lines of harvesting methods, storage and cooling problems in adverse weather conditions, processing, packaging, infrastructure, and marketing systems (Kantor et al., 1997).

2.5.5 Over-preparation of food in restaurants and hotels

Most restaurants, hotels and the food service industry alike have a tendency of over-preparing/producing food (Griffin et al., 2009). While the intention is good especially in anticipation of high customer volume and the ability of not running out of menu, over-preparation often leads to wastage if all the food is unsold. DC Central Kitchen-committed to the course of reducing food wastage, points out that overproduction in the food service industry is the leading cause of food wastage (Kantor et al. 1997). Since the food service operations lacks the ability to quantify the

amount of food consumed on average, the kitchens keep producing amounts thought to be enough but most of it is actually not needed. Besides, some managers believe producing food in large batches minimizes on costs, but in actual fact it results in more waste as compared to cook-to-order preparation or cooking in small batches.

2.5.6 Over-merchandizing and over-ordering in food stores and supermarkets

The over-merchandizing of food items and products in retail centers, wholesale markets, and supermarkets often result in food wastage. Foodservice operations are habitually more focused on over-merchandizing in food stores and supermarkets by using beautiful and attractive displays thereby creating the idea of abundance in an attempt to promote sales and customer satisfaction. The overlooked aspect of overmerchandizing is its association with increased food waste. When people buy more than needed, the excess will often end up in the trash bin. Over-ordering also leads to expiry of food staff with limited shelf life as some of it will remain unsold.

2.5.7 Consumer behavior

Different customers have different preferences and this highly influences consumer purchasing behavior on food items (Schneider, 2013). Particularly, the consumer behavior on focus here is the tendency of having a keen insight for good judgment which results in those who only prefer unblemished vegetables and fruits, and the restrictive must display for shelf life dates. Such consumer behavior more often than not contributes to the wastage of food as most of the food items may remain on the shelves till expiry. Also, such consumer behavior tendencies may force foodservice operators in restaurants and hotels to maintain large menu options and

high-end services while assuring consistency that mostly leads to food wastage (Schneider, 2013).

2.6 Practices towards sustainable food waste management

Waste sustainability can be implemented and utilised to reduce the amount of food waste. There are many international organisations raising awareness and promoting a reduction of food waste alongside sustainable practices. The key aims are to educate, share experiences and provide tools in order to reduce food waste. Organisations include, but are not limited to EU Fusions, WRAP U.K, The Sustainable Restaurant Association (U.K), Love Food Hate Waste (New Zealand), The Green Seal, United Against Waste (Switzerland), and the Green Restaurant Association (USA and Canada) (Parfitt, 2013; Tostivint, et al., 2016). Several have created criteria for defining a sustainable restaurant, resources with strategies to be implemented, and some provide training programs and complete audits. However, membership costs range from approximately $1000-$3000 NZD annually, limiting the number of businesses who can afford this expense. Several organisations criteria are not specially designed with food waste in mind, focusing more on organic and locally sourced food. The international organisations are large and the content is not always applicable to New Zealand businesses. Organisations such as EU Fusions and WRAP U.K. support creating a network platform to share experiences and a community committed to reducing food waste (Parfitt, 2013; Tostivint, et al., 2016).

Many strategies have been researched to reduce food waste and assess the hierarchy of waste disposal. A reduction in plate size has been shown to reduce the amount of food wasted due to less being served, although the customers perception remains unchanged as the plate still appears full (Vogliano & Brown, 2016).

Kallbekken and Saelen (2013) study supports this strategy with results showing food waste was reduced by 19.5% when plate size was reduced. Reducing portion size has a similar effect to reducing plate size (Kallbekken & Saslen, 2013). Allowing customers to help themselves to seconds or to have unlimited sides, can remove the desire to serve larger portions as they are aware they can go back for more (Kallbekken & Saelen, 2013). Providing customers with the option to take their left-overs home in a doggy bag also reduces consumer plate waste (Sundt, 2012). In order to reduce preparation waste, strategies such menu planning, and a fruit-to-root approach can be utilised (Sundt, 2012). Fruit-to-root is when the business aims to use all aspects of the food item, including the potentially avoidable and unavoidable waste. It is expected that there will still be waste from this strategy, although finding innovative uses for food waste will reduce the quantity of waste being disposed. Donating food was previously considered unsafe as the business was liable for any food safety repercussions. This meant donating food was uncommon.

With the introduction of the Food Act 2014, businesses are now protected and able to donate food (Ministry for Primary Industries, 2016). Although this act was passed several years ago, knowledge of the food donors clause is limited in restaurants and cafes (Neff, Spiker & Truant, 2015). Existing research shows many of the above strategies are beneficial in reducing food waste (Parfitt et al., 2013). This research aims to assess which strategies local business owners consider impactful and their perceptions on ease of implementation. According to Halloran et al. (2014) hotel practice sustainable food waste management by pursuing first in first out; labelling food ingredients that show the product expiry dates, and storage instructions in order to avoid damaged raw food ingredients in the storage. These practices also control the stock of raw food ingredients effectively with the right rotation (Halloran et al., 2014).

In addition, stored fresh food ingredients at the appropriate temperatures will also prevent food waste. Hotels should take every possible effort to minimise their food wastage when preparing food, they still cannot fully avoid leftover food wastage due to the strict hotel policy and food safety standards. Based on food safety standards, hotels' food items should not be left on the buffet table for more than four hours and should be thrown away even though those food are still in good quality condition (Papargyropoulou et al., 2016). For safety and hygienic purposes, leftover food from the buffet breakfast should not be reused for other meals or served again to their staff hotel during lunch time. In fact, a selection of the type of food quality, packaging, and storage at appropriate temperatures are influenced by prolonging the quality of leftover food for safe consumption or reuse for preparing other meals. According to Pirani and Arafat (2015) indicated that while food safety standards of hotels ensures the food served is fresh and harmless for the guests, but generates a certain amount of buffet leftover waste.

According to Kasavan, Mohamed and Halim (2017), communication is a very important part in pursuing a systematic process for serving food. For example, clear communication between the waiters and guests regarding food ingredients that are used in the menu, cooking method, and serving portion size of the menu can be avoided in the event of a wrong menu order. In addition, communication between waiters and chefs regarding food menu ordering and number of guest orders is also required. Those clear communications will be helpful to avoid preparing excess quantities of food and preparation food waste. Furthermore, providing various portions of dishes (such as big, medium or small) for guests to choose the size of dishes helps to reduce plate waste. Kallbekken and Saelen (2013) indicated that hoteliers are able to reduce food waste by 19.5% by reducing portion of dishes using

smaller size of plate.

A study by Kasavan et al. (2017) revealed that the strict policy of hotels influences the process management of leftover food and guests' plate waste. In order to follow the hotel's policy, hoteliers (especially big hoteliers) do not allow staff to take anything from their hotels even though there is leftover food or guests' plate waste. Moreover, hoteliers also do not encourage their guests to take away excess plate food ('a lacarte') for safety and hygienic purposes. In addition, tasteless food (error in the recipe) or food that does not meet their expectations also increases guests' plate waste. Sometimes, hoteliers prepare extra quantity of food to avoid last minute cooking for guests who arrive without any booking or reservation. However, such practice results to creating higher leftover food waste. Besides that, this study found that guests' food consumption pattern also influences the practices towards sustainable food waste management and this is beyond the control of hoteliers (Kuo & Shih, 2016).

Guests expect to have a variety of food on their tables, especially during buffet. The hotel, consequently, offers a variety of foods to meet the guests' satisfaction. But unsustainable guests' food consumption pattern leads to generating a lot of plate waste. According to Food Wise Hong Kong (2013), plate waste could be reduced by education or raising awareness among guests through an effective communication program. Jeffery et al. (1994) indicated that overall average plate waste could be reduced significantly by using coercion approach (include penalty) compared to education approach. Thus, the best might be to use both approaches to increase guests' awareness. As per Kasavan et al. (2017) compost is one of the

sustainable practices before food waste is sent to the landfills. Sullivan and Smith (2014) that explain capital and labour intensive in tropical settings, supportive management, and a market for the compost influenced compost practices. Composting practices are attractive options for island hotels to reduce the costs of managing food waste and are good source for landscaping purposes. According to the Environment Protection Agency (2010), composting system at hotels has a capacity to reduce 44% of waste costs. In addition, the separation of waste is the starting point for disposal of food waste in a sustainable way. Stuart (2009) found that culture, personal choice and socio-demographic characteristics have been associated with increased food wastage. For hotel sector, guests arrivals from different cultures, background and personal taste, will determine the consumption of different types of food, which will affect food waste generation. Thus, hoteliers should take possible actions in convincing and encouraging their customers towards plate waste reduction.

Brebbia and Pineda (2004) asserted that a hotel is encouraged to carry out environment-friendly practices because of the monetary benefits that the hotel gets after their implementation. Green Hotelier (2012) opined that big hotel groups have corporate social responsibility programmes which reach out to the surrounding communities and influence them. However, smaller hotels too play an important role. In a few cases, it is simpler for small hotel groups to introduce eco-friendly policies. Mensah (2006) defines environmental management by hotels as a continuous process adopted through management decisions by monitoring a hotel's activities and appropriate programs and activities devised to reduce the negative environmental impacts.

Bohdanowicz (2006) observed that as per the Rio Earth Summit held in 1992, tourism is one of the most important spheres where sustainable development can take

place. It was seen that the hotel industry had started implementing green practices that were being acknowledged and respected. Bohdanowicz (2006) revealed that if considered separately, hotels cannot be said to adversely affect the environment. But if taken into account together, they are seen to waste a lot of resources. About seventy- five percent of the adverse effects of hotels on the environment are connected to exploitation of resources. Singh (2007) revealed that following the international inclination of hotels which choose to 'go green', the Federation of Hotel and Restaurant Association of India (FHRAI) has planned to establish an accreditation committee to certify hotels implementing environment-friendly practices.

Claver-Cortes, Molina-Azorin, Pereira-Moliner and Lopez-Gamero (2007) reviewed that from the 1990's the hotel industry has been going green as a result of changing financial circumstances and also to provide good customer service. Young George, Mahon & Cumberbatch (2007) stated that owners of hotels must be sensitized to the ecosystems around the hotels so that they realize the effect of their daily operations on these ecosystems. Greenberg (2007) reviewed that nowadays, most hotels say that they are "sustainable and "green". These green practices do not inconvenience the guests, who say that when they are made aware of these eco-practices, they are happier to stay there.

White (2007) stated that hotels have started implementing various green programmes, not only due to the demand from their business travellers but also because they save money. Pollock (2007) quoted a survey by Trip Advisor on travellers across the world. According to this, 38 percent of travellers were of the opinion that they gave importance to environmentally-friendly tourism. 38 percent had resided at eco-friendly hotels, while 9 percent particularly booked these hotels. 34

percent travellers were ready to spend more money so that they could stay in green hotels.

Flowers (2008) reported the company policy of the Fairmont Hotels & Resorts that requires its kitchens to utilize organic food that originates in 100 miles. She also reported that Six Senses hotel group of Southeast Asia conserves the seashores at 11 hotels of its group by having a pool sanitation system, which does not use chlorine. This shields the corals and other aquatic life. Ernst and Young (2008) reviewed that hotel groups have started promoting eco-friendly practices and becoming more sustainable. There are different programmes to ensure that the industry is going green- these are related to education, tree plantation, eco-friendly resorts, energy efficiency etc.

Millar and Baloglu (2008) stated that hotels offering eco-friendly features on their own are called green or environmentally friendly hotels. The number of these features may vary. However, it is not easy to define all green hotels, as hotels carry out diverse endeavors to conserve the environment. Hotel News Resources (2008) reviewed the results of a study conducted by the American Hotel & Lodging Association on Green Assessment. The chief inspiration that these hotels have mentioned for promoting green practices is firstly conservation of the environment and secondly, to ensure loyalty of the guests.

Raghavan and Vahanvati (2008) stated that hotels in India have started using green products, lessening consumption of energy as well as cutting down expenses. Hotels are implementing green practices as a business policy. A case is of The Orchid Hotel at Mumbai which is the first eco-friendly five-star hotel in Asia. It focuses on preserving of natural resources however; the level of service giving to the guests is not affected. Kasavana (2008) revealed that showing concern for the environment is

in fashion, is noticed and helps to save expenses. The three R's of reduce, reuse and recycle help hotels reduce their consumption of energy, lessen wastage of their inventory and save money; while at the same time showing concern for the environment. It can be seen that a few hotel companies have boosted their image in the public eye, by going green and promoting sustainability.

Graci and Dodd (2009) analyzed that organizations which assimilate their concern for the environment with their business strategies; as well as minimize their environmental impacts find it easier to get investment from the market. Arieff (2009) said in the recent few years it is seen that green practices are not only implemented in hotel guestrooms, but also in kitchens & bathrooms. Most hotel groups are incorporating these practices as they have realized that there are financial benefits of going green, rather than using it as just a marketing strategy.

Bedlington (2009) stated that in order to examine the extent to which green practices will influence customer's decision about a particular hotel it is essential to first evaluate their approach towards these practices. There are several monetary benefits of implementing green practices for hotels. An increase in the price for providing green facilities and services is not a source of alarm anymore. If green hotels offer equivalent service and facilities as a luxury hotel at the same or lesser price, then luxury market segment as well as eco-sensitive tourists would be happy. Bhaduri (2009) opined that the hospitality industry has continually paid attention to the concept of being eco-friendly. A few hotels have used it as a promotional tool to increase business, but there are others who genuinely take care to be environment-friendly. She further states that hotels choose to go green because of saving of expenses and also because of the demand from guests for such practices. However, the number of hotels that truly choose this as viable business should be checked.

Anand (2009) stated that small and large organizations belonging to different spheres are trying to incorporate concern for the environment with important business choices, so as to have trade that is environmentally friendly. At the same time, they must perform better financially, augment their reputation and get reasonable benefits.

Staff (2009) analyzed that an important concern for the hospitality industry is sustainability. This issue is controlled by factors that are not influenced by the industry. So these concerns are not only related to going green, but also contending with competitors from a different level. Although it might be difficult to follow sustainable practices and get profits, there is substantiation to show that following eco-friendly policies helps to reduce expenditure and improve demand. Staff (2009) opined that Ecotourism that came into fashion some time ago is now becoming an important ethical factor. The hospitality industry has embraced eco-friendly practices with open arms, as it is a profitable marketing tool. All new hotel properties aim to be recognized for following green practices, while the ones that are already present are trying to incorporate eco-friendly practices like using solar & wind energy, linen reuse, recycling of waste etc.

Heisterkamp (2009) analyzed that customers today are not satisfied with just linen & towel reuse programmes as eco-friendly practices in green hotels. They want eco-friendly hotels to have practices that are socially as well as environmentally conscious. Customers demand efficient use of energy, a section to segregate waste, preservation of water. Wilfong (2009) analyzed that the hotel industry used up resources rapidly, so it is essential to take dedicated steps to preserve them. Conserving energy, water, & the quality of air are beneficial for the environment; they improve the hotel's image as well. Roth (2009) observed that customers wish for eco-friendly holiday choices and hotels gain from this. The American hotel industry of 90

billion dollars is influenced by the go green financial trend. Consumers are giving a lot of importance to eco-friendly practices and hotels as well as their suppliers can have higher income and a larger share of the market if they cater to this upcoming niche.

Roos (2009) observed that luxurious Indian and Chinese hotels follow U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) certification, to show their commitment to the green cause. The Indian government has increasingly endorsed sustainability and made certifications essential over the last year. Micioni (2009) revealed that if promoted correctly, the hotel's investors will understand that going green is beneficial for the customers. She further says if hotels have ecofriendly practices that involve the guests, then they are encouraged to accept them. However, the hotels should not make the guests pay extra for these initiatives, otherwise they will not come back to stay again.

Graci and Kuehnel (2010) opined that becoming green has its advantages in terms of employees as well. Today, the employees too are more aware of the environment and thus will prefer employers with the same views. Since attrition levels in the hospitality industry are more, retaining current employees is more cost-effective as against recruiting others and then training them. Rodrigues (2010) stated that in order to identify the hotel as being green, it is necessary to ascertain and advertise the specific green practices of the hotel; rather than only say you run a green business. The customers would like to know about the suppliers of the business, particular green practices that are implemented and those that have an impact on them as guests. They also want to know the practices that can offset the negative impact that they have on the environment. For hotels where guests are not happy with green practices like linen reuse to save water, concentration on sourcing supplies locally

could be one of the modes to sensitize them about the environmental issues.

Chaturvedi (2010) reviewed that increasing green awareness among Indian hotel companies indicates that going green not only enhances the brand worth but also underlines the core values. Since following green practices does not need much maintenance, hotels reduce their expenses and improve the image of the hotel. Expenses incurred on diesel and energy can be reduced with the help of materials that can be recycled and drip irrigation system. Green Hotelier (2012) asserted meetings and events in the times to come, will be green, and this inclination will rise more and more. Hotels need to make arrangements so that they can fulfill these requirements, at times exceed expectations. Otherwise, the meetings and events industry will take its business elsewhere.

Green Hotelier (2011) observed that since customers have become more conscious of the environment & the society, and make their choices accordingly, hotels try to capitalize on this and make eco-friendly interiors to appeal to this new category of environmentally aware guests. Reynolds (2011) observed that the hotel industry has the biggest impact on the environment as it consumes a lot of water, cleaning chemicals and electricity day and night. In the 1990s, eco-friendly hotels started coming up in the industry which implemented practices like proper waste management, conserving of water and energy and informing guests on how to be environment friendly.

Ng Kok Meng (2011) observed that customers select products which are green and if they are offered. Also, to achieve sustainable development, it is necessary to make green products. Tickoo (2011) analyzed that in the past, good hotels would offer the most luxurious experiences. Now, since guests prefer responsible luxury, the hotels have started incorporating sustainable practices in their operations on a large

scale. Englebert (2012) opined that hotels are keen to implement eco-friendly practices to make up for their negative impacts on the environment, as a result of the wide-spread acceptance of eco-tourism. Since there are sustainable options available, hotels are becoming eco-friendly and using materials, water and energy judiciously; at the same time, they provide quality service as well as save money.

Ricaurte (2012) revealed that there are continuous sustainability innovations by the hotel industry. It is easy to craft an eco-friendly world, at the same time convincing the guests that their carbon footprint is lessened. The amalgamation of new services and technologies with ingenious methods for saving money for the hotels leads to innovative practices which might impact standard practices and standards. Marati (2012) opined that a lot of travellers that were surveyed said that given an opportunity, they preferred to take advantage of minor occasions of making eco- friendly choices in their hotels. Roddy and Moss (2012) revealed that small cards in rooms encouraging you to participate in towel and linen reuse do not really seem eco- friendly, however there is substantial reduction of water wastage. Chitravanshi & Idrees (2012) analyzed that India's burgeoning hotel industry is facing sustainability challenges; it is a requirement now not an option. Inadequate resources and increasing expenses can be turned to an advantage. Hotel chains with a global presence are entering the market, accompanied with green practices followed internationally. It is however tough to put all these measures into practice in India.

Ogbeide (2012) observed that a lot of guests are ready to stay in eco-friendly hotels. But, such hotels must offer some enticement to the customers to make them accept the green practices. Also, the hotels must inculcate green practices into the culture of the organization as well as market their green practices to secure an advantage over the competition. Green Hotelier (2012) observed that responsible

procurement means considering the social, ethical and environmental points while deciding about purchasing. Decisions about purchasing can impact the society and the environment, especially for the hospitality and tourism fields as they are compelled to import food and other goods from far away countries in order to serve their guests. Verma (2012) revealed that an increasing number of ecologically-aware guests prefer institutions that are eco-friendly as compared to those that waste energy and are pressurizing hotels to go green. The hotel industry is recognizing that in the long run, there are advantages like less maintenance and saving of energy, particularly with high energy costs. Since there is better technology which is economical as well, practices that were thought to be very costly some time ago are now easily affordable by a lot of institutions.

Chakraborty (2012) reviewed that rising awareness about the environment have made travellers aware of their carbon footprint. They desire to stay in hotels that have green certification. Due to this, hotels now prefer getting certified in order to show their environmental responsibility. Chaudhari Agarwal (2012) stated that green hotels are cost-effective and beneficial for the environment. Some time ago, Ecotourism was thought to be a fashion, but now people are taking it seriously. The hospitality industry has seen its chance and seized this opportunity for marketing. All new hotels want to be recognized as green, while the ones that are already there; are integrating practices that are sustainable.

Chaudhari (2012) revealed that in India, the web-site Google shows that users search for the term 'green hotel' 2900 times in an average across twelve months. The statistics for the same globally is 60500 times. Hopefully, it could be said that more and more people are becoming aware of the environment; however this may be because there could be some personal gains to be had from this concept. Mahajan

(2012) stated that organizations are trying to make the industry accept green measures. There are associations that encourage airlines, hotels and conference centres to implement eco-friendly practices, and promote them. So, the industry is going a greener way.

Mirza (2012) stated that since the idea of eco-friendly hotels and Ecotels is becoming across the globe, Indian hoteliers too are planning green hotels and implementing environment-friendly practices. New hotels all aim to be recognized as green, while the ones already in existence try to implement green practices in the infrastructure already present. Dev (2012) opined that activities for Corporate Social Responsibility are vital to hotels that have realized that they help to create a good brand image. This has an effect on their business, apart from the feeling of doing something for the environment or the society. It motivates employees to be included in these initiatives, creating an all- encompassing work culture. This helps in getting employees as well as employee retention.

2.6.1 Promotion of Waste Reduction, Reuse and Recycle

Companies have been pushed by competitive pressures towards cost reduction and performance improvement of operations to provide better quality products to very demanding markets. The approach of waste reduction and performance has been gaining importance in organizations operations (Gurumurthy & Kadal, 2011; Taj & Morosa, 2011). Waste reduction can be achieved through implementation of lean production systems that includes assessing current situation and designing a production system based on lean system concepts and techniques (Womack &Jones, 2003) Emphasis is placed on the three R's reduction, reuse and recycle. This helps in creating of less waste and increased material recovery. Waste reduction is achieved

through waste minimization at its source so as to minimize the quantity required to be treated and disposed of. This can be achieved through better product design and or process management. Waste recycling is the process for recovering waste products as inputs or resources. Promotion of waste re-use can be realized through using waste as an input for other purpose. Waste can as well be transformed into a form that is less costly or difficult to dispose of a process known as waste transformation (March, 1998).

2.6.2 Collection and Disposal of Waste

Waste collection and disposal should be undertaken regularly and people from economically backward section may be employed for the same. The collected nondegradable material should be removed using covered trucks and trailers. Care should be taken not to spill the waste during transportation. Disposal of waste should be undertaken in prescribed scientific manner. A sanitary landfill designed specifically for the final disposal of waste should be built (Croner, 1998).

Solid waste management involves activities associated with six basic principles of waste generation, storage, collection, transfer and transport processing and disposal (Sharholy, Ahmad, Vaishya, & Gupta, 2007). The amount of waste generated and the way is disposed damages the environment (Choe & Fraser, 1999). Uncollected wastes causes' bad smell, drain blockage, invites scavengers, general public nuisance and become good breeding site for insects.

2.6.3 Waste Composting

In waste composting, organic wastes are subjected to a rapid composting step at a high temperature using a hyper thermal composting machine followed by a further piling step in the atmosphere. In this latter step, the temperature of the

compost piles is kept at approximately 60 °C for several weeks by the heat generated metabolically by the micro organisms growing in the compost piles, as is the case for general composting (Fogarty & Tuovinen, 1991; Williams, Ziegenfiiss, & Sisk, 1992). After the metabolized organic compounds in the piles had been thoroughly utilized by the microorganisms, the temperature of the piles are decreased to the ambient temperature, indicating the maturation of the compost piles.

Large scale composting is an expensive venture and hotels might not engage in the exercise because of the cost involved. For it to work, focus should be on developing ward level or preferably community level, small scale composting process. Hotel based composting helps in diverting a major portion of waste generated close to the source, thereby significantly reducing transportation costs and prolonging the life span of landfalls.

CHAPTER THREE

METHODOLOGY

3.1 The Study Area

The area of study was the conducted in Bolgatanga Municipality in the Upper East Region of Ghana. Bolgatanga Municipal is one of the 260 Metropolitan, Municipal and District Assemblies in Ghana, and forms part of the fifteen (15) Municipalities and Districts in the Upper East Region. With the Administrative capital as Bolgatanga, the Bolgatanga Municipality was established in 2004 by Legislative Instrument (LI) 1797 and is located in the centre of the Upper East Region, approximately, between latitudes 10°30' and 10°50' north and longitudes 0°30' and 1°00' west, it is also the regional capital. The Municipality shares boundaries with Bongo District to the north, to the east with Nabdam District, to the south with Talensi District and to the west with Kassena Nankana Municipal.

The population of the Municipality according to 2010 population and housing census stands at 131,550 with 62,783 males and 68,767 females. The inhabitants of the district belong predominantly to different peoples of Northern Ghana. The town of Bolgatanga, however, has a cosmopolitan character. Here are mixed not only different peoples of the north, but also members of the major ethnic groups include; the Grune, Sisala, Kanjegah, Hausa and Moshi people. The majority of the population in the 1990s lived, in spite of the urban structure of the district, from agriculture, 19% commercial, 12% industry, mainly handicrafts, and just 7.4% were employed in public service. There are some jobs in the mining and construction and in the form of some metal-working companies, repair shops, painting companies etc. but these represent a very small minority. Bolgatanga is the principal centre of education in

Upper East Region of Ghana. Currently, a total of 4 public senior high schools are within the metropolis, 3 nursing training including Midwifery College and a polytechnic.

3.2 Research Design

The research design adopted for the study was survey. Survey research design is a type of descriptive research where the research administers a questionnaire to a sample or to the entire population to describe the attitudes, opinions, behaviours, or characteristics of the population (Creswell, 2012). Creswell asserts that in this procedure, survey researchers collect quantitative, numbered data using questionnaires (e.g., mailed questionnaires) and statistically analyze the data to describe trends about responses to questions and to test research questions or hypotheses.

Considering the nature of the study, the survey design was deemed appropriate in terms of collecting data from a large group of respondents within a relatively short period of time. Kothari (2004), posits that the survey research design is where a sample of the population is studied (questioned or observed) to determine its characteristics or relationship, and it is then inferred that the population has the same characteristics or relationship.

3.3 Population

Population is any group of people, events or things that are of concern to the researchers which they wish to investigate (Sekaran, 2000). Based on the subject of the research, the population for the study was the kitchen staff of four (4) boarding Senior High Schools within the Bolgatanga Municipality. The estimated population of

the study included 64 kitchen staff identified at the four boarding senior high schools in the Bolgatanga Municipality (Author's field notes, 2020).

3.5 Sampling Technique and Sampling Size

Purposive and simple random sampling techniques were used for this study. Purposive sampling technique was used for selecting the 4 boarding senior high schools in the Bolgatanga Municipality. Since only boarding and public senior high schools were needed to meet the objectives of the study, purposive sampling technique was used to handpick these schools. According to Bernard (2002) and Lewis and Sheppard (2006), purposive sampling technique is adopted because of what needs to be known and sets out to find people who can and are willing to provide

To ensure the respondents selected were as representative of the population as possible, simple random sampling technique was employed in selecting 56 staffs working in the kitchen from the identified schools until the desired number of subjects was reached. In the selection of the staffs, this was done by assigning numbers to them and all the numbers were put in the box. Then each unit was picked randomly from the box. The purpose of using a simple random method was to ensure that all staffs in the kitchen from the population had the same chance of being selected and they were all selected by chance. The sampling interval was determined as the ratio of the population to the sample size. The sample size was determined from a table developed by Krejcie and Morgan (1970). Based on this table the sample size determined was fifty six (56) from an estimated population of 64 kitchen staff at the sampled senior high schools in the Bolgatanga Municipality.

3.4 Data Collection Instrument

Questionnaire was used for collecting the necessary information. The questionnaire was designed for the selected fifty (56) staffs in the kitchen responsible for the preparation of food for the students in the selected senior high schools in Bolgatanga Municipality; the items were related to the research questions raised in the study. Avoke (2005) narrated that, questionnaire are the instruments used to collect data for decision making in research. The questionnaire sought information on socio-demographic characteristics, food wastes generation by kitchens of SHS in the Bolgatanga Municipality, and the practices by kitchens of SHS towards sustainable food waste management.

3.5 Validity and Reliability of Instruments

Instrument validity is the extent to which an instrument measures what it is supposed to measure (Kumar, 1999). In this study, it was used because it is basically concerned with determining whether the instrument on the face of it appears to measure what it is supposed to measure. The validity of research instruments was therefore ensured by assessing the questionnaire items during their construction. In order to determine whether the instruments would do what they are intended to do; the questions were discussed with the supervisor for verification. This was to clear any lack of clarity and ambiguity. Reliability refers to the consistency of the instruments in tapping information from more than one respondent.

3.6 Data Collection Procedure

The questionnaires were administered personally and collected by the researcher. A total of 56 questionnaires was administered to the identified kitchen

staff in the selected institutions in Bolgatanga Municipality. The researcher visited the authorities of the participating schools and when permission is granted, the researcher then administered the questionnaires personally and gives to them an appropriate time.

3.8 Data Analysis

After data has been collected, the data were processed using the statistical software packages, SPSS version 23.0 (Statistical Software Package for Social Sciences) and were analysed using descriptive statistics such as frequencies, percentages, mean scores, standard deviations.

3.9 Ethical Consideration

Prior to the study, approval was sought from appropriate authorities and institutions involved in the study. Moreover, respondents were given prior notice before the collection of data. For instance, their permission was sought before recording their voices. The information collected was treated with strict confidentiality. The study ensures the standard of anonymity of respondents in all documents resulting from this study by not providing options on the questionnaires for information such as name of the respondent. Hence, the study was conducted the in an ethical way without compulsion to aid the accuracy of responses, rate of responses and timeliness of data collection.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Response Rate

The study targeted kitchen staff and provided responses used to complete this study. Fifty six (56) questionnaires were sent to kitchen staff in all the four (4) boarding Senior High Schools within the Bolgatanga Municipality. Out of the 56 questionnaires sent out, 49 questionnaires were retrieved successfully giving a response rate of 87.5%. This response rate was excellent and the representative and conforms to Mugenda (1999) stipulation that a response rate of 50% and above are adequate for analysis and reporting.

4.2 Demographic Characteristics

The demographic characteristics of the kitchen staff covers their gender, age group, educational level of the respondents and the number of years respondents have been working as a kitchen staff in the boarding Senior High Schools within the Bolgatanga Municipality.

4.2.1 Gender of Respondents

Table 4.1 presents the response of the respondents concerning their gender group

Table 4. 1: Gender of the respondents

Gender	**Frequency** (N)	**Percentage (%)**
Male	7	14.3
Female	42	85.7
Total	**49**	**100.0**

As depicted in Table 4.1, both male and female were captured in the study. The result of the analysis shows that around 7(14.3%) of the respondents were males as against 42(85.7%) who were females. This underlines the dominance of female in the food sector. This is an indication that majority of the kitchen staff at the various boarding Senior High Schools within the Bolgatanga Municipality are females.

4.2.2 Age group of respondents

The responses of the respondents concerning their age range are presented in Table 4.2

Table 4. 2: Age group of respondents

Age (years)	Frequency (N)	Percentage (%)
18-30	10	20.4
31-40	26	53.1
41-50	11	22.4
Above 50	2	4.1
Total	**49**	**100.0**

From Table 4.2, the highest proportion (53.1%) of the respondents came from the ’31-40 years’ age group; 20.4% and 22.4% of the respondents responded ’18-30 years’ and ’41-50 years’ age group respectively, while the smaller section (4.1%) of the respondents were above 50years. Age category of the respondents was captured in the study to help the researcher assess the different age categories of the respondents. The results also suggest that majority of the kitchen staff were matured and therefore could be captured in an academic study such as this.

4.2.3 Educational level of respondents

The response of the respondents on the educational level are presented in Table 4.3.

Table 4. 3: Educational level of respondents

Educational level	Frequency (N)	Percentage (%)
No formal education	1	2.0
Primary education	18	36.7
Junior high education	23	46.9
Senior high education	4	8.2
Tertiary education	3	6.1
Total	**49**	**100.0**

From Table 4.3, 1(2.0%) of the respondent had no formal education, 18(36.7%) of the respondents had primary, whereas 23(46.9%) of the respondents had junior high school education. Conversely, 4(8.2%) of the respondents had senior high school education, 3(6.1%) of the respondents had tertiary education. This means that majority of the kitchen staff at the various boarding Senior High Schools within the Bolgatanga Municipality were junior high school leavers. The statistics generally indicate that kitchen staff captured in the study has low educational backgrounds.

4.2.4 Number of Years worked

Table 4.4 shows the distribution of the respondents according to number of years of working as a kitchen staff at the various boarding Senior High Schools within the Bolgatanga Municipality.

Table 4. 4: Number of Years worked

Number of years worked	Frequency (N)	Percentage (%)
Less than a year	2	4.1
1 - 5 years	18	36.7
6 - 1 0 years	23	46.9
Above l0years	6	12.2
Total	**49**	**100.0**

Source: Field work, 2020

As indicated in Table 4.4, most (46.9%) of the respondents had been working as a kitchen at their respectively school for 6-10 years, followed by 18(36.7%) of the respondents who had been working for 1-5 years years. In addition, 2 (4.1%) of the respondents had been working for less than a year. Moreover, 6(12.2%) of the respondents had been working for more than 10 years. This indicates majority of the kitchen staff at the various boarding Senior High Schools within the Bolgatanga Municipality had been working for more than 6 years. This gives a clear indication that the respondents have vast experience in and could be in the best position to give responses for this research work.

4.3 Type of food waste generated by kitchens of SHS

In addressing research question one, the respondents were asked on the types of food waste generated by kitchens of SHS in the Bolgatanga Municipality and to rank their level of agreement or disagreement along a number of constructs. The study used a 5-point Likert type scale ranging from “Strongly disagree” to “Strongly agree”, in descending order. Table 4.5 presents the results.

Table 4. 5: Responses on the type of food waste generated

No.	Type of food waste generated	N	Mean	Std. Dev.	Remarks
1.	Leftovers foods are waste generated	**49**	3.82	0.882	Accepted
2.	Discarded food items are kinds of food waste generated	**49**	3.69	1.262	Accepted
3.	Expired food products are food waste generated	**49**	3.63	1.286	Accepted
4.	Waste generated during food preparation at the kitchen	**49**	3.43	1.486	Accepted
5.	Purchasing ingredients more than needed	**49**	3.22	1.311	Accepted
6.	Damage of package food product	**49**	3.14	1.458	Accepted
7.	Over-preparation of food are kinds of food waste generated	**49**	2.14	1.000	Rejected
8.	Rejected food by the students and teachers	**49**	1.96	0.999	Rejected
9.	Purchasing unwanted food products	**49**	1.76	0.693	Rejected

Mean >3.0 = Accepted

Table 4.5 shows the responses of kitchen staff on the type of food waste in the kitchen. On a scale of 1 to 5, it was accepted by the respondents that leftovers foods are waste generated. This statement reflected a mean score of 3.82 and a standard deviation of 0.882. The finding concurs with the study by Papargyropoulou et al (2016) who found that leftover foods are waste generated and 56% of total food waste generated in the kitchen was considered avoidable. Additionally, leftover food waste may still be under-quantified as drink and liquid food waste is often excluded (Papargyropoulou et al., 2016).

Moreover, with a mean of 3.69 and a standard deviation of 1.262, the respondents accepted that discarded food items are the type of food waste generated. Some foods are suitable for humans to eat at some point and ends up discarded or disposed of, even if inedible by this time (Lipinski et al., 2013; Monier, 2011).

Certain foods are deemed not good for humans to eat and considered inedible, such as meat bones, banana skin, egg shells, fruit cores, coffee grounds and slaughter waste (Monier, 2011). Kirk (1995) revealed that discarding of certain food products which cannot be used are major food waste generated in the food service sector.

In addition, the respondents accepted that expired food products are the type of food waste generated. This statement had a mean of 3.63 and a standard deviation of 1.286. Kirk (1995) revealed that expired food items are waste generated in the kitchen. Moreover, the respondents accepted that waste is generated during food preparation at the kitchen. This statement reflected a mean of 3.43 and a standard deviation of 1.486. The result aligns with the study conducted in Finland by Silvennoinen, et al. (2015). The study measured the amount of food waste and the type of food waste in 51 food service outlets including schools, day-care centres, workplace canteens, restaurants, and diners. According to the study, food waste with origins from kitchen waste, and students or the customer leftovers were the major food waste generated (Silvennoinen, et al., 2015). According to Baldwin and Shakman (2012), in the kitchen, vegetables, fresh fruits, and meat need to go through trimming and preparing phase to be ready for use. Staff members with low knowledge and inappropriate kitchen skills training produce food by creating so much waste in the kitchen.

The respondents further asserted that purchasing ingredients more than needed are waste generated in the kitchen. This statement had a corresponding mean of 3.22 and a standard deviation of 1.311. Also, the respondents accepted that damage food products due to inappropriate stored temperature is a type of food waste generated. This statement had a mean of 3.14 and a standard deviation of 1.458. In many food service institutions, poor storage of foods are type of waste generated and ended up in

the trash (Hogan, 2016). As per Baldwin and Shakman (2012), inappropriate storage of food stuff due to staff behaviour plays an important role in food wastage control. Staff behaviours can either reduce or contribute to food waste. For example, if a recipe requires four and a half kilograms of beef and the beef package just comes in 5 kilograms, the chef cannot separate the package and leave the rest unused but use up the whole bag of meat. This action does not come with bad intention, however, it has led to an unexpected amount of food waste (Baldwin & Shakman, 2012).

Conversely, the respondents rejected that Over-preparation of food (x=2.14, SD=1.000), rejected food by the students and teachers (x=1.96, SD=0.999), and purchasing unwanted food products (x=1.76, SD=0.693) are the major kind of food wastage generated by the kitchen.

The finding indicates that leftovers foods, discarded food items, expired food products, and purchasing ingredients more than needed, damage of package food product and waste generated during food preparation at the kitchen are the major type of waste generated by kitchen at the various boarding Senior High Schools within the Bolgatanga Municipality. The results concur with a British study of hospitality foodservice subsectors who reported food waste generated by the kitchens equated to 23% and 8% respectively of total food purchased by weight, most of which is avoidable (Oakdene, 2013). Allocating total kitchen food waste to the generation area found 45% was preparation, 34% was customer plate waste and 21% was spoilage (Oakdene, 2013). Another British study of ten commercial restaurants reported higher preparation waste at 65%, similar plate waste at 30% and minimal spoilage waste at 5%. Total food waste was reported as averaging 480g per customer (Sustainable Restaurant Association, 2010). A study by Papargyropoulou et al (2016) also revealed leftover food items, discarded of food items and damage

food products was considered as the major food waste generated by food service operator. Papargyropoulou et al further found 56% of total food waste and 92% of customer plate waste was considered avoidable. A considerably higher average for daily food waste per customer (1.1kg) was found, although this may be a consequence of the buffet-style service.

4.4 Practices of kitchens staff towards sustainable food waste management

This section examines the practices by kitchens of SHS towards sustainable food waste management. The study used a 5-point Likert type scale ranging from "Strongly disagree" to "Strongly agree'', in descending order. Presented in Table 4.6 are the results.

Table 4. 6: Responses on the sustainable food waste management

No.	Practices towards food waste management	N	Mean	Std. Dev.	Remarks
	Purchase (x=2.84)				
1.	Check what food ingredient is already in storage before making request.	**49**	4.06	1.029	High
2.	Check the food ingredient's expiry date when requesting	**49**	3.31	1.176	High
3.	Check the food ingredient when making request to ensure that food is not broken or packaging is not damaged.	**49**	2.39	1.255	Moderate
4.	Only request the food ingredient according to needs	**49**	1.61	.759	Low
	Storage (x=3.03)				
1.	Store the food ingredient in order during purchase "first-in, first-out".	**49**	3.96	1.136	High
2.	Ensure the food ingredient storage area is safe (avoid spills, broken and damaged products)	**49**	3.55	1.259	High
3.	Make sure fresh food ingredients are stored at the appropriate temperatures	**49**	3.35	1.200	High
4.	Label food ingredients that show the products' expiry dates before being stored	**49**	2.37	1.236	Moderate
5.	Label food ingredients that show the storage instructions before storage.	**49**	1.94	1.049	Low

	Food preparation (x=2.38)				
1.	Consider the demands when preparing food	**49**	3.96	.999	High
2.	Reduce using food ingredients that are easily damaged for preparing food	**49**	2.29	1.208	Moderate
3.	Make extra food in case it is needed only	**49**	1.98	1.070	Low
4.	Use the leftover quality food for the preparation of other meals.	**49**	1.29	.500	Low
	Management of leftover food (x=2.93)				
1.	Use the leftover foods as animal feed	**49**	4.04	1.183	High
2.	Encourage students to take their leftover food along	**49**	3.92	1.181	High
3.	Donate leftover quality food to charity	**49**	1.96	1.188	Low
4.	Let staff take home the leftover quality Foods	**49**	1.82	1.068	Low
	Disposal of waste food (x=1.95)				
1.	Pursuit food waste reduction programme	**49**	2.71	1.307	Moderate
2.	Compost organic kitchen waste	**49**	1.86	.979	Low
3.	Practice food waste segregation	**49**	1.84	.850	Low
4.	Conduct a food waste audit	**49**	1.71	.707	Low
5.	Have a waste management team	**49**	1.63	.602	Low

High: ≥ 3.0, Moderate=2.9-2.0, Low: <2.0

4.4.1 Purchasing

As depicted in Table 4.6, the respondents revealed that they check what food ingredients is already in storage before making request. This statement reflected a mean of 4.06 and a standard deviation of 1.029. Moreover, the respondents indicated that they check the food ingredients expiry date when making request. This statement had a mean of 3.31 and a standard deviation of 1.176. Also, the respondents indicated that they check the food ingredient when making request to ensure that food is not broken or packaging is not damaged with a mean of 2.39 and a standard deviation of 1.255. On the issue that food ingredients is requested according to needs had low mean score of 1.61 and a standard deviation of 0.759.

Therefore, the findings reveal that the interpretation of all the items for the process of purchasing practices is low with an average mean score of 2.84. This implies that the kitchen staff at the various boarding Senior High Schools within the Bolgatanga Municipality does not have control over purchasing of food items. According This finding is in consistent with researchers (Mourad, 2016; Tan, Lyman & Wisner, 2002) who emphasized that kitchen staff who have control over purchase of food item check for various specification such as product quality, timely delivery, ability to support the required quantity, consistency of products, and price. But they forgo these practices when they do not have any control over purchase of the food items.

4.4.2 Storage

Since the kitchen staff serve the teaching and non-teaching staff, and the students, there the needs to have a systematic process on storage to avoid the spoilage of food. Table 4.5 shows that most of the kitchen at the various boarding senior high schools in Bolgatanga Municipality pursue first in first out (FIFO) with a mean of 3.96 and a standard deviation of 1.136 ensure the food ingredient storage area is safe (avoid spills, broken and damaged products) with a mean of 3.55 and a standard deviation of 1.259 and make sure those fresh food ingredients are stored at the appropriate temperatures with a mean of 3.35 and a standard deviation of 1.200. These practices also control the stock of raw food ingredients effectively with the right rotation (Halloran et al., 2014). In addition, stored fresh food ingredients at the appropriate temperatures will also prevent food waste.

On the other hand, the issue that the respondents check label food ingredients that show the products expiry dates before being stored (x=2.37, SD=1.236) and

labels food ingredients that shows the stored instruction before storage (x=1.94, SD=1.049) had moderated and low mean score.

Table 4.6 shows that the interpretation score for all the items for the process of storage is high, with an average mean of 3.03. Halloran et al. (2014) that hotel practice sustainable food waste management by pursuing first in first out (FIFO) and ensuring that food ingredient storage area is safe (avoid spills, broken and damaged products). These practices also control the stock of raw food ingredients effectively with the right rotation. In addition, Halloran et al. affirmed that kitchen staff should take every possible effort to minimise their food wastage by making sure those fresh food ingredients are stored at the appropriate temperatures.

4.4.3 Food preparation

Table 4.6 shows that the mean interpretation of all items for the process preparation of food is low except item 1 (high), and item 2 (moderate). This indicates that the various kitchens does not make extra food in case it is needed only and reuse quality leftover food. The results indicate that kitchen staff consider the demands when preparing food for the students and the teachers with a mean score of 3.96 and a standard deviation of 0.999. On the other hand, the kitchen staff reduce using food ingredients that are easily damaged for preparing food with a mean score of 2.29 and a standard deviation 1.208. With a mean score of 1.98 and a standard deviation of 1.070, the respondents disagreed that they make extra food in case it is needed only. Also, with a mean score of 1.29 and a standard deviation of 0.500, the respondents disagreed that they use the leftover quality food for the preparation other meals.

This clarifies that the interpretation score for all the items for the food preparation is low with a mean score of 2.38. Even though the various kitchens have

taken every possible effort to minimise their food wastage when preparing food, they still cannot fully avoid leftover food wastage due to the strict food safety standards. For safety and hygienic purposes, leftover food from should not be reused for other meals or served again to other people. In fact, a selection of the type of food quality, packaging, and storage at appropriate temperatures are influenced by prolonging the quality of leftover food for safe consumption or reuse for preparing other meals (Papargyropoulou et al., 2016). The above finding is consistent with the study by Pirani and Arafat (2015) who found that while food safety standards ensures the food served is fresh and harmless.

4.4.4 Management of leftover food

The mean interpretation of all items for the process of management of leftover food and guests' plate waste is moderate, which had an average mean of 2.93. The respondents only agreed that they use the leftover foods as animal feed with a mean score of 4.04 and a standard deviation of 1.183, and encourage the students to take along their leftover food along with a mean score of 3.92 and a standard deviation of 1.181. Also, the respondents disagreed that they donate leftover quality food to the charity (x=1.98, SD=1.188) and let the staff to take home the leftover quality food (x=1.82, SD=1.068). The finding indicates that the management of leftover food at the various kitchen is low with a mean score of 2.93. From this, there should be a strict policy at the various boarding of senior high schools to influences the process management of leftover food. According to Food Wise Hong Kong (2013), plate waste could be reduced by education or raising awareness among guests through an effective communication program. On the other hand, studies done by Jeffery et al. (1994) and, Kuo and Shih (2016) found that overall average plate waste could be

reduced significantly by using coercion approach (include penalty) compared to education approach. Thus, the best might be to use both approaches to increase guests' awareness.

4.4.5 Disposal of waste food

The mean interpretation of all the items sent for disposal is low. The respondents moderately indicated that they pursuit food waste reduction programme with a mean of 2.71 and standard deviation of 1.307. Compost is one of the sustainable practices before food waste is sent to the landfills. The practice of compost shows was low with a mean score of 1.86 and a standard deviation of 0.979. In addition the practice of food waste segregation (x=1.84, SD=0.850), conducting a food waste audit (x=1.71, SD=0.707) and having waste management team (x=1.63, SD=0.602) were low. The finding buttresses with the work of Kuo and Shih (2016) who indicated that 95% of the institutions have not implemented a waste audit or established a special team for waste management needs.

The finding in this study also concurs to findings by Sullivan and Smith (2014) that explain that most institutions failed to conduct a food waste audit, and compost organic kitchen waste. Composting practices are attractive options for island hotels to reduce the costs of managing food waste and are good source for landscaping purposes. According to the Environment Protection Agency (2010), composting system has a capacity to reduce 44% of waste costs. In addition, the separation of waste is the starting point for disposal of food waste in a sustainable way.

4.6 Strategies for reducing food waste generations

In this section, the respondents were asked to indicate an integrated strategies for reducing food waste generations towards sustainable food waste management. The respondents were made to rank their level of agreement or disagreement along a number of constructs. The study used a 5-point Likert type scale ranging from "Strongly disagree" to "Strongly agree", in descending order. Table 4.7 shows the result emanated from the study.

Table 4. 7: Responses on integrated strategies for reducing food waste generations

No.		Mean	Std. Dev.	Levene's Test for Equality of Variances	
				F	Sig.
1.	Developing a food waste management policy with clear objectives, procedures, and goals	3.82	1.380	4.934	0.031[b]
2.	Avoid impulsive or advance purchasing of food that is not required immediately	3.71	1.307	1.235	0.272
3.	Better planning of purchases to avoid buying more than is needed	3.55	1.209	5.280	0.026[b]
4.	Better knowledge on how to use the leftovers on other recipes instead of discarding	3.51	1.309	4.097	0.049[b]
5.	Ensuring coordination within food chains	3.33	1.313	0.066	0.798
6.	Better understanding of the distinction between "best before" and "use by" dates	2.51	1.260	3.718	0.060[c]
7.	Better evaluation of the portions that need to be prepared	2.37	1.185	4.764	0.034[b]
8.	Better storage practices and stock management	2.18	1.093	0.075	0.785

[a]*P* < 0.01, [b]*P* < 0.05, [c]*P* < 0.1 *Mean >3.0 = Agreed*

From Table 4.7, the survey results showed that food waste can be reduced by developing a food waste management policy with clear objectives, procedures, and goals. This statement reflected a mean of 3.82 and a standard deviation of 1.380. The Levene's test for equality of variances shows a significant influence of developing a food waste management policy on the reduction of food waste generation (F=4.934, p=0.031<0.05). Conversely, the respondents agreed that avoiding impulsive or

advance purchasing of food that is not required immediately reduce food waste generations. This statement reflected a mean of 3.71 and a standard deviation of 1.307. However, an insignificant difference was found between avoiding advance purchasing of food that is not required immediately and reducing food waste generations ($F=1.235$, $p=0.272>0.05$).

Also, the respondents agreed that better planning of purchases to avoid buying more than is needed eliminates food waste. This statement had a mean of 3.55 and a standard deviation of 1.209. The Levene's test for equality of variances shows a significant effect of better planning of purchases to avoid buying more than is needed on food waste generations ($F=5.280$, $p=0.026<0.05$). With a mean score of 3.51 and a standard deviation of 1.309, the respondent agreed that better knowledge on how to use the leftovers on other recipes instead of discarding. A significant relationship was found on the effect of better knowledge on how to use the leftovers on food waste generations ($F=4.097$, $p=0.049<0.05$).

On the contrary, the respondents disagreed that better understanding of the distinction between “best before” and “use by” dates ($x=2.51$, $SD=1.260$) is a strategy for reducing food waste generations. Meanwhile, a significant relationship was found between the views of the respondents on disagreeing on better understanding of the distinction between “best before” and “use by” dates as strategy for reducing food waste generations ($F=3.718$, $p=0.060<0.1$). Moreover, the respondents disagreed to better evaluation of the portions that need to be prepared ($x=2.37$, $SD=1.185$). However, there was a significant influence was found between the views of the respondents on disagreeing on better evaluation of the portions that need to be prepared as strategy for reducing food waste generations ($F=4.764$, $p=0.034<0.05$). Also, the respondents disagreed to better storage practices and stock

management (x=2.18, SD=1.093) as an integrated strategy for reducing food waste generations towards sustainable food waste management at boarding senior high schools. A significant relationship was found between the views of the respondents on disagreeing on better storage practices and stock management for reducing food waste generations (F=0.075, p=0.785>0.05).

The result indicates that developing a food waste management policy with clear objectives, better planning of purchases to avoid buying more than is needed, and better knowledge on how to use the leftovers on other recipes instead of discarding are integrated strategies that have a direct influence on reducing food waste generations towards sustainable food waste management. This implies that through the introduction of appropriate technical and soft (organisational/social) innovations, the improvement of the management of the whole food system is crucial for the reduction of food waste. Terlizzi, Otterdijk, Dragotta, Pink and Bilali, (2016) reported that food service industries in Mediterranean countries urgently adopt food waste prevention and reduction strategies to reduce waste food generation. Terlizzi, et al. (2016) indicated that designing adequate policies and guidelines and better planning of purchases reduces food waste generations towards sustainable food waste management

The finding aligns with the study Quested, Marsh, Stunell and Parry (2013) who give a detailed measures that could implement to reduce food waste. Quested *et al.* (2013) asserted that better storage practices and stock management, better planning of purchases to avoid buying more than is needed and avoiding impulsive or advance purchasing of food that is not required immediately are measures that could implement to reduce food waste.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter sums up the findings from the study, draws conclusion arising from the study and makes relevant recommendations based on the findings.

5.2 Summary of Findings

A number of findings were made after a discussion of the responses. They are summarized as below;

5.2.1 Type of food waste generated by kitchens of SHS

- The finding indicated that leftovers foods, discarded food items, expired food products, and purchasing ingredients more than needed are the major type of waste generated by kitchen at the various boarding Senior High Schools within the Bolgatanga Municipality.
- The study further revealed that damage of package food product and waste generated during food preparation at the kitchen are the type of waste generated by kitchen at the various boarding Senior High Schools within the Bolgatanga Municipality.

5.2.2 Practices of kitchens staff towards sustainable food waste management

- The finding showed that the kitchen staff at the various boarding SHS does not have control over purchasing of food items.
- It appeared from the study that kitchen at the various boarding SHS make proper storage of food items purchase in the market to avoid waste

- The study revealed that kitchen at the various boarding SHS have poor practice towards proper preparation of food to avoid waste generation.
- The study found that kitchen at the various boarding Senior High Schools had poor practices towards management process of management of leftover food and disposal of food wasted generated.

5.2.3 Integrated strategies for reducing food waste generations

- The result indicated that developing a food waste management policy with clear objectives ($F=4.934$, $p=0.031<0.05$), better planning of purchases to avoid buying more than is needed ($F=5.280$, $p=0.026<0.05$), and better knowledge on how to use the leftovers on other recipes instead of discarding ($F=4.097$, $p=0.049<0.05$) are integrated strategies that have a direct influence on reducing food waste generations towards sustainable food waste management.

5.3 Conclusion

According to the present study, kitchen at the various boarding Senior High Schools generates waste during food preparation at the kitchen, over preparation of food, discarded food items, and damage food products due to inappropriate storage. According to the study entire purchase process is not controlled by the kitchen staffs in preventing waste due to spoilage at an early stage. Moreover, kitchen at the various boarding Senior High Schools make proper storage of food items purchase in the market to avoid waste.

The study concluded that kitchen at the various boarding Senior High Schools have poor practices towards management process of management of leftover food and

guests' plate waste, and disposal of food items. In conclusion, developing a food waste management policy ensures better planning of purchases to avoid buying more than is needed, and better knowledge on how to use the leftovers on other recipes instead of discarding.

5.4 Recommendations

Based on the findings of this work, it was recommended that;

- The school authorities should establish a specific internal audit team and audit food waste generation by measuring the present food waste levels and identify the key sources of food waste generation. Such practices give useful information for food operators to implement effective strategies to reduce food waste before food waste is sent to landfills for disposal.
- The government of Ghana should provide training to the kitchen staff on sustainable food waste management from purchasing to disposal in order to instil and educate staff with food waste reduction culture.
- The authorities of senior high schools should develop a food waste management policy with clear objectives, procedures, and goals towards reduction of food waste, and at the same time, maintaining the safety and standard hygiene purposes. In other words, the policy for food waste reduction should target the circumstances and actions that lead to food wastage and to facilitate the culture of reduce waste in the food service operators operation.

5.5 Suggestion for Further Studies

There are numerous research avenues in future as a result of this study. The following are therefore recommended for further research:

- research into waste management in boarding senior high schools in different geographical location as the current study was conducted in Bolgatanga Municipality in Upper East Region of Ghana.
- Future research into the food waste management at the various senior high school should include the management staff.

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APPENDIX

UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

DEPARTMENT OF HOSPITALITY AND TOURISM EDUCATION

QUESTIONNAIRE FOR KITCHEN STAFF

Preamble: This questionnaire is designed for academic purpose and is only meant to solicit views to assist us in carrying out a study aimed at finding **food waste management in the kitchens of educational institutions in Ghana. A case study of senior high schools in the Bolgatanga Municipality**. Please be assured that the information you will provide will be treated with the needed confidentiality and will be used solely for the purpose of this project.

Section (A): Demographic Background

1. Gender: a. Male ( ) b. Female ( )

2. Age:
   a.18-30 years ( ) b. 31-40 years ( ) c. 41-50 years ( ) d. 50+ ( )

3. Educational Background:
   a. No formal education ( ) b. Primary ( ) c. Junior high school ( )
   d. Senior high ( ) e. Tertiary ( )

4. Marital Status:
   a. Married ( ) b. Single ( ) c. Divorced ( ) d. Widow ( )

5. How long have you been working in this institution?
   a. Less than a year ( ) b. 1-5 years ( ) c. 6- 10 years ( )
   d. 10 years and above ( )

Section (B) – Kinds of food waste generated by food service operators

6. To what extent do you agree with the following kinds of food waste generated. Please rate using a scale of 1 to 5: strongly disagree (1), disagree (2), Uncertain (3), agree (4), and strongly agree (5). *(Please tick the box which best reflect your view).*

S/No.	Type of food waste generated	Scale				
		1	2	3	4	5
1.	Expired food products are food waste generated					
2.	Damage of package food product					
3.	Leftovers foods are waste generated					
4.	Waste generated during food preparation at the kitchen					
5.	Discarded food items are kinds of food waste generated					
6.	Over-preparation of food are kinds of food waste generated					
7.	Rejected food by the students and teachers					
8.	Purchasing unwanted food products					
9.	Purchasing ingredients more than needed					
10.	If other specify:…… …….. …….. ……					

Section (C) – practices towards sustainable food waste management

7. To what extent do you agree with the following kinds of practices towards sustainable food waste management. Please rate using a scale of 1 to 5: strongly disagree (1), disagree (2), Uncertain (3), agree (4), and strongly agree (5). *(Please tick the box which best reflect your view).*

S/No	Practices towards food waste management	Scale				
		1	2	3	4	5
	Purchase					
1.	Only buy the food ingredient according to needs					
2.	Check the food ingredient when purchasing to ensure that food is not broken or packaging is not damaged.					
3.	Check the food ingredient's expiry date when purchasing.					
4.	Check what food ingredient is already in storage before purchasing.					
	Storage					
5.	Make sure fresh food ingredients are stored at the appropriate temperatures					
6.	Store the food ingredient in order during purchase "first-in, first-out".					
7.	Label food ingredients that show the products' expiry dates before being stored.					
8.	Label food ingredients that show the storage instructions before storage.					
9.	Ensure the food ingredient storage area is safe (avoid spills, broken and damaged products).					
	Food preparation					
12.	Make extra food in case it is needed only.					
13.	Reduce using food ingredients that are easily damaged for preparing food.					
14.	Consider the demands when preparing food					
15.	Use the leftover quality food for the preparation of other meals.					
	Management of leftover food					
16.	Use the leftover foods as animal feed					
17.	Donate leftover quality food to charity					
18.	Let staff take home the leftover quality Foods					
19.	Encourage students to take home their leftover food					

	Disposal of waste food					
20.	Compost organic kitchen waste					
21.	Practice food waste segregation					
22.	Pursuit food waste reduction programme					
23.	Have a waste management team					
24.	Conduct a food waste audit					

Section (D): Innovative integrated strategies for reducing food waste generations

14. Are there any existing policy in the school to reduce waste generation in the school?

Yes [ ] No [ ]

15. The school management ensures that the kitchen staff are well informed decisions and reduce food waste generations towards sustainable food waste management.

Strongly disagree [ ] Disagree [ ] Neutral [ ] Agree [ ]
Strongly agree [ ]

16. To what extent do you agree with the following innovative integrated strategies for reducing food waste generations. Please rate using a scale of 1 to 5: strongly disagree (1), disagree (2), Uncertain (3), agree (4), and strongly agree (5). *(Please tick the box which best reflect your view).*

S/N	**Strategies**	**Scale**				
		1	**2**	**3**	**4**	**5**
1.	Better planning of purchases to avoid buying more than is needed					
2.	Avoiding impulsive or advance purchasing of food that is not required immediately					
3.	Better understanding of the distinction between “best before” and “use by” dates					
4.	Developing a food waste management policy with clear objectives, procedures, and goals					
5.	Better storage practices and stock management					
6.	Better evaluation of the portions that need to be prepared					
7.	Better knowledge on how to use the leftovers on other recipes instead of discarding.					
8.	Ensuring coordination within food chains					