UNIVERSITY OF CAPE COAST

FOOD WASTE MANAGEMENT PRACTICES AMONG RESTAURANTS

IN THE CAPE COAST METROPOLITAN AREA

HELENA AFRAM

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IN THE CAPE COAST METROPOLITAN AREA

BY

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Thesis submitted to the Department of Geography and Regional Planning of the Faculty of Social Sciences, College of Humanities and Legal Studies, University of Cape Coast, in partial fulfilment of the requirements for the award of Master of Philosophy degree in Geography and Regional Planning.

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature: ....   Date: ....

Name: Helena Afram

Supervisor's Declaration

I hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of the thesis laid down by the University of Cape Coast.

Supervisor's Signature: ....   Date: ....

Name: Prof. Simon Mariwah

ABSTRACT

The hospitality sector is one of the primary sources of food waste, but the sector has received less attention from researchers. This study examined food waste management practices among restaurants in the Cape Coast Metropolis. Specifically, the study focused on food waste disposal practices, reduction strategies, restaurant challenges, and potential strategies for improving waste management practices. The study utilised snowball and purposive sampling techniques to gain insight into waste generation and management practices from 17 restaurants through in-depth interviews. The findings revealed that restaurants in Cape Coast use external waste collection, sometimes practise waste segregation, and dump at disposal sites and in open spaces. The food waste reduction strategies among the restaurants, including careful food storage, portion control, menu planning and staff training, effectively reduced waste and improved financial outcomes. The restaurants faced challenges managing food waste, such as prepaid credit network problems, power outages, customer dissatisfaction, legal and regulatory issues, and limited kitchen space. Promoting awareness, implementing standard portioning, tracking inventory, and fostering collaboration among local restaurants can mitigate these challenges. Therefore, the Ministry of Tourism and the Ghana Tourism Authority should lead educational campaigns on food waste reduction strategies, targeting restaurant owners, staff, and customers to enhance awareness and promote sustainable practices in the hospitality sector.

KEY WORDS

Cape Coast Metropolis

Food Waste Management

Hospitality Industry

Restaurants

Waste Disposal Practices

Waste Reduction Strategies

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DEDICATION

This thesis is dedicated to my Late Grandfather, Nana Kwankye-Pong II and

Hon. Johnson Kwaku Adu for their encouragement, which fueled my

determination.

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LIST OF ACRONYMS

CCMA   –   Cape Coast Municipal Assembly

WRAP   –   Worldwide Responsible Accredited Production

MSW   –   Municipal Solid Waste

LCA   -   Life Cycle Assessment

EC   -   European Commission

EU   -   European Union

UNESCO   -   United Nations Educational, Scientific and Cultural

                      Organization

EPA   -   Environmental Protection Agency

FAO   -   Food and Agriculture Organization

UK   -   United Kingdom

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Every year, people discard one-third of the world's food before eating it, resulting in the wastage of 1.3 billion tons and the occupation of 1.4 billion hectares of land, equivalent to 28% of the world's agricultural land (Saric, 2019). This food waste costs $750 billion annually in economic losses and environmental costs. The continuous rise of food waste has raised concerns, including climate change, pollution, loss of biodiversity, and overharvesting due to the supply chain process from food production to food consumption (FAO, 2013; Principato et al., 2018).

The hospitality sector is one of the primary sources of food waste, accounting for 17% of total food waste, and more than two-thirds of food waste is avoidable (Beretta et al., 2013). In Europe, the hospitality industry generates 12% of food waste, the third largest proportion after household and manufacturing food waste (Wu & Teng, 2023). In the UK, people generate about 45% of food waste from the preparation phase in the kitchen, 21% of waste occurs due to food deterioration, and 34% of waste consists of uneaten food in restaurants (Saric, 2019). In the United States, the food service industry generates up to 24 million tonnes of food waste and spends about $21 billion a year to dispose of food (Buzby & Hyman, 2012). In Sub-Saharan Africa, food waste is estimated to be around 37% or 120-170kg/year per capita (Sheahan & Barrett, 2017).

Different authors have defined food waste as wasted food that occurs in different stages, ways, and contexts, such as the food supply chain process,

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inedible bio waste, and the food consumption stage (Papargyropoulou et al., 2014; Silvennoinen et al., 2015; Aschemann-Witzel et al., 2015). The FAO (2014) defines food waste as food suitable for human consumption but not eaten by humans and discarded, and the food is left to spoil or expire. Pirani and Arafat (2016) define food waste as unwanted leftover food from guest plates and disposed food from preparation and cooking.

The issue of food waste is particularly acute in developing countries like Ghana, where rapid urbanisation and population growth have led to increased demand for food services (Kuusaana & Eledi, 2015). Food waste forms about 68% of municipal waste in the country (Cudjoe et al., 2021), and 66% of food produced, exported, and consumed is lost yearly to food waste (Obuobi et al., 2022). The food service sector, particularly restaurants, significantly contributes to food waste due to inadequate waste management practices (Addai, 2021).

Inadequate waste management in the hospitality sector has high economic and environmental costs, reducing the efficiency and functionality of natural systems and causing closures of urban facilities (Gyeduah, 2020). The generation and disposal of waste by restaurants exacerbate this problem. To address this issue, managers should consider implementing recycling schemes to promote the reuse, decrease, and recycle strategy (Sloan et al., 2014). Additionally, customers are increasingly environmentally conscious and seek out eco-friendly restaurants (Ballester et al., 2022) as they are becoming aware of the environmental problems caused by the waste management practices of restaurants.

Service quality is crucial in the restaurant industry as it impacts customer satisfaction and retention, which is more cost-effective than acquiring

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new customers (Gyeduah, 2020). Implementing an effective food waste management strategy can be a marketing tool, providing a competitive advantage and contributing to restaurant sustainability (Filimonau et al., 2019; Martin-Rios et al., 2020). Overall, improving waste management practices and focusing on customer satisfaction can have positive economic and environmental impacts on the hospitality sector.

1.2 Problem Statement

Ghana is one of the fastest-growing economies in Africa, and it has experienced significant urbanisation in recent years. This rapid development has increased the number of restaurants in the country, especially in urban areas like the Cape Coast metropolis. Waste management has recently become a significant issue in the country, with Cape Coast included (Gyimah et al., 2021). This is because various industries and homes generate huge tons of waste. The food service industry is known to be one of the silent generators of waste in the environment (Punitha et al., 2016; Gyeduah, 2020).

Restaurants significantly contribute to food waste in the country, and managing this waste is a significant challenge (Seidu, 2020). In addition, poor food waste disposal can lead to environmental degradation, which can have severe implications for public health and the ecosystem. Most restaurants in Cape Coast do not have waste recycling management systems in place (Gyimah et al., 2021). They resort to burning food waste and dumping it at unauthorised refuse sites (Ohene-Darko, 2018). In some instances, restaurant operators leave this food waste unattended, which attracts cats, dogs, and other animals and can lead to physical and microbial contamination of food (Ohene-Darko, 2018). If left unmanaged, food waste becomes a breeding ground for insects, bacteria,

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and vermin such as cockroaches and mice, which may result in economic, health, and environmental hazards (Seberini, 2020).

Lack of appropriate food waste management can be linked to poor environmental sanitation, leading to health problems such as malaria, diarrhoea, and typhoid fever (Mendedo et al., 2017). This can affect the health of management, staff, guests who patronise the restaurant, the community in which they operate, and the country. Again, poorly managed food waste can produce an eminent odour that may lead to environmental pollution (Haddad et al., 2022; O'Connor et al., 2022). All these have a negative economic impact because healthy people produce a healthy economy.

Moreover, the Cape Coast Metropolis is a famous tourist destination in Ghana, and there has been an increasing number of restaurants that meet the food needs of guests who visit the metropolis. However, despite the increase in restaurants and the health threats of poorly managed food waste to the public, most studies do not pay attention to restaurant food waste but rather subsume it in general solid waste management. In addition, most studies focus on food waste in restaurants in Accra (Nikiema et al., 2022; Abubakar, 2018; Osei-Tutu, 2018) and Kumasi (Obuobi, 2021). Meanwhile, socio-cultural and economic factors influencing food waste generation and management vary across space and time. Hence, this study is needed in Cape Coast Metropolis to help reduce environmental health issues and ensure sustainability.

1.3 Purpose of the Study

The study's main objective was to assess food waste management practices among restaurants in Cape Coast.

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1.4 Research Objectives

1. Examine food waste disposal practices among restaurants in the Cape Coast metropolis.

2. Analyse food waste reduction strategies among restaurants in the Cape Coast metropolis.

3. Investigate the challenges faced by restaurants in managing food waste in the Cape Coast metropolis.

4. Explore strategies to improve food waste management practices among restaurants in the metropolis.

1.5 Research Questions

1. What are the food waste disposal practices among restaurants in the Cape Coast Metropolis?

2. Which food waste reduction strategies are adopted by restaurants in the Cape Coast metropolis?

3. What challenges do restaurants face in managing food waste in the Cape Coast Metropolis?

4. What strategies can improve food waste management in the Cape Coast Metropolis?

1.6 Significance of the Study

This study on food waste management practices among restaurants in the Cape Coast Metropolitan Area holds significant importance for various stakeholders, including restaurant owners, government agencies, environmental organisations, and the local community. By examining the current food waste management practices and identifying potential areas for improvement, this study aims to reduce the environmental footprint of the restaurant industry.

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Implementing effective waste management practices, such as source segregation, composting, and recycling, can help minimise the amount of food waste sent to landfills, thereby reducing methane emissions and conserving valuable resources.

The study highlights opportunities for resource efficiency and supports adopting sustainable practices, such as portion control, inventory management, and staff training on waste reduction techniques. It helps restaurants implement strategies to reduce food waste and optimise resources, resulting in cost savings and a reduced demand for raw materials. The study also provides insights into the economic benefits of food waste reduction and supports the business case for implementing sustainable waste management practices.

The findings of this study can also serve as a basis for developing policies and regulations related to food waste management in the restaurant sector. Government agencies and local authorities can utilise the research outcomes to design and implement effective waste management programmes, set waste reduction targets, and establish guidelines for waste segregation, collection, and disposal. The study can create an enabling environment for sustainable practices and facilitate integrating food waste management into broader policies.

The study assesses restaurant waste disposal practices toward food waste reduction and sustainability. It can inform targeted awareness campaigns and educational initiatives by highlighting restaurants' challenges and understanding the barriers to implementing effective waste management practices. Increased awareness and knowledge among restaurant stakeholders

can promote behavioural changes, foster a culture of waste reduction, and encourage the adoption of sustainable practices beyond the scope of this study.

Lastly, restaurants play a central role in the community and have the potential to influence consumer behaviour. By actively engaging with the local community, restaurants can raise awareness about food waste issues, educate consumers about sustainable choices, and promote responsible consumption. The study's findings can support community engagement by providing evidence-based recommendations and best practices for restaurants to implement community outreach programmes and collaborate with local organisations and initiatives to reduce food waste. For example, restaurants can partner with food banks, animal farm owners, or charitable organisations to donate excess food instead of throwing it away. Such collaborations reduce food waste and address food insecurity within the community.

1.7 Delimitation of the Study

This study focused on food waste management practices among restaurants in the Cape Coast Metropolitan Area. The research collected data from a representative sample of restaurants within the metropolitan area. The study primarily employed qualitative research methods, including interviews and observations, to gather in-depth information regarding food waste generation, management practices, and challenges.

1.8 Limitations of the Study

Although this study provided valuable insights into food waste management practices among restaurants in the Cape Coast Metropolis, it was limited by time, funding, and practical field experiences. The academic timeline constrained prolonged engagement with participants, while restricted funding

curtailed the scope for more extensive fieldwork and data collection. Furthermore, practical issues during fieldwork (including scheduling conflicts and staff turnover in restaurants) impeded the breadth of data gathering, affecting the generalisability of the findings.

1.9 Organisation of the Study

This thesis consists of five chapters. Chapter One introduces the study, presenting the background, problem statement, objectives, research questions, significance, scope, delimitation, and limitations. Chapter Two reviews the relevant literature on food waste management practices in the restaurant industry. Chapter Three describes the research methodology, including the research design, data collection methods, and sampling techniques. Chapter Four presents the results and discussion based on the data collected. Finally, Chapter Five summarises the study and presents conclusions, recommendations and future research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviewed the studies and publications on food waste management practices among restaurants. The review provides the conceptual definition of food waste in restaurants, the frameworks guiding the study and the empirical literature review.

2.2 The Concept of Food Waste in Restaurants

Food waste refers to the loss or waste of edible food, occurring at the various stages of the food supply chain, from production and processing to distribution and consumption (Principato et al., 2018; Caldeira et al., 2019). It encompasses any food that is discarded, lost, spoiled or uneaten. Food waste is managed in various ways, such as donations to feed people, the creation of animal feed, composition, anaerobic digestion, or disposal in landfills or combustion facilities. Food waste and loss are estimated to be roughly one-third of the global food intended for human consumption (Schinkel, 2019). This results in wastage of about 1.3 billion tonnes and the occupation of about 1.4 billion hectares of land, costing $750 billion annually in economic and environmental costs (Saric, 2019). The causes of food waste or loss include weather changes, processing problems, overproduction, unstable markets, and more.

In restaurants, food waste refers to the discarded or unused food that occurs during the various stages of restaurant operations, including food preparation, serving and post-meal clean-up (Liang et al., 2021). The challenge of food waste in the food service sector is even more pronounced in Africa and

other emerging economies (Papargyropoulou et al., 2019). For instance, Wen et al. (2018) observe that the food service industry in China generates half of the total food waste. According to Chomba (2022), the estimated percentage of food waste generated by restaurants and other food services is roughly 37% or 120-170kg/year per capita in Africa. However, restaurant operators often do not perceive food waste as falling within their responsibility, leading to a lack of motivation to adopt more sustainable practices (WRAP, 2013). Several common factors contribute to food waste in restaurants, including improper storage, mishandling during preparation, over-preparation, serving excessive portions, leftover food on plates, challenges in accurately predicting customer numbers, forgotten the spoiled food, and limited awareness due to inadequate data on food waste (Papargyropoulou et al., 2019; Sakaguchi et al., 2018; Offei & Mikkelsen, 2011).

Scholars have extensively tried to understand and classify the factors contributing to food waste in the food service industry. Principato et al. (2018) differentiate between kitchen and client food waste. They argue that kitchen food waste arises during various stages such as storing, meal preparation, ingredient cooking, dish plating, and serving, while client food waste refers to leftovers on customer plates. This categorisation aligns with the classification proposed by Papargyropoulou et al. (2019), which divides food waste into preparation-related and customer-related waste. The latter category is further subdivided into customer plate waste and buffet leftovers. Pinto et al. (2018) categorise food waste into four groups, stating that food is wasted due to spoilage, meal preparation, excessive portioning, and customer behaviour (plate leftovers or plate waste). Martin-Rios et al. (2018) emphasise three stages of

food waste occurrence: storage, preparation (kitchen waste), and consumption (plate waste). This three-stage categorisation is commonly used in industry and governmental reports on food waste in the food service sector (WRAP, 2017).

These reports also attempt to provide quantitative estimates of the relative magnitude of food waste. For example, in Austria's food service sector, 29% of food is wasted in the kitchen, primarily as excess ingredients from meal preparation or over-cooking, resulting in unsold dishes (Hennchen 2019). In the UK, 45% of food waste occurs during the preparation stage, which falls under the responsibility of the kitchen department. Additionally, 21% is attributed to food spoilage and quality deterioration, for which the kitchen and procurement departments are responsible, while 34% of food waste occurs on customer plates, which is the responsibility of consumers (WRAP 2017). The UK's Sustainable Restaurant Association provides slightly different figures for London, indicating that most food waste in the city happens during preparation (65%), followed by waste on customer plates (30%) and spoilage (5%) (SRA 2010). Furthermore, Lemos's (2019) data suggests that over 70% of food waste occurs globally during preparation. Similar conclusions can be found in academic research on food wastage in the food service sector in Malaysia (Goh & Jie 2019; Papargyropoulou et al. 2019).

Restaurants are highly interested in the economic benefits of reducing food waste since they not only purchase food but also incur expenses for waste disposal. Thus, emphasising the financial consequences of food waste can motivate restaurants to prevent it (Heikkilä et al., 2016). However, historically, restaurants have factored in a certain amount of waste in their cost models and transferred these costs to consumers through higher menu prices (McAdams et

al., 2019). With increasing competition in the industry, rising food costs, and heightened consumer awareness regarding restaurants' environmental practices, there is more pressure than ever on restaurants to manage their food waste effectively.

2.3 Empirical Review

This section presents an empirical literature review on food waste management in restaurants. The empirical review is based on reviewed literature related to the study's objectives.

2.3.1 Food Waste Disposal Practices Among Restaurants

Quantifying the global wastage of thousands of food items poses a significant challenge. However, an extensive literature review indicates that meat, fruit, and vegetables, as well as bread and bakery products, emerge as the primary sources of food waste in developed countries (Lau et al., 2021; Brancoli et al., 2017). Food waste constitutes a substantial portion of municipal solid waste (MSW) and contributes to critical environmental issues, including greenhouse gas emissions from anaerobic digestion and leachate production in landfill sites. Food waste management follows a standard planning, collection, recycling, processing, and disposal framework, focusing on minimising environmental impacts. Proper disposal practices are crucial in reducing food waste, minimising environmental impact, and promoting sustainable resource management. Different food waste disposal methods, such as composting, incineration, and landfilling, are often used in disposing of food waste.

2.3.1.1 Landfilling

Landfilling is one of the most common methods of food waste disposal. It involves the burial of waste in designated areas known as landfills. Food

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waste is mixed with other types of waste, such as plastics, paper, and yard waste, and deposited in large pits or trenches in landfills. The waste is then compacted and covered with layers of oil or other materials to prevent odour, pests, and the release of gases. According to Henderson (2017), food waste represents about 20% of the contents of US landfills. Landfills are designed to store waste materials in a confined space, preventing them from contaminating the surrounding environment. Landfill gas typically comprises 60 to 65% methane and 35 to 40% carbon dioxide. Methane, represented by the chemical formula CH_4, has a global warming potential 21 times higher than carbon dioxide over a 100-year time frame (Derwent et al., 2023). Landfills contribute approximately 8% to 18% of the world's anthropogenic methane emissions (Saunois et al., 2020). In countries with high gross domestic product (GDP), this percentage can increase from 30% to 37% (Sauve & Van Acker, 2020; Melikoglu et al., 2013).

Leachate leakage into soil and groundwater is among the various issues associated with landfills. Leachate refers to a potentially toxic liquid that drains from the landfill. On average, landfills produce about 0.17 to 0.25 cubic meters of leachate per ton of municipal solid waste (Melikoglu et al., 2013). Consequently, new methods and techniques are being developed to utilise landfill gas effectively and reduce leachate production from landfills.

In the United Kingdom, approximately 28 million tonnes of municipal waste are generated annually, with 83% ending up in landfills (Jambeck et al., 2015). Around 60% of this municipal waste is biodegradable materials, primarily food waste. The environmental impact of food waste is significant. All the carbon emissions generated during production, processing,

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transportation, and storage are also wasted when food is wasted. This issue is estimated to contribute to at least 20% of the United Kingdom's greenhouse gas emissions, equivalent to approximately 15 million tonnes of carbon dioxide annually (Melikoglu et al., 2013).

2.3.1.2 Incineration or Combustion

In addition to landfilling, waste management techniques for Municipal Solid Waste (MSW) include combustion or incineration. Incineration is another thermal treatment process that burns waste materials at high temperatures, reducing them to ash. According to a study by Singh and Sharma (2016), incineration is a viable method for disposing of waste, as it reduces the volume of waste and generates energy in the form of heat and gas. Incineration offers a significant advantage by reducing the waste volume. Additionally, with proper equipment, an incinerator can be utilised as a waste-to-energy facility, generating electricity (Mukherjee et al., 2020). The heat generated from waste combustion can be harnessed to produce steam, which powers a turbine for electricity generation. Since no new fuel sources are required apart from the waste, municipal solid waste (MSW) is often considered a renewable energy source. There are 89 operational MSW-fired power plants in the United States, contributing around 2,500 megawatts or approximately 0.3% of the nation's total power generation (Branchini, 2015; Melikoglu et al., 2013).

To correctly manage the incineration process, incinerators must be used in conjunction with landfill systems to dispose of the resulting ashes. Incinerating waste at high temperatures effectively destroys chemical compounds and disease-causing bacteria. Consequently, incinerated MSW does not pose additional environmental issues at landfill sites. However, as part of

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MSW, incinerating food waste alone can lead to significant environmental problems. The incineration of MSW produces carbon dioxide, nitrogen oxides, sulfur dioxide, and small amounts of toxic pollutants like mercury compounds and dioxins. Assuming that organic household waste consists entirely of food waste, a higher heating value of 6.4 MJ/kg was assigned to food waste (Negri et al., 2020; Boys et al., 2000).

2.3.1.3 Composition

Composition is another effective method of food disposal practices. Composition is a natural process that breaks down organic waste into nutrient-rich soil. According to a study by Sheets et al. (2015), composting reduces food waste and produces a valuable product that can be used for gardening and agriculture. Composting also reduces the amount of methane produced by food waste in landfills, thus mitigating the impact of food waste on climate change. However, composting requires proper management and monitoring to ensure the process works effectively and efficiently.

Maintaining a specific carbon-to-nitrogen ratio in the waste is crucial, as it facilitates microbial activity to create optimal composting conditions. This ratio should ideally fall between 25:1 and 35:1. Other essential parameters include a moisture content of 50% to 65% (on a wet basis), sufficient oxygen supply, small particle sizes, and adequate void space (Melikoglu et al., 2013). When composting is conducted correctly, food waste can be transformed into an environmentally friendly product, reducing the waste's volume and mass by up to 40% (Narasimmalu & Ramasamy, 2020). However, if the composting process is not adequately managed, it can result in offensive odours.

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Composting can be performed on both domestic and industrial scales. In Western countries, local authorities often encourage home composting as it eliminates waste collection and processing costs. Composting primarily yields compost as the end product without generating other value-added products. Nonetheless, alternative bioprocesses could be developed to utilise food waste, which shares similarities with composting but can potentially produce valuable products. Before composting, it is crucial to characterise the food waste and determine the suitable bulking agent (Guidoni et al., 2018). However, it is essential to note that the composition of food waste can vary across different locations and over time, necessitating regular adjustments to composting recipes.

2.3.2 Challenges Faced by Restaurants in Managing Food Waste

Waste collection plays a crucial role in waste management systems. The inefficient and ineffective application of waste management approaches has become central to many discussions on the progress of sub-Saharan countries. Restaurants face numerous challenges when it comes to managing food waste effectively. These challenges stem from various factors, including over-production, the volume and type of waste generated, lack of awareness, and operational constraints.

2.3.2.1 Overproduction and Food Spoilage

Overproduction and food spoilage are significant challenges restaurants face in managing food waste. Several factors, including inaccurate demand forecasting, menu planning, and poor inventory management, contribute to these challenges. Accurate demand forecasting is crucial for restaurants to determine the appropriate quantity of food to prepare (Filimonau et al., 2020).

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However, predicting customer demand accurately can be difficult, especially during peak hours or when facing fluctuations in customer traffic (Hildebrandt & Ulmer, 2022). As a result, restaurants may end on the side of caution and produce more food than necessary to avoid running out of popular menu items. This overproduction can lead to excess food that goes unsold and ultimately becomes waste.

Moreover, perishable ingredients have limited shelf life; if they are not used within that timeframe, they can spoil and become unsuitable for consumption (Riesenegger & Hübner, 2022). For example, fresh produce, dairy products, and meats have relatively short expiration dates, making them particularly vulnerable to spoilage. Restaurants must carefully monitor inventory levels and rotation practices to ensure ingredients are used before expiration. Failure to do so can result in food waste, as spoiled items must be discarded. Additionally, the nature of the restaurant industry often involves menu diversity and daily specials. While offering various options and unique dishes can enhance customer satisfaction and attract new patrons, it can also increase the risk of food waste (Liu et al., 2022). Certain menu items or ingredients may be less popular and unsold, leading to waste. Daily specials can pose similar challenges, as the specific ingredients required for these limited-time offers may not be fully utilised if customer demand is lower than anticipated.

2.3.2.2 Logistics and Infrastructure

Restaurants often encounter logistical challenges when it comes to waste collection and disposal, particularly in terms of accessing appropriate waste management infrastructure. The availability and accessibility of waste

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management facilities, such as composting facilities or food recovery organisations, can vary greatly depending on the region and local regulations. These logistical challenges can pose significant barriers to effective food waste management for restaurants.

One of the primary challenges is the lack of logistics and facilities. For instance, Ghana faces the problem of providing adequate logistics for container manufacturing, waste transport, and recycling, leading to inadequate collection and improper waste disposal practices (Gyeduah, 2020). Composting is an environmentally friendly method of diverting organic waste from landfills and turning it into nutrient-rich compost. However, not all areas have accessible composting facilities, especially in rural or suburban regions (Merkle, 2021). This can result in limited options for restaurants to dispose of their food waste in an environmentally sustainable manner. Without the necessary infrastructure for composting, restaurants may have no choice but to dispose of their food waste in traditional landfill facilities, contributing to environmental degradation and missed opportunities for resource recovery.

Another logistical challenge relates to partnerships with food recovery organisations. These organisations work to collect excess food from restaurants and redistribute it to those in need, thereby reducing food waste and addressing food insecurity. However, establishing and maintaining partnerships with food recovery organisations can be challenging, particularly if the organisation's operations do not align with the restaurant's operating hours, location, or transportation capabilities (Hegnsholt et al., 2018; Sekiguchi et al., 2018). Furthermore, the logistics of coordinating regular pickups and ensuring proper

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food safety measures can present additional complexities for restaurants (Akkerman et al., 2023).

Additionally, regulatory constraints and waste management regulations can further complicate the logistics of food waste disposal (Sharma et al., 2020; Priefer et al., 2016). Different regions may have varying regulations regarding waste segregation, disposal methods, and licensing requirements. Compliance with these regulations adds a layer of complexity for restaurants, especially those operating in multiple jurisdictions. Navigating these regulations and ensuring compliance can require significant time, effort, and resources.

2.3.2.3 Staff Training and Awareness

Staff training and awareness are crucial to effectively managing food waste in restaurants. Employees may inadvertently contribute to increased food waste without proper knowledge and understanding of waste reduction strategies. Sakaguchi et al. (2018) and Wu & Teng (2023) have highlighted the lack of awareness among restaurant staff regarding the impact of food waste and the skills required to manage it effectively. They emphasise the need for comprehensive training programs that educate staff on waste reduction strategies and provide them with the necessary tools to implement them in their daily work. Furthermore, customers also play a significant role in contributing to food waste. Many individuals order more food than they can, leading to leftover food that often goes to waste (Liu et al., 2022). Addressing this issue requires staff training and raising awareness among customers about the impact of their choices on food waste.

2.3.2.4 Limited Storage Facility

Limited storage space poses a significant challenge for restaurants in managing food waste. This is particularly prevalent in urban areas or smaller establishments where space is at a premium (McAdams et al., 2019). The lack of adequate storage space can result in difficulties in organising and managing food inventory, leading to increased waste due to spoilage or expired ingredients (Gładysz et al., 2020). Restaurants require sufficient storage space to accommodate various ingredients, including perishable items such as produce, dairy products, and meats. These ingredients have limited shelf lives and must be stored under appropriate conditions to maintain their freshness and quality. However, when restaurants face space constraints, it becomes challenging to store these items correctly, increasing the risk of spoilage and waste.

Inadequate storage space can lead to improper organisation and inventory rotation (Gładysz et al., 2020; Blum, 2020). When items are not stored systematically, tracking ingredients' freshness and expiration dates becomes challenging. As a result, ingredients may go unnoticed and eventually expire, rendering them unsuitable. This leads to unnecessary waste as these expired items must be discarded. Furthermore, limited storage space can hinder effective inventory management practices. Restaurants must monitor their inventory levels to ensure they order and utilise ingredients promptly. However, it becomes challenging to conduct accurate stock assessments without sufficient space to store inventory. This can lead to overstocking or understocking ingredients, contributing to food waste (Ratliff, 2023; Oishi, 2019). Overstocking increases the likelihood of ingredients becoming spoiled or expiring before they can be used, while understocking can result in shortages

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and the need for additional emergency purchases, leading to increased waste if the excess ingredients are not effectively managed.

2.3.2.5 Time and Operational Constraints

In a fast-paced restaurant environment, time and operational constraints pose significant challenges to implementing effective waste reduction practices (McAdams et al., 2019). The primary focus of restaurant operations is to prepare and serve high-quality food to customers while maintaining a clean and efficient kitchen. These demands often precede waste management efforts, making it challenging to prioritise and dedicate time to waste reduction.

Restaurant time constraints can result in rushed and inefficient processes, increasing food waste (Aytaç & Korçak, 2021; Chen & Jai, 2018). For example, during busy periods, cooks and kitchen staff may prioritise speed and productivity over careful portion control and inventory management. This can lead to overproduction, where more food is prepared than necessary to meet customer demand. Additionally, under time pressure, staff may resort to quick and easy preparation methods, such as pre-cutting ingredients or using pre-packaged products, which can increase the likelihood of food spoilage and waste (Filimonau et al., 2020; Gładysz et al., 2020)

Operational constraints, such as limited staffing and high customer demand, can also impact waste reduction efforts (Charlebois et al., 2015). Restaurants strive to provide prompt and efficient service to their customers, which may result in a focus on meeting immediate demands rather than implementing long-term waste reduction strategies. Staff may have limited time and resources to devote to waste segregation, composting, or food donation

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programs, which can lead to missed opportunities for waste reduction (Sucheran & Olanrewaju, 2021; Filimonau et al., 2020).

2.3.3 Strategies to Improve Food Waste Management Practices among Restaurants

Food waste management is a growing concern worldwide due to its impact on the environment, human health, and the economy. Food waste represents a significant loss of resources and contributes to greenhouse gas emissions and climate change. Various strategies have been proposed to improve food waste management in recent years, including source reduction, food recovery, and recycling.

Recycling is not typically considered a primary method of disposing of food waste but rather a way to divert food waste from landfills and turn it into other valuable products. One example of recycling food waste is through anaerobic digestion, a process in which microorganisms break down organic matter without oxygen to produce biogas (a mixture of methane and carbon dioxide) that can be used for energy (Paritosh et al., 2017). The remaining material can also be used as fertiliser.

Furthermore, source reduction is the most potent and effective waste management method (Mahesh Kumar et al., 2016). By designing systems and policies to prevent, minimise, or avoid waste in the first place, humans can save food and labour dollars while immensely impacting the environment. Source reduction strategies include improving inventory management, reducing portion sizes, and educating consumers about food waste. Source reduction benefits include cost savings, reduced environmental impact, and improved sustainability. However, source reduction requires significant effort and

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cooperation from all stakeholders, including managers, cooks, waiters /waitresses, and consumers.

Food recovery is the process of collecting and redistributing surplus food to people in need. Food recovery strategies include donations to food banks, feeding programs, and food rescue organisations (Mahesh Kumar et al., 2016; Sisson, 2016). The benefits of food recovery include reducing hunger, supporting local communities, and improving the environment by diverting food waste from landfills. However, food recovery also faces logistical and operational difficulties, safety concerns, and legal barriers.

Moreover, composting can also help in reducing food waste. Composting is a natural process that involves decomposing organic waste, such as food scraps, into nutrient-rich soil known as compost. It can be done on a small scale in households or on a larger scale in community composting facilities. By diverting food waste from landfills and instead using it to create compost, this strategy not only reduces the amount of food waste going to landfills but also produces a valuable product that can be used in agriculture and gardening (Sánchez, 2022; Hashim et al., 2021).

Also, staff training and awareness are vital in successfully managing restaurant food waste (Okumus, 2020). When employees are well-informed and trained in waste reduction strategies, they can actively contribute to minimising food waste throughout the restaurant operations. However, lacking knowledge or awareness about waste reduction strategies can lead to increased food waste (Hennchen, 2019). Training programs should focus on practical waste reduction techniques and best practices. Staff members should be educated on portion control methods to avoid overproduction and reduce plate waste. They should

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also receive guidance on proper food storage techniques to preserve the freshness and quality of ingredients, thereby minimising spoilage. Additionally, training should cover inventory management strategies to ensure that ingredients are used efficiently and effectively, reducing the likelihood of food waste (Nguyen, 2022).

Furthermore, conducting regular food waste audits is an essential step in understanding and addressing the issue of food waste (Leal Filho et al., 2021). These audits analyse the quantity and types of food waste generated in different settings, such as restaurants, schools, or households. By closely examining the sources and patterns of food waste, it becomes possible to identify specific areas where waste occurs and implement targeted interventions to reduce it effectively (Thamagasorn & Pharino, 2019; Kim et al., 2019). With this knowledge, measures can be taken to improve inventory management, adjust portion sizes, or implement better meal planning strategies to minimise food waste.

Moreover, advances in technology have the potential to revolutionise food waste management. Smart inventory management systems, for instance, utilise sensors and data analysis to track and monitor food stock in real-time (Soori et al., 2023). This helps businesses and organisations optimise their ordering and production processes, reducing the risk of overstocking and expiration. Additionally, digital platforms and mobile applications can facilitate the redistribution of surplus food from businesses to charities or individuals in need, minimising food waste and fostering community connections (Karnesh et al., 2023).

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Lastly, raising public awareness about the issue of food waste is crucial in changing consumer behaviour and attitudes (Filimonau et al., 2020). Public awareness campaigns can be designed to inform and educate individuals about the environmental, social, and economic consequences of wasting food. By highlighting the impacts of food waste, such as the depletion of resources, greenhouse gas emissions, and the exacerbation of global hunger, these campaigns aim to inspire individuals to act. They can also provide practical tips and guidelines on reducing food waste at restaurants, such as proper meal planning, storage techniques, and creative ways to use leftovers (Berjan et al., 2019).

2.3.4 Summary of Gap Analysis and Contribution to Knowledge

The empirical review on food waste management in restaurants highlights significant findings and practices like landfilling, incineration, and composting as prevalent disposal methods, each with unique environmental impacts. Landfills, while common, contribute to high methane emissions and potential leachate issues; incineration reduces waste volume but emits greenhouse gases, and composting offers a greener alternative by converting waste into nutrient-rich soil, though it requires meticulous management.

The literature review uncovers several gaps in the restaurant industry's current understanding and management of food waste. Despite the existing waste management frameworks, comprehensive strategies that effectively integrate environmental, economic, and social dimensions remain lacking. Most notably, the variability in waste composition and the challenges in implementing region-specific solutions suggest a need for more adaptable and scalable waste management strategies.

Moreover, the review reveals a critical need for enhanced staff training and consumer awareness to reduce food waste proactively. Restaurants face operational and logistical hurdles that hinder effective waste management, compounded by insufficient infrastructure for alternative disposal methods like composting in certain regions.

In contributing to knowledge, this review reveals the necessity for more targeted research into innovative and sustainable waste management practices that can be tailored to diverse restaurant settings. It also highlights the potential for technological advancements in inventory and waste monitoring to mitigate food waste significantly. Addressing these gaps could lead to more efficient resource use, reduced environmental impact, and better compliance with regulatory standards, ultimately promoting a more sustainable food service industry.

2.4 Theoretical/Conceptual Framework of the Study

When studying food waste management practices among restaurants, different frameworks and theories can be used to guide the investigation. These frameworks provide a structured approach to understanding and analysing the complex dynamics of food waste generation, prevention, and reduction. These frameworks include the systems theory, the Life Cycle Assessment (LCA), the Institutional theory, the Behaviour change theory, the sustainable consumption theory, and the Waste Hierarchy Framework (Ng & Sia, 2023; Han, 2020; Ali et al., 2019; Yeo et al., 2019). This study is grounded on the Waste Hierarchy framework. The Waste Hierarchy Framework was chosen for studying food waste and management practices among restaurants in the Cape Coast Metropolitan Area because it prioritises waste management strategies, considers

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the environmental impact of different waste management options, and aligns with the principles of minimising waste and maximising resource circulation.

2.4.1 The Waste Hierarchy Framework

The Waste Hierarchy Framework, or the waste management framework, is a guiding principle for waste management, emphasising the priority order of waste management strategies: prevention, reduction, reuse, recycling, and disposal (Zhang et al., 2022; Drangert,2018). The framework has its origins in the field of environmental management. It was developed as a guiding principle to prioritise and promote more sustainable waste management practices. The framework has been widely adopted by international organisations, scholars, government, and environmental experts.

The waste hierarchy concept emerged during the late 1970s and early 1980s as a response to increasing concerns regarding the environmental consequences of waste generation and disposal (Fitch-Roy et al., 2020). It emerged as a response to the prevailing "linear economy" model, where resources were extracted, processed, consumed, and discarded as waste. The waste hierarchy framework was initially formulated to address the challenges associated with solid waste management, including the increasing volumes of waste generated, the limited availability of landfill space, and the negative environmental consequences of traditional waste disposal methods (David et al., 2020).

The exact origin of the waste hierarchy framework is difficult to attribute to a single individual or organisation, as it evolved through contributions from various researchers, practitioners, and policymakers. However, it gained prominence through the work of environmental organisations and international

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bodies. The European Union played a significant role in popularising and promoting the waste hierarchy framework in the European context. It was first officially codified in the European Waste Framework Directive, adopted in 1975 and has since undergone several revisions (European Union, 1975). The directive provided a legislative framework for waste management in EU member states and established the waste hierarchy as a fundamental principle.

Figure 1: The waste management hierarchy
Source: European Union (1975); Zhang et al. (2022); Drangert (2018)

The waste hierarchy is typically represented as a pyramid or ladder with different waste management options arranged in order of preference. The specific hierarchy levels may vary slightly depending on the source, but they generally include the following:

a. Waste Prevention: The highest level of the hierarchy emphasises the importance of reducing waste generation at the source. This includes strategies such as product design for sustainability, efficient resource use, and promoting a shift towards a circular economy.

b. Waste Reduction/Re-use: The next level focuses on minimising waste through measures like reuse and reduction. These strategies

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aim to recover materials and resources from waste streams, reducing the need for raw material extraction and energy-intensive manufacturing processes. Re-use strategies could include donating excess food to food banks and charity groups and composting food waste for gardening and farming.

c. Waste Recycling: Recycling involves transforming waste into new products or raw materials for manufacturing. It helps conserve resources, reduce energy consumption, and minimise the environmental impacts of extraction and production.

d. Waste Recovery: This level encompasses methods like energy recovery, where waste is used as an energy source through incineration or anaerobic digestion. Energy recovery can contribute to reducing dependence on fossil fuels and reducing greenhouse gas emissions.

e. Waste Disposal: The lowest level of the hierarchy represents the least preferred option—disposing of waste in landfills or incineration without energy recovery. These methods are associated with significant environmental impacts, such as pollution, greenhouse gas emissions, and the depletion of finite landfill space.

The waste hierarchy framework has been widely adopted internationally and incorporated into waste management policies and regulations in various countries and by scholars in various fields. The waste hierarchy has helped in decision-making and encouraged a shift towards more sustainable waste management practices prioritising waste prevention, resource efficiency, and environmental protection.

2.4.2 Application of the Waste Hierarchy Framework

The waste hierarchy is a ranking system used to evaluate different waste management options according to which is best for the environment. In the context of restaurant waste, correctly applying the waste hierarchy offers several benefits, including preventing the emission of greenhouse gases, reducing pollutants, saving energy, and encouraging the development of sustainable practices tailored to restaurant operations' unique challenges. Scholars have extensively applied the waste hierarchy framework in various studies, and these insights are highly relevant to restaurants seeking to improve their waste management. For instance, Milios and Dalhammar (2020) investigated the potential for re-use and ascending the waste hierarchy in commercial recycling centres in Sweden. While their study focused on recycling companies, the findings highlight opportunities for restaurants to incorporate re-use, repair, and sale of materials—practices that could reduce waste generated from food packaging, kitchen equipment, and leftover food— thereby improving economic profitability and sustainability when strategically implemented.

Redlingshöfer et al. (2020) reviewed the effectiveness of the food waste hierarchy in reducing environmental impacts from food waste in OECD countries. Their findings apply to restaurants, where assessing and preventing food waste remains a priority yet often under-represented. They identified barriers such as difficulty defining prevention measures and conflicting goals, which restaurants also face when prioritising waste prevention strategies. Similarly, Srijuntrapun et al. (2022) examined the food waste hierarchy's role as Thai hotels seek to fulfil their corporate social responsibility. Their research

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provides a parallel for restaurants, as adopting the food waste hierarchy can motivate the sector to implement reduction strategies, meet CSR goals, and create shared value through sustainable practices. Kowalski et al. (2021) used the food waste hierarchy to assess the material recovery potential of meat waste incineration. Although focused on industrial meat waste, their approach underscores the importance of recovering valuable materials even from hazardous waste streams. This concept can be adapted by restaurants managing meat waste to recover resources, reduce disposal costs, and minimise environmental impact. Lazell (2016) examined consumer food waste behaviour in a university setting to tackle food waste at the prevention stage. While the context was academic, the study's utilisation of the waste hierarchy to understand and address consumer behaviour can inform restaurants about the importance of consumer engagement in waste reduction efforts. Restaurants can learn from such studies to overcome barriers like lack of awareness, trust issues, and cultural norms, thereby improving food sharing and waste prevention initiatives on their premises.

By adapting these scholarly applications of the waste hierarchy to the restaurant industry, stakeholders can make informed decisions, prioritise sustainable waste management practices, and contribute to a more circular and resource-efficient economy. This framework helps restaurants identify key areas for waste reduction, design strategies that align with environmental and economic goals, and protect the environment while enhancing operational efficiency.

2.4.3 Limitations of the Waste Hierarchy Framework

While the waste hierarchy framework is widely used and valuable in waste management practices, it does have some limitations. These limitations range from conceptual difficulties to difficulties in implementation. The waste hierarchy faces a conceptual problem related to prevention and reuse as waste management options (Van Ewijk & Stegemann, 2016). They argue that including prevention in a framework primarily designed for waste managers may hinder prevention efforts through policy. The difference between prevention and waste management is that waste managers have limited control over prevention. Therefore, changing the perception of discarded goods as waste is challenging due to vested interests among waste collectors. Once materials are collected as waste, there are limited opportunities for prevention, only "preparing for re-use." Re-using waste materials can be complicated due to legal restrictions and the perception of waste as an environmental hazard. Wilkinson (1999:2002) suggests that valuing products and materials can lead to more careful treatment and reduce waste.

Furthermore, the waste hierarchy establishes a priority order for waste management options based on their relative desirability (Ahlroth et al., 2011). However, it lacks guidance when considering trade-offs with activities beyond waste management. Environmental policy decisions often impact multiple sectors, and policymakers need to compare the potential benefits of changes in waste management with those in other sectors like energy and transport. In such cases, alternative environmental impact assessment methods can provide decision-makers with better guidance for allocating financial resources among waste management and other sectors. These methods enable a more

comprehensive evaluation of the overall environmental impact and help inform resource allocation decisions (Ahlroth et al., 2011)

Furthermore, the waste hierarchy framework primarily directs its attention to waste generators and management facilities, highlighting their roles in waste management practices. However, it may fall short of comprehensively addressing the shared responsibility that extends across the entire product lifecycle, encompassing crucial aspects such as product design, material selection, and extended producer responsibility (Shooshtarian et al., 2021; Maitre-Ekern, 2021). These factors are vital in influencing the overall sustainability and environmental impact of products and materials. By not fully incorporating these considerations, the waste hierarchy framework may miss opportunities for more proactive waste prevention and sustainable practices throughout the value chain. It is essential to recognise the need for collaboration and shared responsibility among all stakeholders involved in the product lifecycle to ensure a holistic and practical approach to waste management and resource conservation.

Lastly, the effective implementation of the waste hierarchy and its ability to achieve dematerialisation can be significantly influenced by the conditions under which it is permissible to transition from a higher-priority waste management practice to a lower one (Van Ewijk & Stegemann, 2016). The hierarchy outlines the order in which waste management options should be considered, but the criteria for determining when options are deemed exhausted are subject to debate (Pires & Martinho, 2019). Existing regulations and guidance often lack clarity in this regard. For example, the Scottish Government vaguely mentions the need to "exhaust" higher priority options without

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providing specific interpretations (Scottish Government, 2013). Clear interpretations are mostly limited to landfills, which are prohibited for certain materials such as liquid waste, hospital and clinical waste, and tyres (O'Hare, 2017; Van Ewijk & Stegemann, 2016).

2.4.4 Relevance of the Waste Hierarchy Framework to the Study

The waste hierarchy is relevant to the study because it helps to assess and analyse the various waste generation and management strategies in these restaurants. The framework provides a systematic approach for evaluating waste management options, including prevention, reduction, reuse, recycling, and disposal. The waste hierarchy framework identifies opportunities to implement waste prevention and reduction strategies. These strategies may include improving inventory management practices, implementing portion control measures, and enhancing customer education initiatives. Additionally, the framework helps to evaluate the effectiveness of existing waste management practices in aligning with the waste hierarchy principles and identify areas for improvement. The waste hierarchy framework serves as a valuable tool in understanding and addressing food waste challenges within the context of restaurant operations in Cape Coast.

2.5 Conceptual Framework of the Study

The conceptual framework for this study is adapted from the waste management hierarchy framework (figure 2), which outlines how the socio-cultural factors of restaurant operators and workers influence the various strategies for sustainably managing waste. Socio-cultural factors encompass three key components: socio-demographic characteristics, cultural attitudes towards waste, and consumer behaviour. The socio-demographic characteristics

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include age, gender, education level and income, which can influence individuals' attitudes and behaviours towards waste management. Cultural attitudes refer to the cultural beliefs, values, and norms regarding waste within the Cape Coast community. Cultural attitudes shape individuals' perceptions of waste, impacting their waste management practices.
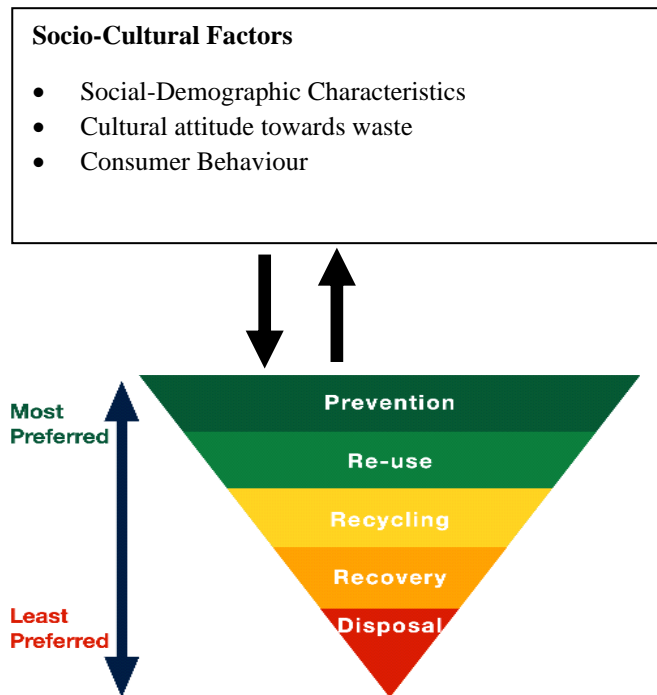
Strategies to Improve Food Waste Management

Figure 2: Conceptual Framework for Waste Management Practices

Sources: Adapted European Union (1975), Zhang et al. (2022), and Drangert (2018)

Consumer behaviour plays a significant role in generating and managing food waste. Factors such as purchasing habits, food handling practices, portion sizes, and preferences influence the amount of waste consumers generate. On the other hand, the waste hierarchy provides a structural approach to waste management through the five stages by ensuring that food waste is discarded efficiently and sustainably.

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In the conceptual framework, socio-cultural factors and the waste hierarchy framework are intertwined and influence each other. Socio-cultural factors shape individuals' attitudes, behaviours, and decision-making regarding food waste management. Simultaneously, the waste hierarchy framework provides a guideline for waste management practices, and the implementation of these practices can, in turn, influence socio-cultural factors by shaping attitudes, norms, and behaviours towards waste. By examining the interplay between socio-cultural factors and the waste hierarchy framework, the study aims to gain insights into the factors influencing food waste generation, management practices, and potential areas for intervention and improvement. This comprehensive approach helps understand the complex dynamics of food waste management within the context of socio-cultural factors and the waste hierarchy framework.

2.6 Chapter Summary

This chapter has provided a comprehensive literature review on restaurant food waste management. The concept of food waste was defined, highlighting its significance in terms of economic, environmental, and social implications. Theoretical frameworks such as the waste hierarchy were discussed to understand the various stages of waste management and prioritise waste prevention and reduction strategies. The empirical review examined restaurants' current food waste disposal practices, revealing the prevailing challenges of managing food waste. The identified challenges included inadequate awareness and training among staff and a lack of proper infrastructure and equipment. These challenges contribute to the significant food waste generated in restaurants and hinder effective waste management.

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Furthermore, strategies to improve food waste management in restaurants were explored. These strategies encompassed both prevention and reduction approaches, as well as innovative solutions for food waste diversion. Staff training and education, proper inventory management, and other factors were emphasised as effective prevention and reduction measures. Additionally, composting was highlighted as a viable strategy for diverting food waste from landfills.

Overall, this literature review underscores the pressing need for efficient food waste management in the restaurant industry. It highlights the issue's complexity, with multiple stakeholders and challenges involved. However, it also provides valuable insights into potential strategies and approaches that can be adopted to tackle this issue effectively.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methodology used in the study. It contains the research philosophy and design, study area, target population and other aspects of the methodology, such as data analysis and ethical considerations.

3.2 Study Area

Geographically, the study is limited to the Cape Coast Metropolis, located between latitudes 5°07′ and 5°20′ north of the equator and longitudes 1°11′ and 1°41′ west. The Metropolis shares boundaries with the Abura-Asebu-Kwamankese District to the east, Komenda-Edina-Eguafo-Abrem District to the west, Twifo Heman Lower Denkyira District to the north, and is bordered on the south by the Gulf of Guinea. Cape Coast has evolved into a socially dynamic and economically active area with a total population of 118,106, comprising 57,365 males and 60,741 females (Ghana Statistical Service, 2021).

Historically, Cape Coast was a central trading hub during the colonial era and was deeply involved in the transatlantic slave trade. One of its most famous monuments, Cape Coast Castle, holds UNESCO World Heritage status. Constructed by the Swedes in the 17th century and subsequently controlled by the British, this castle was a pivotal site for commodities such as gold, ivory, and enslaved people. Its dungeons and the "Door of No Return" serve as stark reminders of the brutal experiences endured by millions of Africans. Beyond its historical relevance, the Metropolis offers a tranquil coastal setting and picturesque beaches that have become magnets for domestic and international visitors. Such natural beauty and cultural sites are key attractions that have

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benefitted from recent Ghanaian tourism initiatives, most notably the "Year of Return" in 2019, which drew substantial numbers of diaspora tourists and other international travellers to Cape Coast.
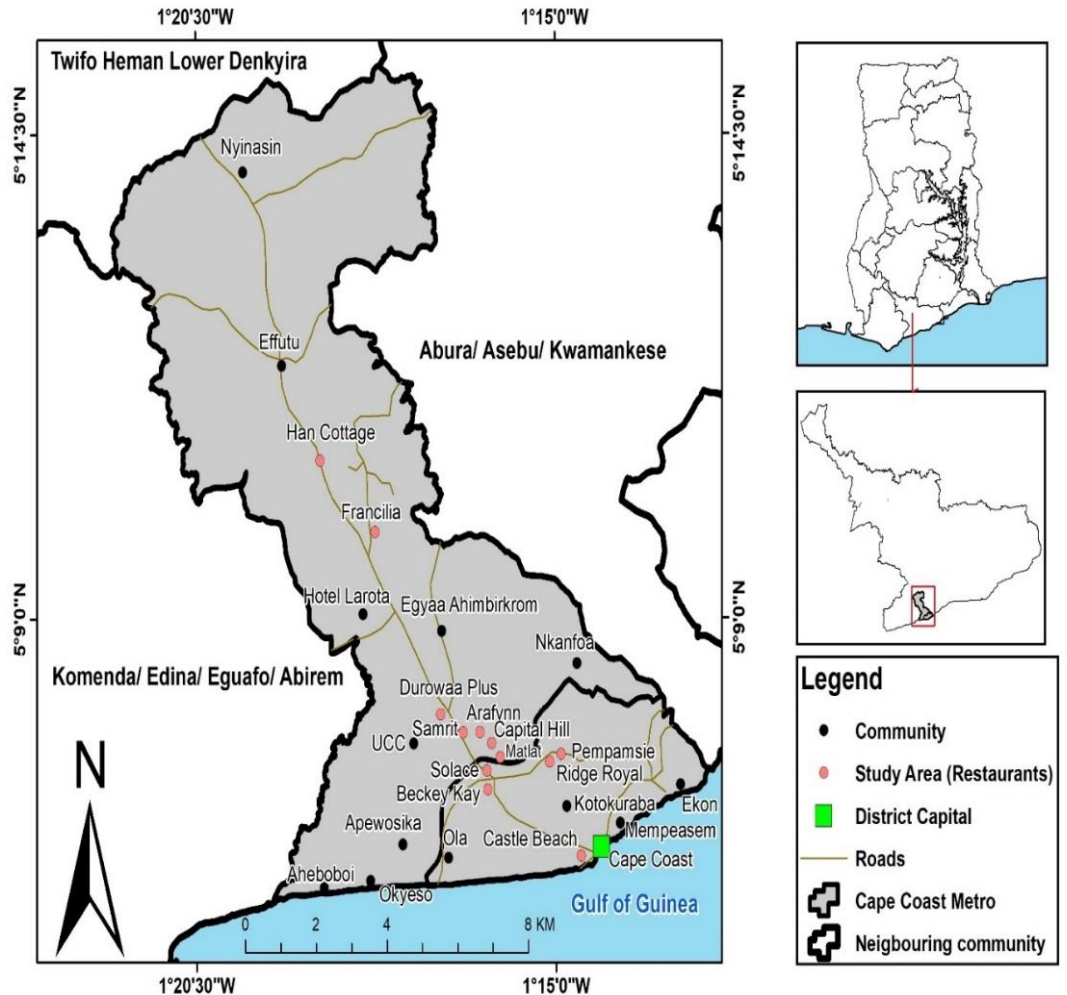
Figure 3: Study Area Map of Cape Coast Metropolis

Source: Geography and Regional Planning Dept.

The expanding interest in Cape Coast, bolstered by this tourism surge, has directly influenced the growth of the local hospitality industry. The city's diverse offerings and reputation as a safe and welcoming environment have increased hotels, guesthouses, and restaurants—catering to a broad audience ranging from residents to visiting tourists, students, and diaspora returnees. This

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broader happiness in the hospitality industry has created new jobs and sparked entrepreneurial enthusiasm, with more restaurants opening to meet the rising demand for varied dining experiences. The city's role as a centre for higher education—through the University of Cape Coast—adds to its vibrancy, drawing students, academics, and conference delegates from all over the world. The Fetu Afahye festival and other cultural celebrations also showcase a rich Fante tradition, further promoting tourist arrivals and, in turn, intensifying the need for expanded hospitality services.

Despite these positive developments, Cape Coast still faces challenges in solid waste management. Limited infrastructure for efficient waste collection and segregation leads to considerable environmental concerns. Food waste is often handled through open dumping and burning—practices that adversely affect human health and the natural ecosystem (Baffour-Awuah, 2014). Additionally, social disparities—such as differing income levels and unequal resource access—contribute to variations in consumption habits, storage practices, and food waste generation. Such inequities underscore the importance of understanding and improving the food waste management practices of restaurants, households, and individuals across different neighbourhoods.

In conducting this study, the research focused on various communities within the Metropolis, including Abura, Pedu, Kotokuraba Rigde road, where some of the selected restaurants (e.g., Da Breeze Bar and Restaurant,Berkey Restaurant ,Ridge Royal hotel and Solace Bar) were located. This range of research sites reflects the heterogeneous nature of Cape Coast's hospitality landscape, which continues to be shaped by ongoing tourism, educational activities, and cultural events.

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3.3 Research Philosophy

The interpretive research philosophy was used to guide the study. The interpretive philosophy emphasises the subjective nature of human experience and seeks to understand the meaning and interpretation of social phenomena from the perspective of the individuals involved (Nickerson, 2022). The interpretivism or interpretive research philosophy is essential for examining food waste management practices among restaurants in Cape Coast due to its suitability for studying social phenomena, understanding subjective experiences, capturing contextual nuances and providing practical insights for improving food waste management strategies in the metropolis. It will also help to gain a deeper understanding of the cultural, social and economic factors that influence waste management practices among restaurants in Cape Coast.

3.4 Research Design

The descriptive research design was used in the study. The descriptive research design involves analysing and describing a particular phenomenon to generate insights and understanding about the subject of study as it occurs (Patnaik & Pandey,2019). In the context of restaurant waste management, a descriptive case study design was used to examine the waste management practices of a specific restaurant or group of restaurants. A descriptive design helps to identify best practices in restaurant waste management and barriers or challenges that may need to be addressed to improve waste management practices among restaurants in the Cape Coast metropolis.

3.5 Target Population

The target population for the study is cooks, waiters/waitresses, and managers of restaurants on the Cape Coast. These include the licensed and

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unlicensed restaurants in Cape Coast. Cape Coast has three (3) standalone licensed restaurant establishments and nine (9) licensed hotels operating restaurants (Ghana Tourism Authority, 2023). However, there is an unknown number of unlicensed restaurants on the Cape Coast. Both types of restaurants were the target population for the study on food waste management of restaurants in the Metropolis.

3.6 Sampling Technique

A sampling technique is used to select a subset of individuals from a larger population to gather data about the population (Etikan, Musa & Alkassim, 2016). Nonprobability sampling techniques were used in the study. Thus, purposive and snowballing sampling techniques were used to select respondents for the study.

3.6.1 Snowball Sampling Technique

Snowball sampling is a recruitment technique in which research participants are asked to assist researchers in identifying potential subjects (Etikan, Alkassim & Abubakar, 2016). Snowball sampling was first used to select the unlicensed restaurants in the Cape Coast Metropolis, while the licensed restaurants were given by the Ghana Tourism Authority (Cape Coast). The steps that were followed are as follows:

a. Identification of a few licensed restaurants in Cape Coast and interview of the owners or managers about their food waste management practices

b. The licensed restaurant owners or managers were asked if they knew of any unlicensed restaurants in the area willing to participate in the study.

c. Interviews were conducted with these additional restaurants, and they were asked for referrals to other restaurants.

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d. Record-keeping was used to record the number and details of restaurants interviewed to obtain a diverse sample that captured the perspectives of different stakeholders.

e. Factors such as the diversity of restaurant types, sizes, and locations in the area and any commonalities or patterns regarding data saturation in the interviews were considered to determine when to stop recruiting participants.

Therefore, seventeen (17) restaurants were selected for the study using snowball sampling.

3.6.2 Purposive Sampling

Purposive sampling is a non-probability sampling methodology where units are intentionally selected based on their possession of specific characteristics required for inclusion in the sample (Etikan et al., 2016). After selecting the restaurants using snowballing, purposive sampling was used to select the managers, cooks, and waiters/waitresses. The criteria that were used in the selection of the sample are as follows.

i. Respondents who have been employed in restaurants for more than a month

ii. Respondents who have knowledge and experience in restaurant food waste management

Seventeen participants were selected purposively from 17 different restaurants to capture a broad perspective on food waste management in Cape Coast. This included standalone eateries as well as two-star and three-star establishments. In each restaurant, one key informant (manager, cook, or head waitress/waiter) was chosen based on their hands-on experience and decision-making role in

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daily operations. Although many restaurants are in the metropolis, 17 interviews were sufficient to reach data saturation as recurring themes and practices became evident. This focused yet diverse sample captures lower- and higher-end restaurants and reflects the varied culinary settings and responsibilities (cooking, supervising, serving) that influence food waste generation and management decisions.

3.7 Data Collection Instruments

Data were collected using a semi-structured interview guide and observation checklist. Semi-structured interviews were conducted with restaurant managers, cooks, and waiters/waitresses involved in food waste management. These interviews provided insights into the challenges faced by restaurants and potential strategies for improving food waste management. Observational studies were conducted in selected restaurants to gain a first-hand understanding of food waste management practices. The researcher observed food preparation, storage, and disposal processes, noting any waste reduction strategies in place and identifying areas for improvement.

3.7.1 Interview Guide

A semi-structured interview guide comprised sections tailored to meet each study objective. The background section elicited demographic details and restaurant profiles, facilitating an understanding of respondents' roles and operational contexts. Questions on food waste disposal practices allowed the researcher to capture information on storage, handling, and final disposal methods, thereby addressing the first objective. Another section focused on food waste reduction strategies, exploring portion control, inventory checks, and reuse/recycling approaches, thus aligning with the second objective.

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Challenges—such as infrastructural gaps, regulatory issues, and attitudinal factors—were probed to meet the third objective, while improvement strategies were sought in the final section, satisfying the study's concluding objective. This structured guide provided consistency across interviews and allowed for an in-depth exploration of key themes relevant to the study's aims.

3.7.2 Observation Checklist

An observation checklist was used to systematically record key indicators of food waste management practices in each restaurant, ensuring that actual on-site operations aligned with or differed from the respondents' interview accounts. The checklist was divided into distinct sections covering waste disposal processes (e.g., bin separation, storage, and disposal frequency), portion control (observing how meals were measured or plated), staff engagement (e.g., training or displayed reminders), and environmental/hygiene indicators (including pest presence or odours). Using these structured sections, the researcher could verify self-reported strategies, identify inconsistencies, and gather visual evidence of real-world behaviours. This observational data complemented the interviews, thus enhancing the study's reliability and achieving the research objectives of understanding and evaluating practical food waste management practices in the selected restaurants.

3.8 Pre-testing of Instrument

The interview guide and observation checklist were pre-tested in restaurants in Elmina to ensure the validity and effectiveness of the instruments before conducting the study on assessing food waste management practices among restaurants in Cape Coast. The pre-testing helped to gather valuable

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insights and make necessary adjustments, ensuring that the instruments effectively captured the required data before the actual study in Cape Coast.

3.9 Data Collection Procedure

The instruments (observational checklist and interview guides) were used to collect data from restaurants in Cape Coast. Seventeen restaurants were deliberately chosen to ensure broad coverage of culinary settings, including standalone eateries and two- and three-star establishments from various neighbourhoods in the metropolis. This purposeful selection allowed direct observation of waste handling, customer flow, and kitchen practices across different price points and ownership structures. By capturing variations in size, clientele, and management style, the observations yielded detailed insights into how local contexts and operational constraints influence the generation and handling of food waste.

Several approaches were employed to gain access to the restaurants. These included obtaining permission from the restaurant owners or managers through direct contact, explaining the purpose and significance of the study, and assuring them of confidentiality and anonymity. Also, building rapport and trust with the restaurant employees and stakeholders was essential for securing access and cooperation.

Furthermore, the interviews were conducted with restaurant managers and staff members involved in food waste management. The interview guide provided a structure for the interviews while allowing flexibility for open-ended discussions. The interviews took place in a private area within the restaurant and other mutually convenient locations. The interviews lasted between 30-40 minutes. A comfortable and conducive environment to encourage participants

was established, allowing them to share their experiences and perspectives openly.

Moreover, on-site observations were conducted in the restaurants to observe food waste management practices directly. The observation checklist guided the systematic recording of relevant information during the observations. Various aspects were observed and documented, including food preparation processes, storage practices, portion sizes, packaging waste, and disposal methods. Attention was paid to visible practices and underlying systems and routines.

Throughout the data collection process, detailed field notes were taken to record important observations, interview responses, non-verbal cues, and contextual information. These field notes served as a valuable resource during data analysis and interpretation. Additionally, supplementary materials, such as photographs or videos (with permission), were collected to provide further documentation and context to support the findings. During the entire data collection process, the researcher maintained ethical considerations, such as obtaining informed consent from participants, ensuring confidentiality and anonymity, and respecting the privacy and sensitivity of the information shared by the restaurant stakeholders. The data collection process took 2 months (May - July 2023).

3.10 Data Analysis

Qualitative data from interviews were transcribed, coded, and analysed using thematic analysis to identify key themes related to food waste management practices and improvement strategies. First, the interview recordings and observational notes were transcribed into written text. This

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ensured that the data was easily accessible for analysis and allowed for a thorough examination of participants' responses. Afterwards, the coding process categorized and labelled segments of data based on their content, meaning or relevance to the research objectives. It helped organise and structure the data to identify patterns, themes and connections. Lastly, thematic analysis was employed to extract critical themes related to food waste management practices and improvement strategies from the coded data. The coded segments were systematically reviewed, identifying recurring patterns and grouping them into meaningful themes that captured the essence of the data. The Maxqda software, a popular qualitative data analysis software, was used.

3.11 Ethical Consideration

This section pertains to the ethical standards that researchers must adhere to throughout all stages of the research process. The study obtained ethical approval from the University of Cape Coast Institutional Review Board (UCCIRB/CHLS/2023/138) to ensure ethical practices. Once the clearance was obtained, the research was conducted with strict adherence to ethical considerations, including the right to participation, informed consent, confidentiality, data privacy, and anonymity.

Participants' consent was obtained before their involvement in the study. Participants were informed that their participation was voluntary, and they were free to decline participation at any time without obligation. Their consent was documented through their signature or thumbprint on the consent form. Participants were also encouraged to ask questions about the study, and the investigator and research assistants responded satisfactorily.

Participants and restaurants were assigned unique serial numbers to safeguard their identities to ensure anonymity and confidentiality. This measure ensured that any information provided by participants on their restaurants could not be linked back to them, and unauthorised access to the data was prevented. Participants were assured that their data would be stored securely in a personal password-protected drive by the researcher and that it would not be used for any purposes other than the study itself, protecting their privacy.

3.10 Chapter Summary

This chapter detailed the study's methodological approach to investigating food waste management practices among restaurants in Cape Coast. Adopting an interpretive research philosophy and a qualitative design, the researcher collected data from 17 purposively selected restaurants, including standalone and star-rated establishments. Semi-structured interviews were conducted with key informants—managers, cooks, and waitstaff—while on-site observations provided additional context on daily operations and waste disposal practices. Data were then transcribed, coded, and analysed using thematic analysis, allowing for the identification of recurrent patterns. Ethical protocols, including informed consent and confidentiality, were strictly followed to ensure that respondents' rights were respected throughout the study.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results and discussion of the data for the study. The chapter is divided into sections based on the demographic characteristics and the study's objectives.

4.2 Socio-Demographic Characteristics of Respondents

This section presents an overview of the socio-demographic characteristics of the respondents based on the data taken from the field. These include the total number of respondents, age range, gender, occupation, and restaurant menu diversity. Purposive sampling techniques were used to select and interview the respondents until data saturation was achieved. Table 1 presents the socio-demographic characteristics of the respondents. The respondents were selected from seventeen (17) restaurants consisting of 13 standalone restaurants, 2 Two-star restaurants and 2 Three-star restaurants. The restaurants were assigned unique letters ranging from Restaurant A to Q, which aided the analysis.

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Table 1: Socio-demographic characteristics of respondents

Variables	Frequency (n=17)
Gender	
Male	7
Female	10
Average Age = 36 years	
Category of Restaurants	
Standalone Restaurant	13
Two Star Restaurants	2
Three Star Restaurants	2
Education Level/Certification	
Senior High School Certificate	7
Degree/Diploma	9
Master's Degree	1
Position in Restaurant	
Cook	5
Cook/Waitress	1
Chef	2
Cook/Manager	1
Waitress	1
Supervisor/Waitress	2
Supervisor	1
Manager	4
Working Experience	Min = 3 Months
	Average working experience = 6.5 years
	Max = 35 years
Number of restaurants worked in before current employment	
1	6
2	3
3	3
4	4
5	1

Source: Field Data (2023)

The respondents included Seven (7) males and ten (10) females with an average age of 36. The respondents' educational levels and certifications ranged from senior high school certificate holders to master's degree holders, with most

of the respondents having a degree or diploma that helped run the restaurants' operations. The participants comprised five cooks, one cook/waitress, two chefs, one chef/manager, one waitress, two supervisors/waitress, one supervisor and four managers.

Interestingly, the respondents had at least three months of working experience, with an average of 6.5 years and a maximum of 35 years. According to a chef at Restaurant D, "*I have been operating in the restaurant for about fifteen years with experience of working in four restaurants before joining this restaurant*." This shows that the respondents have versatile knowledge in the hospitality industry and more working experience at different restaurants.

Moreover, the study delved into the culinary landscape of the various restaurants, exploring the menu and cuisine preferences shared by different respondents. With a focus on local Ghanaian dishes, such as banku with tilapia, jollof rice, and fufu, the study unveils a spectrum of continental offerings ranging from rice to pizza to European and Chinese influences. According to the cook/waitress at Restaurant A,

> *Our restaurant focuses on local dishes, such as banku with tilapia, banku with Okro stew, fried rice, yam and plantain with palaver sauce, and different types of soup. However, we serve continental food primarily to our foreign guests.*

The cook of Restaurant E also added,

> *The restaurant's menu includes breakfast food such as chakalaka beans, small cucumber and tomato salad, oath, two eggs, chicken bites, Turkish bread, and bread with butter and jam. We also serve plain rice, grilled chicken, and local and continental foods.*

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However, the manager of Restaurant K indicated that

> *The restaurant's menu depends solely on the food choices and*
> *preferences of the customers. The dishes are tailored to the customers'*
> *needs and requests to purchase our food. The food bought here mainly*
> *consists of Jollof, fried rice, and banku and tilapia. We sometimes do*
> *potato chips, but it is based on customers' occasional requests.*

Interestingly, some restaurants offer services such as buffets and "a la carte" for customers. According to the Manager of Restaurant P,

> *The hotel offers two types of services, the buffet and "A La Carte,"*
> *mainly for family services and requests from Chinese customers. The*
> *buffet displays dishes in the restaurant, and guests come and make*
> *themselves out. The A La Carte is where they take the individually priced*
> *based on the order from the menu. The customer places the order, and*
> *the food is being prepared per the order. We also serve continental and*
> *local foods.*

The findings from the restaurants shed light on the varied culinary approaches and services these establishments offer. Restaurant A prioritises local Ghanaian dishes but recognises the importance of serving continental options, mainly catering to foreign guests. Restaurant E boasts a diverse menu, blending breakfast items with a mix of local and continental offerings and showcasing various culinary choices. Restaurant K takes a personalised approach, tailoring its menu based on customer preferences and emphasising a customer-centric model. Restaurant P, in contrast, adopts a more structured service approach, providing both buffet and "A La Carte" options, with the latter catering to family services and Chinese restaurant requests. These diverse strategies highlight the

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adaptability of restaurants to customer demands, local and international influences, and the need for personalised experiences in the ever-evolving hospitality industry (Bardukova, 2023).

Moreover, the Supervisor of Restaurant O also stated that

We used to have a menu chart, but the prices were too high, and people were not buying the food. Thus, we decided to go away with the menu chart and sell what food was available. Daily, we can have banku, fufu, jollof rice, fried rice, and plain rice. What is available is what we sell to the customer. Our breakfast starts from 7 am to 10 am, and we use 30-minute intervals to tidy up and set up the lunch and dinner from 11 am to 7 pm. We do not have a break between lunch and supper. They are together. The restaurant closes at 7 pm.

The Supervisor of Restaurant O provides a unique perspective on managing their menu and daily operations. The revelation that the restaurant used to have a menu chart but abandoned it due to high prices and low customer engagement speaks volumes about the challenges they faced in attracting patrons. This aligns with studies indicating that higher food prices attract low customer engagement (Bergel & Brock, 2019; Thomas & Turk, 2023). The decision to sell what food is available reflects a pragmatic approach, possibly driven by the need to streamline operations and adapt to their clientele's preferences and economic considerations. The restaurant ensures simplicity and efficiency by focusing on staple dishes such as banku, fufu, jollof rice, fried rice, and plain rice. The detailed breakfast, lunch, and supper schedule highlights the disciplined structure of the restaurant's daily operations. The absence of a break between lunch and supper and the decision to close at 7 pm

further underscores their commitment to providing continuous service throughout the day. This approach may strategically respond to customer demand, offering a more straightforward and accessible dining experience. The decision to eliminate a fixed menu and serve what is available aligns with adapting to market dynamics and maintaining cost-effectiveness (Dupuis et al., 2024; Ji & Han, 2022).

4.3 Food Waste Disposal Practices among the Restaurants

Food waste disposal practices are the methods and procedures businesses, individuals, or communities employ to manage waste (Lau, Sabran & Shafie, 2021; Brancoli, Rousta & Bolton, 2017). Food waste is generated at various stages of the food supply chain, including production, processing, distribution, retail, and consumer level (Papargyropoulou et al., 2014; Silvennoinen et al., 2015). This section deals with research objective one, which examines the food waste disposal practices among the restaurants in the Cape Coast metropolis. This section is organised into subsections based on the aspects of food waste disposal practices they address, such as food waste generation and sources, customer interaction and complaints, and food waste handling and disposal.

4.3.1 Food Waste Generation and Source

Food waste in restaurants is a pervasive issue arising from multiple sources within the culinary industry. The process begins in the kitchen, where over-preparation, imperfect food items, and trimming practices contribute to significant waste (Papargyropoulou et al., 2019; Sakaguchi, Pak & Potts, 2018; Offei & Mikkelsen, 2011). Moreover, menu planning, portion control, and ordering practices are crucial in determining how much food goes uneaten. Plate

waste from diners, influenced by portion sizes, changing tastes, and societal norms, adds to the problem. This subsection addresses food waste generation by examining the sources, how much is generated, the types of food waste, and the category of customers who leave food uneaten in restaurants.

The investigation of food waste sources in the restaurants in the Cape Coast metropolis unveiled multiple sources of wastage. Among the identified sources were vegetables, guest leftovers, burnt food, overcooked food, and contaminated foods. A cook from Restaurant C highlighted that unfinished customer meals and bones from customer plates are notable sources of food waste. Most respondents pointed out unfinished customer meals and surplus vegetables from the market as contributing factors. They indicated that unfinished customer meals and bones from customer plates are significant sources of food waste and point to the need for strategies to manage portion sizes and encourage customers to consume their meals entirely. This aligns with existing studies emphasising the importance of portion control and customer education in reducing food waste in restaurant settings (Freedman & Brochado, 2010). The mention of surplus vegetables from the market as a contributing factor to food waste highlights the importance of effective inventory management and ordering practices. Studies have consistently emphasised optimising inventory control to minimise unnecessary food purchases and subsequent wastage (Buisman et al., 2019; Birisci & McGarvey, 2018; Derqui et al., 2016).

Furthermore, the study illuminated the impact of kitchen errors, as noted by the Waitress at Restaurant F,

> *If a cook makes a mistake or fails to meet quality standards, we often*
>
> *have to discard the prepared dish, particularly potato chips and bread,*
>
> *which tend to linger unsold in the fridge.*

The Supervisor of Restaurant P echoed the sentiment that guest leftovers, burnt and overcooked food, and contaminated items were significant contributors to wastage. The investigation's revelation of the significant impact of kitchen errors on food waste aligns with Charlebois et al. (2015) findings that emphasise the importance of kitchen efficiency and staff training in minimising food wastage. The mention of discarding prepared dishes like potato chips and bread due to mistakes or failure to meet quality standards underscores improved cooking techniques and quality control processes by advocating for enhanced kitchen practices to reduce food waste (Gładysz et al., 2020).

On the types of food waste generated, it was revealed that rotten tomatoes and other vegetables, food from customer plates, and overproduction in the kitchen were the causes. According to the Manager of Restaurant L,

> *Common food waste is leftover food from plates. Customers will order*
>
> *banku and tilapia and often leave some food uneaten. Sometimes, there*
>
> *are bones from chicken left by customers who purchase rice with*
>
> *chicken. This is mainly because the customers are satisfied.*

The implications of the findings on the types of food waste generated, particularly the prevalence of leftover food from customer plates, emphasise the need for targeted interventions in portion control and customer education to minimise food waste in restaurant settings (Coşkun & Özbük, 2020; Sakaguchi et al., 2018). The Manager of Restaurant L's observation regarding customers leaving uneaten portions of banku and tilapia and leftover chicken bones from

rice dishes due to satiation highlights the importance of addressing customer behaviours and expectations. Strategies that focus on offering appropriate portion sizes and encouraging patrons to take home leftovers may prove beneficial in mitigating these familiar sources of waste. This aligns with the broader literature that underscores the role of consumer awareness and engagement in reducing food waste within the hospitality industry (Soma et al., 2020; Filimonau et al., 2020).

Furthermore, the findings regarding the food waste generated daily in the restaurant revealed different perspectives influenced by various factors such as the type of service, customer behaviour, and kitchen practices. According to a cook at Restaurant C, on averag*e, "there are three plates of leftover food daily from customers' food. However, there are days we do not get leftovers from customers' plates*." The Supervisor of Restaurant P also highlighted,

> *Food wastage in restaurants is about 10-15%, varying with business levels. Waste occurs when customers do not finish their meals, and kitchen errors lead to unusable food, such as improper storage or spoiled meals. Additionally, buying and processing ingredients like cassava contributes to waste, including weight loss from peeling and spoilage after cooking.*

Also, the food and beverage manager of Restaurant Q pointed out that,

> *Our restaurant mainly offers A La Carte service, but breakfast, provided as a buffet, is a significant source of waste. Guests often take more than they eat, such as leaving sausages uneaten. Although breakfast is included and charged, many do not consume it if it is taken later. Additionally, conferences with buffet menus show similar waste*

patterns, with attendees taking more than they eat due to prepaid meals. Typically, only 80% of the food taken is consumed, leading to substantial food wastage.

The cook at Restaurant C emphasises the variability in leftover food, indicating that some days witness no leftovers, pointing to the importance of understanding the fluctuating patterns of food waste. Similarly, the Supervisor of Restaurant P highlights the multifaceted nature of wastage, encompassing both restaurant and kitchen operations. The acknowledgement that food wasted in the restaurant, though paid for, still contributes to overall waste echoes the dilemma many establishments face. The revelation by the food and beverage manager of Restaurant Q regarding breakfast-related waste and conference buffets aligns with existing studies emphasising challenges in such settings, with individuals taking more than they consume, contributing to significant food wastage (Sharma et al., 2021; Juvan et al., 2018). These findings collectively emphasise the need for targeted interventions that consider the specific dynamics of each restaurant setting to minimise food waste effectively.

In exploring the factors contributing to the leftover food in restaurants, the responses provided the category of customers that often leave leftovers in restaurants. The respondents pointed to specific demographics, with females, individuals recovering from hospital visits, and customers aged 50 and above identified as more likely to leave food on their plates. These insights suggest that health conditions and age influence eating habits and the likelihood of leaving food uneaten. This finding underlines the importance of considering diverse demographic, health, and cultural factors when addressing customer needs and food waste in restaurants (Özbük & Coşkun, 2020).

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4.3.2 Customer Interaction and Complaints

This sub-section focuses on understanding the dynamics of customer interactions, particularly those involving orders and requests that may contribute to food waste. It explores the common complaints and feedback received from customers about food waste. This sub-section dwells on the frontline experiences of staff in navigating the delicate balance between customer satisfaction and minimising food waste in restaurants. It has been established that effective customer interaction is pivotal in shaping the dining experience and managing food waste in restaurant operations (Filimonau et al., 2020). The waitstaff's decisions and interactions significantly influence the delicate balance between meeting customer expectations and minimising unnecessary waste. It was observed that customer interaction is one of the most challenging aspects of running restaurants as customers often abandon their food due to waiting time, causing food waste and income losses to the waitperson. In response, Restaurant K's waitress made the following comment.

> *As a waitress, I inform customers about the kitchen's estimated food preparation time, typically 30 minutes, to manage their expectations and reduce pressure from frequent inquiries about their orders. If customers cannot wait, they are notified promptly. Despite these efforts, there are still instances of food waste when customers leave before their order arrives or choose not to consume the food due to wait times. If another customer orders the same dish shortly after it is prepared for a previous customer who left, we can serve it. However, if no such request is made, the waitress must often bear the cost of the food, sometimes taking it home if it remains unclaimed by the end of the day.*

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The excerpts above underscore the significance of effective communication in managing customer expectations, particularly regarding food preparation times. The emphasis on providing clear instructions and proactive communication aligns with studies in service management and hospitality, highlighting the importance of communication in customer satisfaction. The waitress's approach in promptly informing customers about extended wait times and the potential consequences of leaving before the order is ready reflects a proactive strategy to prevent dissatisfaction. This shows the importance of customer communication in service industries (De Vries et al., 2018). Furthermore, the waitress's responsibility for covering the cost of unserved food when no customer requests the dish resonates with broader discussions on food waste in the hospitality industry. Studies on sustainable practices in the food service sector often stress food wastage's economic and environmental impacts, emphasising the need for effective management strategies to minimise waste (Ale et al., 2019; Nguyen, 2022; Ghosh et al., 2016).

The findings also reveal a range of practices and considerations in managing leftover food in restaurants and kitchens. The options for customers to take their leftover food along or dispose of it in dustbins reflect a diversity of preferences. The respondents were committed to food safety by not reusing leftover food for guests and instead channelling it into a separate container for disposal or collection. Observing an individual collecting leftovers for his dogs suggests a potential link between the generation of leftovers and food waste reduction. Additionally, Restaurant O's waitpersons monitor customers who consistently leave uneaten food and adjust their portion sizes; this demonstrates

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a commitment to reducing food waste through portion control (Freedman & Brochado, 2010; Wu & Teng, 2022).

Customer complaints were also an invaluable feedback mechanism in refining and improving areas in the restaurant service delivery. Understanding and addressing customer complaints is essential to ensuring guest satisfaction and loyalty. Handling complaints can significantly impact a restaurant's reputation, customer retention, and overall success (Hess, 2008). From the study, the common complaints discovered were customers' dissatisfaction with the quantity and prices of food items, spicy food, undercooked and overcooked meals, spoiled food items, and waiting time. In response to the complaints, a cook in Restaurant A made the following statement.

A guest suggested offering smaller, more affordable salad portions to reduce waste. After noticing that he consumed only a small part of the salad served, he proposed that smaller portions could be sold at a lower price instead of large quantities at a high price. For instance, pricing a portion at GH10.00 instead of GH60.00 could allow customers to enjoy their meal without the risk of waste, especially since salads spoil within 2 to 3 days in the fridge. This feedback highlights an opportunity to adjust our menu offerings better to match customer preferences and reduce food wastage.

Similarly, the Waitress in Restaurant F made the following comments.

Customers have expressed dissatisfaction with the texture of our fried rice, citing it as either undercooked and stiff or overcooked. The latter issue often results from the sauce used during preparation, which can cause the rice to melt. Concerns have also been raised about storing

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plain rice, specifically if it is kept in a cold box where it might be exposed to heat that alters its texture. Typically, the rice is cooked in the morning and later stir-fried with vegetables upon customer orders. We prepare this in batches of five plates to ensure freshness, but there have been instances where the vegetables overcook by the time the last portions are ready, leading to customer complaints and refusal of the dish.

These statements highlight challenges and customer dissatisfaction within the food service industry, encompassing issues related to food quantity, pricing, quality, and waiting times (McAdams et al., 2019; Gyeduah, 2020). The responses from the restaurants offer valuable insights into potential solutions, emphasising the importance of understanding customer perspectives and addressing specific concerns to minimise food waste. The suggestion from the guests in the restaurant to offer smaller, more affordable portions aligns with the broader discourse on portion control and its impact on reducing food waste, resonating with studies advocating for sustainable practices in the hospitality sector (Wansink & Van Ittersum, 2013; Duursma et al., 2016).

4.3.3 Food Waste Handling and Disposal

Restaurants handle and dispose of waste differently, from burning to recycling. Effective handling and disposal of food waste in restaurants is crucial for minimising environmental impact, ensuring hygiene, and managing costs. This subsection examines the food waste storage method, ways of disposal, percentage of food disposed of, and guidelines for effective food waste disposal practices among restaurants in the Cape Coast Metropolis. The storage of food waste before disposal is a crucial aspect of waste management in various settings, including households, businesses, and restaurants. Proper storage is

essential to minimise unpleasant odours, prevent pathogens' spread, and facilitate efficient disposal practices (Filimonau et al., 2020; Haddad et al., 2022; O'Connor et al., 2022). The findings indicated that the respondents use various waste storage methods before disposal. These methods include storing in dustbins (Plate 1), freezing, and using polyethene bags and containers. A cook at Restaurant H stated that

> *External individuals or services collect food waste and typically contact us to arrange for its retrieval. To facilitate this process, we store the food waste in a rubber bag, keeping it in the fridge until the designated collectors arrive. This routine involves removing the bag from the fridge and delivering it to the collectors daily before closing. However, it is essential to note that waiters or waitresses are responsible for ensuring proper disposal in the dustbin if the designated collectors do not retrieve the food waste on a particular day.*

The Manager of Restaurant Q also added,

> *We have containers, dustbins, and polyethene bags where we store the waste before collecting it. Sometimes, we separate the food waste into different categories, such as rice, vegetables, and bones, in bags and bins. However, we mostly mix all the waste, tie and store it in a dustbin for disposal.*

Similarly, the manager of Restaurant P also commented.

> *Food waste from guest tables is promptly stored in a bin, and the Zoom Lion company collects it. In contrast, kitchen waste is stored for weighing purposes related to cost control. The cost controller oversees this process and makes deductions accordingly. However, food waste*

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generated within the restaurant is swiftly discarded into a bin

immediately after plates are cleared from guest tables.

Interestingly, some restaurants were observed burning food waste and having no storage facility in place for storing the waste. From the observations at Restaurant F, food waste is often disposed of and burnt at nearby locations. A cook from Restaurant F commented on this.

We burn the food waste that is generated from the restaurant. Food waste and plastics, paper, rubbers, bottles, and others exist. Mostly, we put them in bins and collect them later to burn.

These findings from the study reveal a diverse range of methods employed by the respondents for storing food waste before disposal, including dustbins, freezing, polyethene bags, burning (Plate 2), and containers. The implication of these varied practices suggests a lack of standardised approaches across the establishments, possibly influenced by factors such as the type of waste, disposal procedures, and organisational policies (Filimonau & Delysia, 2019). The respondents' testimonies highlight the incorporation of external waste collection services and internal practices for cost control and efficient waste management (Guria et al., 2021; Filimonau et al., 2019). While reflecting a degree of awareness and responsiveness, these practices also underscore the need for more systematic and streamlined approaches within the hospitality industry to enhance overall waste management efficiency.

Plate 1: Dustbins for storing food waste at a Restaurant
Source: Field Data (2023)

Plate 2: Waste burning site of a Restaurant
Source: Field Data (2023)

Regarding the methods of disposal, the food waste at the restaurants was often observed to be put in polyethene bags or dustbins, thrown in gutters, dumping sites, and collected by Zoomlion Ghana. Per most respondents' statements, the food waste is put together at the end of the working day in a central bin and collected by Zoomlion Ghana and other waste collection

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companies for disposal. The supervisor of Restaurant P commented that Zoomlion Ghana comes for the waste at the end of the day after it has been bagged and placed in the bins. He further indicated that the overproduced food in the kitchen and leftover foods are also bagged and disposed of because it is against hotel policy to resell leftover food to guests. A cook at Restaurant N also stated,

> We use a bin for general waste disposal, and in addition, there is a larger bin where individual food waste is segregated from plastics, cans, and papers. The sorting process ensures that different types of waste are separated appropriately. Ultimately, the final disposal occurs in the central waste facility by Zoomlion and other companies.

Moreover, it was observed that some restaurants burn the waste and dispose of them in gutters. A waiter at Restaurant J stated, "*We have a dumping site in front of the restaurant where we dispose of any food waste and other forms of waste generated here. The waste is put in black polythene bags before we burn them.*" The chef also confirmed in Restaurant D that *liquid waste from the kitchen is often diluted in water and thrown in the gutters.*

Plate 3: Dumping site of a Restaurant
Source: Field Data (2023)

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The findings concerning food waste disposal practices in the studied restaurants reveal a mix of methods, including using polyethene bags, dustbins, gutters, dumping sites, and collaboration with waste collection services like Zoomlion Ghana. Observing that some restaurants resort to burning waste and disposing in gutters raises environmental concerns and highlights the need for more sustainable disposal methods (Singh et al., 2014; Eseyin-Johnson, 2011).

Furthermore, the responses to inquiries about the percentage of food wastage in the restaurant offers varied perspectives among the respondents. The cook at Restaurant B notes that during peak periods, the establishment occasionally experiences leftover food, estimating around six plates from customers. The Cook at Restaurant D emphasises that the kitchen avoids overproduction, but customer leftovers, including bones and vegetables, result in approximately four plates being discarded daily. The supervisor of Restaurant P provided a percentage estimate of ten but highlighted the dependency on the number of guests, suggesting a fluctuating pattern. Conversely, the Manager of Restaurant Q distinguishes between kitchen and restaurant waste, stating that only around 10% of food is wasted in the restaurant due to customer behaviours like sampling, especially during breakfast. These findings highlight the complex nature of food waste in restaurants, influenced by factors such as customer volume, kitchen practices, and meal sampling behaviours, thereby emphasising the need for tailored strategies to address specific sources of waste in different operational scenarios (Hennchen, 2019; Romani et al., 2018).

The responses to inquiries about specific procedures or guidelines for food waste disposal in the studied restaurants highlight a lack of standardised practices and various approaches. A cook at Restaurant A describes a standard

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method of disposal involving placing food waste in a singular dustbin without segregation. She stated that;

We do not follow a standard disposal method; we place the waste in the dustbins without any segregation. In our kitchen, we have a single dustbin for general waste disposal.

The Supervisor of Restaurant I outline a less formalised but practical approach, where a designated container serves as a collection point for food waste, allowing any available person to dispose of it when the waste collector arrives. He stated;

Keeping all food waste in a designated container has become a standard practice. If I am unavailable, anyone present knows that the food waste is stored in that specific container, allowing them to hand it over to the collector easily. This is the established procedure, and if the waste can be used as animal feed, we find it unnecessary to dispose of it in a dumping pit.

The respondents indicate an absence of formal procedures, with food waste mixed with other waste. Notably, the manager of Restaurant K reveals an alternative practice driven by cost considerations, wherein a designated individual collects and burns the waste on-site daily. He stressed that,

Our restaurant has no specific procedure for disposing of food waste, which is generally mixed with other waste. The owner has opted for an alternative approach to avoid the cost associated with hiring Zoomlion Ghana Limited. Instead, a person collects and transports all the waste to a site adjacent to the restaurant, where it is burned daily before closing.

These findings suggest a lack of standardised guidelines in the studied restaurants, which may be attributed to financial considerations, operational efficiency, or a lack of awareness regarding sustainable waste management practices (Wu & Teng, 2023). While some restaurants in the study lacked formal procedures, Wu, Mohammed and Harris (2021) emphasised the importance of structured waste management plans to reduce environmental impact and promote sustainability. As noted by some respondents, the lack of segregation and mixing of food waste with other waste may hinder recycling efforts and contribute to environmental challenges associated with improper disposal. Additionally, the on-site burning practice raises environmental concerns and contrasts with recommendations for eco-friendly disposal methods. This was synonymous with the findings of Gyimah et al. (2021) that most Cape Coast restaurants resort to burning food waste. These discrepancies highlight the need for awareness and adoption of more sustainable food waste disposal practices within restaurants in Cape Coast Metropolis, aligning with global efforts towards environmental responsibility.

4.4 Food Waste Reduction Strategies among Restaurants in Cape Coast Metropolis

Food waste reduction strategies include the various practical tips and habits individuals adopt to minimise food waste (Kim et al., 2019). In the restaurant industry, reducing food waste is environmentally responsible and contributes to cost savings (Vizzoto et al., 2021;). This section focuses on objective two of the study, which analyses the food waste reduction strategies used by restaurants in the Cape Coast Metropolis. This section entails sub-sections that examine the existing strategies and measures of the restaurants'

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use, their motivations for using these methods and their effectiveness, future considerations, and collective actions on food waste reduction methods.

4.4.1 Existing strategies and measures to reduce food waste

Food waste reduction in restaurants is a multifaceted challenge that requires a combination of thoughtful strategies. One essential approach is portion control. By implementing precise portion sizes, establishments can reduce plate waste and better manage kitchen production. According to the chef of Restaurant B, this approach caters to customer preferences but also helps to optimise resource utilisation. On the implementation of portion control, he stated,

> *We implement food portion control in our kitchen to minimise waste. For instance, when storing fish in the fridge, we divide it into portions for specific orders. If I am absent, the assigned cook knows that each portioned fish is intended for a single order. This practice ensures that no cook mistakenly takes a portioned fish, cuts it, and uses it in a different order. We follow a similar approach to other foods, such as scaling quantities like 200 grams or 150 grams. This systematic portioning helps prevent food wastage in the kitchen. We often fillet fish and debone meat or chicken. There are two types of fillets—inner fillet and outside fillet. "Stick fish" refers to fish with bones, while "fillet fish" is boneless. When portioning, such as 1 kilogram, each serving is carefully measured to be 1.5 grams. This practice is applied consistently to all fish and meats, reducing waste and loss in the restaurant.*

It was also found that some restaurants have implemented portion control to reduce food waste. It was interesting to know that they implemented

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portion control by targeting regular customers and matching the quantity of food to the customer consumption rate. A cook in Restaurant A explained that;

> *In our restaurant, we employ a strategic approach to control food portions, utilising both the A La Carte strategy and accommodating the preferences of our regular customers. This dual strategy plays a crucial role in minimising food waste. For instance, with our A La Carte strategy, we carefully tailor each order to meet the specific preferences and appetites of the customer. Moreover, for our regular customers, whom we have come to understand better, we consider their eating habits. For those not known to consume large quantities of food, we purposefully adjust the portions to smaller quantities. This proactive measure ensures that when we serve their meals, they are more likely to finish everything, minimising the risk of excess food going to waste. This thoughtful approach aligns with our commitment to reducing food waste and enhancing the overall dining experience for our valued customers.*

The findings underscore the significant implications of implementing restaurant portion control strategies to reduce food waste. These practices contribute to waste reduction and align with existing literature on sustainable practices in the hospitality industry, which advocates for implementing effective strategies to manage food resources (Zhang et al., 2022; Drangert,2018; Nguyen, 2022).

Furthermore, it was found that some restaurants use temperature management to avoid burning food and creating food waste. According to the Head Supervisor of Restaurant O, methods such as slow cooking, sous vide and simmering at lower temperatures reduce food waste in several ways. She further stated that;

Certain foods require careful temperature management during the cooking process to prevent burning. For example, dishes like jollof rice should be prepared using low heat to avoid scorching. The success of this approach lies not in the choice of utensils but in the cook's experience. On the other hand, banku demands high heat initially, transitioning to low heat during the mixing stage. Maintaining high heat throughout would result in burnt banku. Our kitchen uses a meticulous approach to rice preparation to prevent food wastage. We cook five kilograms of rice in small bags, preparing separate batches for jollof, fried rice, and plain rice. Rather than cooking all the rice at once, we portion it. When we notice that only three or four plates remain, we cook another bag of five kilograms. This daily practice ensures that there is no leftover rice in the kitchen. Our cooking schedule is tailored to match the demand for our food. Wednesdays, Thursdays, and sometimes Tuesdays are peak days, prompting us to cook four bags of five-kilogram rice daily. On Mondays and Fridays, we adjust our cooking to two bags daily. This strategic approach guarantees that our food is consistently fresh, meeting the varying demands of our customers.

The findings underscore the crucial role of temperature management in cooking as a strategic approach employed by some restaurants to mitigate food waste. Specifically, using different temperature methods, such as slow cooking, sous vide, and controlled simmering, emerges as an effective means to prevent food burning, ensuring optimal taste and quality (Shepard, 2021). Also, by adopting a portioned cooking approach, the restaurant minimises the risk of leftover rice, cooking in response to real-time demand. This adaptive cooking schedule,

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tailored to peak and off-peak days, not only prevents overproduction but also ensures the consistent freshness of the food, meeting the dynamic needs of customers. The findings reveal that a thoughtful temperature management strategy and tailored cooking practices can significantly reduce food waste in restaurant operations.

Moreover, it was found that restaurants buy food items in controlled quantities, introduce cost incurrence to chefs and store leftover food to avoid food waste. The strategic procurement of ingredients in controlled quantities ensures that restaurants only acquire what is necessary for immediate use, minimising the risk of surplus perishables (Mujasi, 2021). According to the Manager of Restaurant Q:

> *We have adopted a systematic purchasing strategy to reduce food waste, buying only necessary quantities of food items like fish and tomatoes based on anticipated occupancy. We also practice moderated cooking, limiting rice to twenty daily portions, ensuring it is consumed by early afternoon to avoid leftovers. To manage costs and waste, we use LPG and heavy-bottomed utensils for cooking rice instead of more expensive rice cookers. This approach effectively curtails food wastage and controls expenses.*

The strategic procurement of ingredients in controlled quantities aligns with the findings of Hartigan and Lakos (2021), which emphasise the significance of mindful purchasing practices in reducing food waste. The manager's systematic approach reflects a meticulous strategy to minimise surplus perishables. The emphasis on cooking in moderation, particularly with items like rice, underscores the commitment to preventing excess production and subsequent

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food waste. The hotel's consideration of cost-effective alternatives, such as utilising LPG and heavy-bottomed utensils for rice cooking, demonstrates a thoughtful balance between expense management and waste reduction. These practices contribute to the broader studies on sustainable food management within the hospitality industry, showcasing the effectiveness of a multifaceted approach from procurement to cooking processes in mitigating food waste.

Moreover, introducing cost incurrence to chefs underscores the financial consciousness that encourages mindful cooking practices, discouraging unnecessary waste through a heightened awareness of excess production's economic impact (Filimonau et al., 2022). The Head waitress of Restaurant F stressed that "*management of the restaurants use cost incurrence where the cook or the waitress pays any food wasted*". She further indicated that "*the restaurants applied this method to deter some cooks from overproducing food and causing losses to the restaurant.*" This approach shows the importance of cost-effective strategies in waste reduction within the restaurant industry (Guria et al., 2021). Cost incurrence is a deterrent, holding chefs and waitstaff accountable for food wastage and creating a direct financial consequence for overproduction. By incorporating such financial incentives, restaurants address the economic implications of food waste and foster a culture of accountability and resource optimisation, contributing to the broader literature on sustainable and efficient practices in the hospitality sector.

Nevertheless, storing leftover food showcases a commitment to optimising resources, allowing for repurposing ingredients in subsequent dishes or as part of creative daily specials. A cook from the Restaurant H restaurants explained that "*leftover food in the kitchen is often stored in the fridge and used*

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the following day". She further stated, "*Occasionally, when plain rice remains, we repurpose it by using it for fried ri*ce.". By preserving and repurposing leftover ingredients, the restaurant minimises food waste and enhances efficiency in kitchen operations (Nguyen, 2022). The cook's explanation about storing leftover food in the fridge for subsequent use echoes the notion that strategic storage can reduce unnecessary discards. The specific example of repurposing plain rice for fried rice exemplifies this approach's creative and practical application, showcasing how surplus ingredients can be transformed into new menu items. This finding shows the importance of adaptive strategies in the culinary realm, contributing valuable insights to the broader literature on sustainable restaurant practices.

4.4.2 Motivations and Effectiveness of the Implemented Measures to reduce Food waste

The motivations behind and the effectiveness of the measures to reduce food waste in restaurants are crucial considerations in sustainable food management practices. Motivations often stem from environmental, economic, and ethical concerns. Environmentally, reducing food waste aligns with global efforts to mitigate climate change, as decomposing food generates greenhouse gases (Nordin et al., 2020). Economically, minimising waste enhances cost-efficiency and improves overall profitability for restaurants. Ethical motivations include a commitment to responsible resource use and addressing the social implications of food scarcity (Lehtokunnas et al., 2022). The motivations were found to stem from economic reasons and provide portions that customers can consume at the restaurants. The Cook of Restaurant A indicated that the motivation for implementing portion control to reduce food waste stems from

observing customers eating small portions of their breakfast and creating food waste. The chef of Restaurant D restaurants also indicated that they implement those methods to meet weekly profit margins.

Moreover, it was also found that the cost of food items motivates some restaurants to implement methods to reduce food waste. According to the chef of Restaurant B,

> *The chef oversees the purchased food items as they determine the cost and pricing strategy to ensure the restaurant operates profitably. In restaurant terms, a common practice involves multiplying the cost of each item by a factor of 3. For example, a meat item costing GH 5.00 would be priced at GH 15.00. This breakdown allows GH 5.00 to cover the initial item cost, another GH 5.00 for taxes and staff payments, and the remaining GH 5.00 for maintenance expenses. Adhering to these restaurant terms motivates us to implement portion control strategies that align with maintaining financial sustainability and operational efficiency.*

A cook from Restaurant H also made similar statements. According to her,

> *Due to the current high prices of food items in the market, I find it impractical to purchase food commodities for 200.00, sell a portion for 50.00, and discard the remaining 150.00 worth of food, resulting in a loss. To address this challenge, we have implemented reuse and recycling measures to store unsold food for future use. This allows us to retrieve our investment the next day, as it is from these earnings that we cover our expenses; otherwise, we would face the risk of going hungry.*

The motivations identified in the study highlight the crucial intersection of economic factors and customer-centric approaches in implementing food waste reduction strategies in restaurants. The economic motivation revolves around profit margins, cost considerations, and financial sustainability. The practice of multiplying the cost of food items by a factor of 3, as described by the chef at Restaurant B, demonstrates a systematic approach to pricing that influences the decision to implement portion control strategies. These motivations align with studies that emphasise the economic impact of food waste on restaurant operations, emphasising the need for cost-effective strategies to ensure financial viability and operational efficiency in the face of economic constraints (Reynolds et al., 2019; Kim et al., 2019).

The effectiveness of measures can be evaluated based on the reduction in overall food waste, improvements in resource management, and positive impacts on the restaurant's bottom line. Strategies such as portion control, temperature management, cost incurrence, and strategic procurement have effectively minimised waste. Success is often measured by improved customer satisfaction, optimised kitchen operations, and reduced financial losses associated with overproduction and discarded food items (Strotmann et al., 2017; Chawpraknoi & Boonyanan, 2019). According to the cook of Restaurant A, customers consume the breakfast served after implementing the portion control method. After implementing these methods, the cook and head waitress of Restaurants E and F indicated a cost reduction. All the kitchen staff and waitresses are cautious of how food is cooked and served. It was interesting to learn that implementing food reduction strategies has prevented odours and

animals from intruding into some restaurant premises. According to the Manager of Restaurant G,

> *The issue of animals entering the backyard has been successfully resolved, and the solution appears effective. Since the implementation of the solution, the animals have ceased to come into the backyard, making it an effective measure for dog owners. After implementing these food reduction methods, odours have also been reduced in the backyard.*

The findings underscore the multifaceted benefits of implementing food waste reduction measures in restaurants, aligning with existing studies emphasising the importance of these strategies for overall operational success (Vizzoto, Testa & Iraido, 2021; Filimonau et al., 2019:2020). The evaluation criteria, including the reduction in food waste, improved resource management, and positive financial impacts, resonate with the reported successes in various establishments. The effectiveness of portion control, temperature management, cost incurrence, and strategic procurement is evident in improved customer satisfaction, streamlined kitchen operations, and notable cost reductions at restaurants. The staff's heightened awareness of food preparation and service aligns with the emphasis on these practices, contributing to a more sustainable and efficient restaurant environment (WRAP, 2013). Furthermore, preventing odours and animal intrusion in some establishments, as highlighted by the Manager of Restaurant G, reinforces the broader positive environmental and sanitation implications of these food waste reduction strategies (Thyberg & Tonjes, 2016). These findings substantiate the practical effectiveness of the implemented measures in enhancing both the financial and environmental aspects of restaurant operations.

4.4.3 Future considerations and collective actions to reduce food waste

Future considerations and collective actions to reduce food waste require a holistic approach involving various stakeholders, including individuals, businesses, governments and non-governmental organisations. The study observed that restaurants are considering prospective measures to reduce food waste. These measures range from ways of preparing food to using bins in restaurants. According to the supervisor of Restaurant I,

The only strategy we have recently implemented pertains to chicken due to its bones. The chef suggested transforming it into chicken pieces with a specific program. This way, people can enjoy the chicken, including the bones, without realising they are chewing on them.

The Supervisor of Restaurant P also made the following comment;

We propose setting up a designated area with central bins equipped with air conditioning to enhance our waste management efforts. This controlled environment will help preserve food waste longer, preventing unpleasant odours even if the food spoils. The refrigeration will be a temporary solution until waste management services arrive to collect the discarded food, ensuring a more efficient and hygienic process.

Similarly, the manager of Restaurant P also added,

We are designing and acquiring additional equipment for our kitchen modernisation efforts. One noteworthy suggestion is to include a versatile tool known as the black pan. This heavy metal pan, commonly used in industrial settings, proves valuable for various cooking applications. Its uses range from preparing sauces to cooking rice and vegetables. With easy regulation, the black pan ensures precise cooking,

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minimising the risk of burnt food. Although it comes with a relatively high cost, approximately US$13,000, its multifunctionality and regulatory features make it a worthwhile investment.

These suggest a proactive and innovative approach among restaurants to consider prospective measures to reduce food waste. The strategies proposed, such as transforming chicken bones into edible pieces, setting up designated areas with air-conditioned central bins for extended food waste preservation, and introducing versatile cooking equipment like the black pan, showcase a commitment to efficient waste management and resource optimisation. These measures emphasise the importance of technological advancements and modernisation in kitchens to enhance operational efficiency and reduce food waste (Ismail et al., 2013; Soori et al., 2023). Despite their initial costs, considering multifunctional tools and equipment highlights a long-term investment perspective, echoing the literature's emphasis on the economic benefits of sustainable practices in the hospitality industry.

Moreover, the study also sheds light on the collective actions that restaurants can employ to reduce food waste in Cape Coast. The cook in Restaurant A emphasised the importance of portion control and advised against overcooking. She stated that;

For food sellers aiming to reduce waste, a practical approach is essential. If expecting to serve five people, avoid preparing food for ten as excess may go unsold. Combining leftover food with fresh meals is acceptable, provided it maintains quality. Prioritising rapid sales can risk health due to airborne diseases. It is more effective to cook enough for anticipated demand and prepare additional portions only if needed

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and time permits. This strategy helps minimize leftovers and ensures efficient resource use.

The head waitress of Restaurant F also stressed the role of kitchen keepers in coaching cooks to be vigilant and avoid food waste. She made the following comments;

It sounds like our strategy is highly effective. The presence of a kitchen keeper who actively coaches' cooks plays a crucial role in ensuring vigilance and preventing food ingredient wastage. Compared to other restaurants I have worked with, the level of supervision here is notably stringent. The strict oversight is understandable, as any mistakes leading to food waste incur costs, and paying for wasted ingredients is disheartening, especially when the food was not consumed.

Moreover, the food and beverage manager of Restaurant Q stressed the importance of sharing ideas among restaurants on the Cape Coast. He stated that;

In Ghana, there is often a reluctance to share ideas among restaurants, hindering progress. After a workshop with the Food and Drugs Authority, I realized that just gathering chefs for discussions is not enough. Including hotel managers and directors, especially those who have invested heavily without sufficient operational knowledge, could significantly reduce waste. At my previous job, the operational standards were unsatisfactory, prompting me to move to a better position in Cape Coast. When I resigned, the manager preferred less qualified staff, emphasizing the need for basic cooking skills over advanced qualifications. This attitude makes it challenging to implement

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changes through collaboration, as many owners believe they are on the right track despite evident issues.

On another note, the Manager of Restaurant L also shared valuable insights from a recent training session conducted by the Ghana Food and Drugs Authority at Sasakawa. He revealed that the training covered various aspects, including food preservation and kitchen maintenance. He suggested that all restaurant operators attend such workshops to gain knowledge and practical skills. This proactive approach allows him to learn and implement best practices.

The findings from the study provide valuable insights into practical measures and collective actions that restaurants can employ to reduce food waste. The emphasis on portion control indicates its significance in minimising waste and optimising resources (Freedman & Brochado, 2010). The strict supervision and coaching role of kitchen keepers also resonates with studies emphasising the importance of vigilant kitchen management in preventing ingredient wastage and associated costs (Riesenegger & Hübner, 2022). As expressed by some respondents, the reluctance to share ideas and collaborate reflects a challenge in implementing collective actions within the industry. This finding aligns with literature discussing the complexities of fostering collaboration and sharing ideas in the restaurant sector (Wellton & Lainpelto, 2021; Lee, Sardeshmukh & Hallak, 2016).

4.5 Challenges of Restaurants in Managing Food Waste in Cape Coast Metropolis

Restaurants face various challenges in managing food waste, impacting operational efficiency and environmental sustainability. This section addresses objective three of the study, which assessed the challenges restaurants faced in

managing food waste in the Cape Coast Metropolis. One significant challenge that restaurants face is related to prepaid credit network problems and power outages affecting the storage and transportation of food. Power outages are a common problem in Ghana, affecting food storage in restaurants. According to the chef of Restaurant B,

> *One significant challenge we face is related to prepaid credits. Purchasing additional credits can be problematic due to poor network when our prepaid credits are depleted. This situation becomes particularly disruptive for restaurants as it affects food storage in the fridge and the freezer. Additionally, when we experience power outages, we must transfer our food items from the restaurant's fridge to an externally rented one. This involves considerable back-and-forth movement to transport the food between the external location and the restaurant, incurring substantial costs.*

The issue of prepaid credits and the subsequent complications due to a poor network and power outages resonate with the challenges facing many businesses in Ghana. This narrative reflects the intersection of contemporary technology and traditional restaurant operations, underscoring the vulnerability of relying on digital systems for crucial functions.

Customer dissatisfaction with food was another significant challenge that restaurants in Cape Coast were discovered to be facing. According to the chef of Restaurant D, this is a recurring issue. This issue often arises from the complex interplay between foods and drinks, sometimes leading to digestive discomfort. He further expressed that,

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Dealing with customer dissatisfaction presents a frequent challenge in the restaurant industry when opinions on a dish's quality vary. As a chef, I actively engage with customers who are unhappy with their meals to understand their specific concerns. I am mindful of the potential mismatch between certain foods and drinks, sometimes leading to digestive issues. By suggesting alternative dishes that better complement their chosen beverage, I aim to enhance their dining experience. However, some complaints may be influenced by factors outside our control, such as a customer's mood or external circumstances affecting their appetite. This adds complexity to addressing such issues effectively and requires a nuanced approach to customer service.

The chef's acknowledgement of taste discrepancies and proactive approach to engaging with dissatisfied customers shows the importance of addressing such concerns in the hospitality industry (Gyeduah, 2020). The implications extend beyond mere taste preferences, delving into the complexities of food and beverage interactions that may lead to valid complaints. The mention of customers attributing discomfort to the purchased food, waking up without appetite despite hunger, and the influence of external factors on mood highlights the multifaceted nature of restaurant challenges. This revelation emphasises the need for chefs and establishments to navigate the culinary aspects and the intricate interplay of customer expectations, menu choices, and various external factors that contribute to a satisfactory dining experience (Liu & Tse, 2018).

Furthermore, it was discovered that limited kitchen space is a significant challenge for restaurants in Cape Coast. Limited kitchen space poses a considerable obstacle for restaurants, impacting the efficiency and workflow of

culinary operations (Dareker & Peshave, 2016). According to Demetry (2013), chefs and kitchen staff often navigate tight quarters, leading to bottlenecks and hindrances to food. The restricted space can limit the installation and storage of essential cooking equipment. Per the statement of a cook at Restaurant H,

> *In this establishment, the management has provided us with fridges and deep freezers, facilitating the storage of leftover food to manage food waste effectively. This provision proves beneficial in contrast to a restaurant lacking such essential items, where the absence of proper storage solutions would likely lead to complications. Furthermore, sufficient space in the kitchen for proper food storage is critical, and the lack thereof poses challenges.*

This finding aligns with the findings of Byun and Jiang (2018) that a lack of kitchen space can affect proper food storage, which can influence the customers' eating experience at the restaurant.

Nevertheless, a notable challenge was found to stem from the portion control strategy employed in the kitchens of restaurants, where the purchased commodities for the week can be depleted before the weekends, especially during peak customer hours. According to the supervisor of Restaurant I, the implications of this challenge are in two folds. Firstly, it disrupts the seamless flow of kitchen operations as the chef is compelled to abandon kitchen duties and rush to the market for additional food commodities. This not only disrupts the efficient handling of customer orders but also introduces an element of unpredictability into daily operations. Secondly, while the intention is to reduce food waste through portion control, the practicality of ensuring a consistent supply of food during business hours becomes a logistical challenge. Hence,

striking a balance between portion control and meeting customer demand on time becomes essential for addressing this challenge efficiently.

Lastly, the respondents were asked if there were any regulatory or legal challenges related to food waste management. It was found that some restaurants follow the regulations regarding food management while others struggle to adhere to the requirements. According to a chef at Restaurant B,

We were instructed not to mix meat and fish in the same container due to the risk of cross-contamination. It is essential to store meat separately from fish, necessitating distinct containers for each product. For example, if you purchase fresh tomatoes and okra from the market and place them in the same container, the okra turns black and spoils relatively quickly.

Similarly, the cook of Restaurant M also stated the following:

We comply with regulations by not storing leftover food for over two days and using plain rubber containers to prevent contamination. We separate carbohydrates from proteins, especially pork, to avoid moisture transfer to items like rice. Additionally, we use specific utensils and equipment based on the oil and ingredients used, catering to dietary preferences such as non-pork options for Muslims and those sensitive to its scent.

The findings reveal a nuanced picture of how restaurants in Cape Coast adhere to or face challenges with regulatory or legal requirements related to food waste management. According to the Manager of Restaurant Q,

Proper food storage poses a significant challenge due to our limited facilities. Unlike my previous experiences at State Hotels in Uganda and

the Grand Imperial Hotel, where multiple cold rooms and chillers were designated for specific items like milk, eggs, fish, and meat, we have only one chiller and one cold room. Additionally, our two deep freezers, split between cooked and uncooked a la carte items, do not allow ideal separation. This lack of space and insufficient equipment hampers our ability to maintain the stringent hygiene and safety standards necessary to prevent cross-contamination, impacting food quality.

The establishments are committed to following guidelines by avoiding cross-contamination of meat and fish, emphasising the need for separate containers. The findings highlight adherence to specific regulations, including the time limit for storing leftover food and the use of plain rubber containers. The consideration of diverse dietary preferences, such as avoiding mixing pork with other foods, reflects an awareness of customer needs.

Conversely, Restaurant Q faces challenges due to limited space and equipment, impacting the ability to segregate food items adequately. This aligns with proper segregation, storage, and disposal practices to prevent food waste and maintain restaurant hygiene standards (Joshi & Visvanathan, 2019; Sucheran & Olanrewaju, 2021; Filimonau et al., 2020). The diverse experiences outlined in these responses emphasise the need for tailored strategies that balance regulatory compliance with practical challenges, shedding light on the intricate nature of food waste management in the restaurant industry.

These findings indicate that restaurants in the Cape Coast Metropolis encounter significant challenges in managing food waste, which are critical to operational efficiency and environmental sustainability. The difficulties primarily stem from infrastructural inadequacies, such as intermittent power

supply and unreliable digital payment networks, which disrupt food storage and increase costs due to the need for alternative storage solutions during outages (Boateng et al., 2021). These challenges are compounded by customer dissatisfaction arising from dietary mismatches, affecting customer retention and contributing to food waste when meals do not meet expectations (Amankwah-Amoah, 2020). Furthermore, spatial constraints in kitchen areas hinder efficient food preparation and storage, exacerbating waste issues (Kwakye et al., 2018). Comparatively, studies suggest that such operational hurdles are not unique to the Cape Coast Metropolis but are also prevalent in other regions, where similar infrastructure deficits and customer management issues impact food waste management (Filimonau & De Coteau, 2020; Mensah & Julien, 2019). These studies show the necessity for targeted interventions that address restaurant management's infrastructural and customer relationship aspects to mitigate food waste effectively.

4.6 Strategies to improve food waste management practices

Improving food waste management involves adopting approaches encompassing various stages of the food supply chain. These include awareness and education, standard portioning, inventory tracking and management and collaboration with local restaurants and organisations. Restaurants in Cape Coast have implemented several strategies to improve food waste management, focusing on environmental hygiene, precise food storage, and inventory control aligned with customer demand. Maintaining cleanliness ensures a safe environment, reducing the risk of contamination and spoilage. Proper storage techniques (such as using refrigerators and freezers appropriately) preserve food quality and extend shelf life, thereby minimizing waste. Additionally, ordering

ingredients based on customer orders prevents overstocking and subsequent spoilage. These practices align with broader industry recommendations, advocating regular inventory audits to optimize purchasing and reduce unnecessary waste.

This section focuses on Objective 4 of the study, which examines strategies to improve food waste management practices among restaurants in the Cape Coast Metropolis. This section contains sub-sections related to the objective that focuses on the restaurant's response to the food waste challenges, collaboration for food waste management, and recommendations to address the challenges.

4.6.1 Restaurants response to the food waste challenges

Restaurants have many responses to the challenge of food waste, with multiple approaches aimed at minimising environmental impact and optimising operational efficiency. Restaurants in Cape Coast respond to these challenges to prevent food waste by practising environmental hygiene, storing food, and ordering ingredients based on the number of orders. According to the chef of Restaurant B,

> *We prioritise carefully storing our foods in the fridge and the deep freezer. Additionally, when a customer orders tea and requests the addition of lemon, we take precautions. Mixing lemon, which contains acid, directly with milk in the tea can cause curdling. To avoid this, we refrain from adding lemon directly to the tea but instead serve it in a separate bowl alongside the tea. This practice is instrumental in preventing waste and ensuring food quality.*

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Moreover, a cook from the Restaurant H also commented,

> *We are aware that customers visit our establishment without prior notice, and as a practice, we consistently maintain a well-kept environment with the necessary materials to ensure hygiene and prevent food wast*e.

Similarly, the supervisor of the restaurant also added,

> *We have successfully addressed the issue of ingredients going to waste by obtaining the seller's contact number. If any of our ingredients run out, we can contact them for timely delivery, allowing us to continue our operations seamlessly while restocking based on the number of orders.*

The findings indicate that restaurants in Cape Coast are adopting diverse strategies to tackle food waste challenges. These responses align with existing literature emphasising the importance of proactive measures to minimise waste and enhance operational sustainability. Practices such as careful food storage, thoughtful menu planning to prevent over-purchasing, and considering the impact of food combinations on quality resonate with the broader principles advocated in studies on food waste reduction. The emphasis on maintaining a well-kept environment, even during unanticipated customer visits, demonstrates a commitment to hygiene standards that can contribute to both waste reduction and customer satisfaction (Wang et al., 2013). Additionally, the collaboration with ingredient suppliers to facilitate timely deliveries aligns with studies recommending efficient supply chain management to reduce the likelihood of food spoilage (Papargyropoulou et al., 2014; Silvennoinen et al., 2015; Aschemann-Witzel et al., 2015). These restaurants' responses reflect a holistic

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understanding of the multifaceted nature of food waste challenges and underscore the importance of tailored context-specific solutions.

4.6.2 Collaboration for food waste management among restaurants

Collaboration among restaurants is an essential step in food waste management strategies. However, the challenge of collaboration for food waste management lies in establishing effective communication channels and fostering a shared commitment to sustainable practices (Martin-Rios et al., 2018; Young et al., 2018). Often, each restaurant operates independently, focusing on its immediate concerns and strategies. Coordinating efforts among various establishments to address food waste collectively demands a level of cooperation, trust, and open communication that may be lacking. From the findings, it was observed that restaurants in Cape Coast Metropolis are incapable of collaborating to reduce food waste because of factors such as competition and the priorities of each establishment. On this, the cook of Restaurant A stated,

> *Coordinating a uniform policy on leftover food management among vendors is challenging due to differing practices—some reuse, recycle or discard leftovers. Enforcing a standard approach is problematic as not all vendors can be compelled to follow specific disposal or reuse methods. If a collective policy mandates disposal, it could lead to increased waste. Alternatively, promoting reuse might raise the risk of contaminated foods, particularly perishable dishes like 'waakye.' This disparity in compliance is further complicated by individual priorities, with some vendors focusing on personal benefits over collective guidelines.*

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Moreover, a cook at Restaurant C also made the following comments:

> *As restaurant operators, our collaboration hinges on strict adherence to regulations and regular training on waste reduction. Through these initiatives, we strive for uniformity across establishments. Our recent association meeting discussed handling scenarios where customers cannot finish their meals. A common practice is to package these leftovers for customers to purchase, aligning with their preferences and effectively minimizing food waste in our restaurants.*

Also, the Food and Beverage Manager of Restaurant Q made the following comments:

> *Creating effective collaboration might be challenging; however, if regulatory bodies such as the Food and Drugs Authority and other authorities could enforce a la carte service and portion control, food waste in restaurants and kitchens could be significantly minimised if not eliminated.*

The findings underscore the complex dynamics and challenges associated with achieving collaboration among restaurants for effective food waste management. Studies support the notion that establishing shared commitments and effective communication channels is crucial for collaborative efforts in waste reduction (Pearson & Perera, 2018; Young et al., 2018). The identified challenges in Cape Coast Metropolis, such as competition, varied priorities, and concerns about differing choices in leftover food management, resonate with existing studies.

4.6.3 Potential Strategies and Impact of Training for Improving Food Waste Management

This section provides insights into the potential strategies suggested by the respondents for improving food waste management in Cape Coast. The respondents suggested incorporating leftover food, proper food preservation, adoption of cost-incurrence and portion control, and training as potential strategies to improve food waste management among restaurants in the metropolis. A cook at Restaurant A shared her opinion on ways to improve food safety by incorporating leftover food. According to her,

> *Based on my experience, if there is leftover soup from the previous day, a practical suggestion is to incorporate it into the preparation for the current day by reducing the quantity accordingly, thus avoiding unnecessary disposal. Similarly, for plain rice, the leftover portion can be stored in the fridge and reheated using a microwave the following day, providing an opportunity to sell it to customers instead of discarding it.*

The chef of Restaurant D also suggested that,

> *Our primary goal is to preserve food to minimize wastage effectively. This involves correct storage, with specific items designated for the fridge and others for the freezer, to prevent cross-contamination. For example, vegetables and meats must be stored separately, and fish, fruits, and drinks should not be mixed due to their differing temperature requirements. We address these challenges using separate fridges and freezers for various product types. Moreover, the careful preparation of food is crucial. When serving customers, it is important to cater to their*

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preferences and health, prioritizing their well-being over mere financial

transactions and ensuring the food sold is safe to consume.

By emphasising the economic repercussions of excess cooking and waste, this approach encourages kitchen staff to be more mindful of their cooking techniques and portion control. This aligns with the broader theme observed in the findings, highlighting the importance of strategic measures and awareness in preventing food waste (Diaz-Ruiz et al., 2019). The cost-incurrence strategy addresses economic concerns and is a practical tool to promote efficiency and sustainability in restaurant operations.

Furthermore, controlling portion sizes and wisely sourcing food items were suggested as potential ways to reduce food waste. The food and beverage manager of Restaurant Q emphasised that,

Controlling portion sizes and mindful sourcing are essential to reducing food waste, a point I have stressed to management. Losses often start during the purchasing phase, particularly with inappropriate buying decisions. For instance, when sourcing fish from Elmina, where it arrives fresh, we utilize every part of the fish, including the head, to minimize waste. However, fish from Tema may require trimming spoilage-prone parts upon arrival, leading to waste. If I owned a restaurant, I would adopt a meticulous approach to purchasing. For example, selecting specific cuts like goat shoulder or leg can reduce waste compared to buying indiscriminately. Purchasing the entire animal with a cow offering about 17 distinct cuts is often unnecessary. Strategic purchasing extends to vegetables, such as choosing peeled

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over unpeeled cabbage and avoiding bulk purchases based on weight

alone. Making informed buying choices is crucial to curbing food waste.

The findings above underscore a range of practical and strategic recommendations from respondents to enhance restaurant food waste management, aligning with existing literature on sustainable practices in the food industry. Incorporating leftover food reflects a pragmatic approach to utilising surplus items in ongoing preparations, minimising unnecessary disposal. The emphasis on proper food preservation, avoidance of cross-contamination, and conscientiousness of those preparing food resonate with established food safety and hygiene principles. The recommendation for a cost-incurrence strategy aligns with economic considerations and financial incentives to discourage overcooking and waste (Canalie et al., 2016; Bos-Brouwers et al., 2014). Collectively, these suggestions contribute to a holistic and sustainable approach to food waste reduction in restaurant operations.

Furthermore, the findings also reveal that some restaurants in Cape Coast Metropolis actively engage in training and awareness programmes, primarily organised by health management bodies and regulatory authorities such as the Ghana Food and Drugs Authority. These programmes focus on various aspects, including food preservation, kitchen hygiene, cleanliness, and waste disposal. The manager of Restaurant G highlights the importance of regular checks by health management personnel, emphasising cleanliness and tidiness and explicitly focusing on waste disposal practices. The manager of Restaurant L indicates that workshops organised by the Ghana Food and Drugs Authority cover various topics related to restaurant operations, including food preservation, kitchen cleaning, and staff-customer relationships. Additionally,

the supervisor and the food and beverage manager of Restaurant P and Q describe in-house training sessions conducted by the restaurant. These internal training sessions occur regularly and involve both kitchen and restaurant staff, demonstrating a commitment to continuous improvement and addressing specific challenges, such as food cost management. The findings underscore the significance of ongoing training and awareness initiatives in shaping the practices of restaurant staff, aligning with studies emphasising the importance of education and knowledge-sharing to enhance food safety and waste reduction measures in the food industry (Leal Filho et al., 2021; Evans & Welch, 2015).

4.7 Chapter Summary

The chapter presented findings from a study on the Cape Coast Metropolitan Area restaurant industry, offering insights into the socio-demographic characteristics of 17 respondents, including cooks, waitresses, and managers. It highlighted the industry's adaptability to customer preferences, as evidenced by a diverse menu spectrum and pragmatic strategies like eliminating fixed menus to navigate pricing challenges. Additionally, it delves into food waste disposal practices, identifying sources like kitchen errors and unfinished meals and proposing mitigation measures such as portion control and improved customer communication. Despite diverse disposal practices, the lack of standardisation underscores implications for environmental sustainability. Strategies for food waste reduction, including portion control, temperature management, and strategic procurement, were discussed, along with challenges such as prepaid credit network issues and limited kitchen space. Moreover, the study outlined recommendations for enhancing food waste management, including awareness campaigns, standard portioning, inventory

tracking, and collaboration with local establishments. It addressed challenges like competition and varied priorities hindering collaborative efforts, suggesting solutions such as incorporating leftover food and training programmes organised by health authorities. Practical recommendations stressed strategic purchasing, mindful cooking, and internal training to reduce food waste effectively.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The main aim of this study is to assess the food waste management practices among restaurants in Cape Coast. This chapter presents the summary of findings and provides conclusions and recommendations based on the study results.

5.2 Overview of the Study

This study assessed food waste management practices among restaurants in Cape Coast. Specifically, it examined the food waste disposal practices, food waste reduction strategies, challenges in managing food waste, and the strategies to improve food waste management practices among restaurants in Cape Coast. The study used the qualitative approach, selecting and interviewing 17 respondents, including cooks, waitresses, and hotel restaurant managers, using a purposive sampling technique. The summary of the findings is presented below.

5.3 Summary of Key Findings

The findings indicated that most respondents were women, a common characteristic in Ghana's restaurant and hospitality industry. There was a vast knowledge and versatility among the respondents, with some having over 15 years of working experience. The restaurants were found to offer different types of dishes ranging from Ghanaian to continental dishes to meet customers' preferences. Some restaurants operated without a fixed menu in response to pricing challenges to meet quotas and market dynamics.

It was found that restaurants dispose of waste through external waste collection, internal segregation, burning, dustbin use, and waste disposal in gutters. It was found that kitchen errors, unfinished customer meals, and surplus vegetables contributed to restaurant waste generation. Customer interactions also play a crucial role in waste generation, as some customers leave their food due to long waiting times. Complaints about food quantity, pricing, and quality were also identified as customer issues in these restaurants. There was a lack of standards and regulations specifying waste disposal practices among restaurants in Cape Coast.

Furthermore, portion control emerged as a crucial strategy to reduce food waste, with restaurants tailoring orders to customer preferences and adjusting quantities for regular patrons. Temperature management methods like slow cooking and simmering were also found to prevent burning and reduce food waste. The strategic procurement of ingredients in controlled quantities, cost incurrence to cooks or chefs, and storing leftover food were additional measures to combat food waste. Motivations, mainly economic factors, were found to drive these strategies, ensuring the financial sustainability and profitability of the restaurants.

Moreover, the challenges the restaurants faced were difficulties related to prepaid credit network problems and power outages, regulatory and legal challenges, customer dissatisfaction with food, limited kitchen space, and the portion control strategy that had created challenges in maintaining a consistent food supply during peak hours to managing food waste.

Lastly, various strategies were recommended to enhance food waste management practices in the Cape Coast Metropolis. These included promoting

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awareness and education, implementing standard portioning, tracking inventory, and encouraging collaboration with local restaurants and organizations.

5.4 Conclusions

The following conclusions were made based on the summary of key findings of the study:

a. Restaurants in Cape Coast exhibit diverse food waste management practices, including external waste collection, internal segregation, dumping at the site and disposal in gutters. These practices show the absence of standardized regulations in waste disposal among restaurants in the Metropolis.

b. Food waste reduction strategies include careful food storage, menu planning, type of services operated, collaboration with suppliers, cost-incurrence, portion control, and training programmes for staff of restaurants in Cape Coast. These strategies emphasize the importance of strategic decision-making and internal training for effective waste reduction.

c. Food waste reduction strategies in Cape Coast restaurants, such as portion control, A la carte service and temperature management, were economically motivated and effective, leading to reduced waste and positive financial outcomes.

d. Challenges faced by restaurants in managing food waste include prepaid credit network problems, power outages, customer dissatisfaction, legal and regulatory challenges, and limited kitchen space.

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e. Food waste management practices among Cape Coast Metropolis restaurants can be enhanced by promoting awareness, implementing standard portioning, tracking inventory, and fostering collaboration among local restaurants despite competition and differing priorities.

5.5 Recommendations

The following recommendations were made for the study based on the summary and conclusions.

- Restaurant owners and operators should implement comprehensive training programs for their staff, focusing on sustainable waste management practices. These programs should cover proper food storage, waste segregation, and efficient food preparation techniques. Additionally, periodic workshops led by waste management experts can reinforce the importance of these practices.

- Stakeholders, including local government and restaurant associations, could collaborate to organize an annual 'Waste Reduction Week'. This campaign would encourage restaurants to participate in activities that promote effective waste reduction strategies, such as cooking demonstrations, menu planning sessions, and discussions on best practices in waste management. This initiative can serve as both an educational tool and a way to commend restaurants for their waste reduction efforts publicly.

- The local government and restaurant associations should create a certification program that recognises and rewards restaurants for excellent waste management practices. This program could include criteria such as minimal waste production, innovative waste reduction

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strategies, and practical training programs. Certification could lead to benefits such as tax incentives, recognition in local media, and increased customer trust.

- Restaurants should be encouraged to partner with environmental NGOs or waste management companies to conduct regular waste audits. These audits can help identify specific areas of improvement and develop customized action plans. Educational materials and resources should be provided to assist in implementing these plans, ensuring continuous improvement in food waste management practices.

5.6 Limitations of the Study

The study on food waste management in Cape Coast restaurants may have several limitations. Firstly, the diversity in management practices and types of restaurants could lead to variability in the applicability and effectiveness of observed strategies. Secondly, relying on self-reported data from restaurant owners and operators might introduce bias or inaccuracies in reporting waste management practices and outcomes. The study's focus on a single geographic region limits its generalizability to other contexts with different cultural, economic, and regulatory environments. Lastly, the absence of a longitudinal approach restricts the ability to observe the long-term impacts and sustainability of the implemented waste reduction strategies.

5.7 Suggestions for Future Studies

Future studies on food waste management in the restaurant industry should focus on quantifying the economic impact of waste reduction strategies to build a compelling business case for their adoption. Research could also explore the effectiveness of technology-driven solutions, like innovative

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inventory management systems and IoT-enabled waste tracking tools, in reducing waste. Additionally, comparative studies between different geographic regions or varying scales of restaurant operations could provide insights into the adaptability and scalability of successful waste management practices. It is crucial to investigate the psychological and behavioural factors influencing both staff and customer attitudes towards food waste, as understanding these aspects can lead to more effective educational campaigns and policymaking.

REFERENCES

Abubakar, S. (2018). *Eco-Friendly Packaging in Restaurants in Accra-Application, Attitudes and Challenges* (Doctoral dissertation).

Addai, M. (2021). Assessing the causes and effects of food loss and food waste. A comparative analysis of Ghana and Sweden. (*Master Thesis Series in Environmental Studies and Sustainability Science)*.

Ahlroth, S., Nilsson, M., Finnveden, G., Hjelm, O., & Hochschorner, E. (2011). Weighting and valuation in selected environmental systems analysis tools–suggestions for further developments. *Journal of Cleaner Production*, *19*(2-3), 145-156.

Akkerman, R., Buisman, M., Cruijssen, F., de Leeuw, S., & Haijema, R. (2023). Dealing with donations: Supply chain management challenges for food banks. *International Journal of Production Economics*, 108926.

Ali, S. M., Moktadir, M. A., Kabir, G., Chakma, J., Rumi, M. J. U., & Islam, M. T. (2019). Framework for evaluating risks in food supply chain: Implications in food wastage reduction. *Journal of cleaner production*, *228*, 786-800.

Aschemann-Witzel, J., de Hooge, I., Amani, P., Bech-Larsen, T., & Oostindjer, M. (2015). Consumer-Related Food Waste: Causes and Potential for Action. *Sustainability*, *7*(6), 6457–6477.

Aytaç, K., & Korçak, Ö. (2021). IoT based intelligence for proactive waste management in Quick Service Restaurants. *Journal of Cleaner Production*, *284*, 125401.

Baffour-Awuah, E. (2014). The state of a 'choked'lagoon: A two-decade overview of the Fosu lagoon in Cape Coast, Ghana. *channels*, *5*(17).

Ballester, E., Ruiz-Mafé, C., & Rubio, N. (2022). Females' customer engagement with eco-friendly restaurants in Instagram: the role of past visits. *International Journal of Contemporary Hospitality Management*, (ahead-of-print).

Bardukova, L. (2023). Navigating the Hospitality Horizon: Current Trends and Strategies for Customer Attraction and Retention in the Hotel Industry. *Economics and computer science*, *2*, 88-103.

Beretta, C., Stoessel, F., Baier, U., & Hellweg, S. (2013). Quantifying food losses and the potential for reduction in Switzerland. *Waste management*, *33*(3), 764-773.

Bergel, M., & Brock, C. (2019). Visitors' loyalty and price perceptions: The role of customer engagement. *The Service Industries Journal*, *39*(7-8), 575-589.

Berjan, S., Mrdalj, V., El Bilali, H., Velimirovic, A., Blagojevic, Z., Bottalico, F., Debs, P., & Capone, R. (2019). Household food waste in Montenegro. *Italian Journal of Food Science*, *31*(2), 274 – 287.

Blum, D. (2020). Ways to reduce restaurant industry food waste costs. *International Journal of Applied Management and Technology*, *19*(1), 1.

Boys, J. T., Covic, G. A., & Green, A. W. (2000). Stability and control of inductively coupled power transfer systems. *IEE Proceedings-Electric Power Applications*, *147*(1), 37-43.

Branchini, L. (2015). *Waste-to-energy: advanced cycles and new design concepts for efficient power plants*. Springer.

Brancoli, P., Rousta, K., & Bolton, K. (2017). Life cycle assessment of supermarket food waste. *Resources, Conservation and Recycling*, *118*, 39-46.

Buzby, J. C., & Hyman, J. (2012). Total and per capita value of food loss in the United States. *Food policy*, *37*(5), 561-570.

Caldeira, C., De Laurentiis, V., Corrado, S., van Holsteijn, F., & Sala, S. (2019). Quantification of food waste per product group along the food supply chain in the European Union: A mass flow analysis. *Resources, Conservation and Recycling*, *149*, 479-488.

Charlebois, S., Creedy, A., & von Massow, M. (2015). "Back of house"– focused study on food waste in fine dining: the case of Delish restaurants. *International Journal of Culture, Tourism and Hospitality Research*.

Chen, H. S., & Jai, T. M. (2018). Waste less, enjoy more: Forming a messaging campaign and reducing food waste in restaurants. *Journal of Quality Assurance in Hospitality & Tourism*, *19*(4), 495-520.

Chomba, S. (2022). 3 ways to tackle Food Loss and Waste in Africa. *World Resources Institute.* Retrieved from https://www.wri.org/insights/3-ways-reduce-food-loss-waste-africa.

Cudjoe, D., Nketiah, E., Obuobi, B., Adu-Gyamfi, G., Adjei, M., & Zhu, B. (2021). Forecasting the potential and economic feasibility of power generation using biogas from food waste in Ghana: Evidence from Accra and Kumasi. *Energy*, *226*, 120342.

David, V. E., John, Y., & Hussain, S. (2020). Rethinking sustainability: a review of Liberia's municipal solid waste management systems, status, and challenges. *Journal of Material Cycles and Waste Management*, *22*, 1299-1317.

Demetry, D. (2013). Regimes of meaning: The intersection of space and time in kitchen cultures. *Journal of Contemporary Ethnography*, *42*(5), 576-607.

Derwent, R. G., Utembe, S. R., Jenkin, M. E., Khan, M. A. H., & Shallcross, D. E. (2023). Investigating the role of organic compounds in intercontinental ozone transport: Reactivity scales and Global Warming Potentials (GWPs). *Atmospheric Environment*, *306*, 119817.

Drangert, J.O. (2018). A Systems Approach to Secure Food, Good Health and a Healthy Environment. *Journal of Nutrition and Public Health*, *1*(10001), 1–5.

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics*, *5*(1), 1-4.

European Union. (1975). *Council Directive 75/442/EEC of 15 July 1975 on waste*. Official Journal L 194, 25/07/1975, 0039–0041. Retrieved from EUR-Lex. https://eur-lex.europa.eu/

Filimonau, V., Fidan, H., Alexieva, I., Dragoev, S., & Marinova, D. D. (2019). Restaurant food waste and the determinants of its effective management in Bulgaria: An exploratory case study of restaurants in Plovdiv. *Tourism Management Perspectives*, *32*, 100577.

Filimonau, V., Matute, J., Kubal-Czerwińska, M., Krzesiwo, K., & Mika, M. (2020). The determinants of consumer engagement in restaurant food waste mitigation in Poland: An exploratory study. *Journal of Cleaner Production*, *247*, 119105.

Filimonau, V., Todorova, E., Mzembe, A., Sauer, L., & Yankholmes, A. (2020). A comparative study of food waste management in full service restaurants of the United Kingdom and the Netherlands. *Journal of Cleaner Production*, *258*, 120775.

Fitch-Roy, O., Benson, D., & Monciardini, D. (2020). Going around in circles? Conceptual recycling, patching, and policy layering in the EU circular economy package. *Environmental Politics*, *29*(6), 983-1003.

Food and Agricultural Organisation (FAO). (2013). *Food Wastage Footprint; Impacts on Natural Resources Summary Report*. Retrieved from https://reliefweb.int/attachments/d33f0b55-b8c0-3843-a3fc-9d4788c4240a/i3347e.pdf

Food and Agriculture Organization of the United Nations. (2014). Global Initiative on Food Losses and Waste Reduction. Available online: http://www.fao.org/3/a-i4068e.pdf.

Freedman, M. R., & Brochado, C. (2010). Reducing portion size reduces food intake and plate waste. *Obesity*, *18*(9), 1864-1866.

Ghana Statistical Service. (2021). *General Report Volume 3A Population of Regions and District.* Accra.

Ghana Tourism Authority. (2023). *List of Restaurants in Cape Coast*. Cape Coast.

109

Gładysz, B., Buczacki, A., & Haskins, C. (2020). Lean management approach to reduce waste in HoReCa food services. *Resources*, *9*(12), 144.

Goh, E., & Jie, F. (2019). To waste or not to waste: Exploring motivational factors of Generation Z hospitality employees towards food wastage in the hospitality industry. *International Journal of Hospitality Management*, *80*, 126-135.

Guidoni, L. L. C., Marques, R. V., Moncks, R. B., Botelho, F. T., da Paz, M. F., Corrêa, L. B., & Corrêa, É. K. (2018). Home composting using different ratios of bulking agent to food waste. *Journal of environmental management*, *207*, 141-150.

Gyeduah, C. (2020). *Examining solid waste management practices in food service sector of Ghana. A case study of Sunyani municipality* (Doctoral dissertation, University of Education-Winneba).

Gyimah, P., Mariwah, S., Antwi, K. B., & Ansah-Mensah, K. (2021). Households' solid waste separation practices in the Cape Coast Metropolitan area, Ghana. *GeoJournal*, *86*(2), 567-583.

Haddad, A., Harb, A., Abujeish, F., Manaseer, N., & Shalash, O. (2022). Quantifying odour impacts from aged organic waste to be considered as a priority constraint in route optimisation for waste collection trucks. *Waste Management & Research*, 0734242X221122574.

Han, H. (2020). Theory of green purchase behavior (TGPB): A new theory for sustainable consumption of green hotel and green restaurant products. *Business Strategy and the Environment*, *29*(6), 2815-2828.

110

Hashim, A. A., Kadir, A. A., Ibrahim, M. H., Halim, S., Sarani, N. A., Hassan, M. I. H., ... & Hissham, N. F. N. (2021, May). Overview on food waste management and composting practice in Malaysia. In *AIP Conference Proceedings* (Vol. 2339, No. 1, p. 020181). AIP Publishing LLC.

Hegnsholt, E., Unnikrishnan, S., Pollmann-Larsen, M., Askelsdottir, B., & Gerard, M. (2018). Tackling the 1.6-billion-ton food loss and waste crisis. *The Boston Consulting Group, Food Nation, State of Green*.

Heikkilä, L., Reinikainen, A., Katajajuuri, J. M., Silvennoinen, K., & Hartikainen, H. (2016). Elements affecting food waste in the food service sector. *Waste Management*, 56, 446–453.

Henderson, J. (2017). *Guest Commentary – Food Waste: Breaking Down the Issue that won't Break Down.* The Council Global Food and Agriculture Program

Hennchen, B. (2019). Knowing the kitchen: Applying practice theory to issues of food waste in the food service sector. *Journal of Cleaner Production*, *225*, 675-683.

Hildebrandt, F. D., & Ulmer, M. W. (2022). Supervised learning for arrival time estimations in restaurant meal delivery. *Transportation Science*, *56*(4), 1058-1084.

Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., ... & Law, K. L. (2015). Plastic waste inputs from land into the ocean. *Science*, *347*(6223), 768-771.

Karnesh, S., Krishna, P. R., Jothi Sankar, S., Irshath, A. A., & Rajan, A. P. (2023). Review on Facilitation of Surplus Food Redistribution Using Mobile Applications. *International Journal of Research and Analytical Reviews (IJRAR)*, 10(2), 676-688.

Kim, J., Rundle-Thiele, S., & Knox, K. (2019). Systematic literature review of best practice in food waste reduction programs. *Journal of Social Marketing*, *9*(4), 447-466.

Kowalski, Z., Kulczycka, J., Makara, A., & Harazin, P. (2021). Quantification of material recovery from meat waste incineration–An approach to an updated food waste hierarchy. *Journal of Hazardous Materials*, *416*, 126021.

Kuusaana, E. D., & Eledi, J. A. (2015, December). As the city grows, where do the farmers go? Understanding Peri-urbanization and food systems in Ghana-Evidence from the Tamale Metropolis. In *Urban Forum* (Vol. 26, No. 4, pp. 443-465). Dordrecht: Springer Netherlands.

Lau, K. Q., Sabran, M. R., & Shafie, S. R. (2021). Utilisation of vegetable and fruit by-products as functional ingredient and food. *Frontiers in nutrition*, *8*, 661693.

Lazell, J. (2016). Consumer food waste behaviour in universities: Sharing as a means of prevention. *Journal of Consumer Behaviour*, *15*(5), 430-439.

Leal Filho, W., Lange Salvia, A., Davis, B., Will, M., & Moggi, S. (2021). Higher education and food waste: assessing current trends. *International Journal of Sustainable Development & World Ecology*, *28*(5), 440-450.

Lemos, L. (2019, March 4). *Uncovering the kitchen of the future at GRIF 2019. Winnow Solutions*. Retrieved from https://blog.winnowsolutions. com/uncovering-the-kitchen-of-the-future-at-grif-2019.

Liang, Y., Song, Q., Liu, G., & Li, J. (2021). Uncovering residents and restaurants' attitude and willingness toward effective food waste management: a case study of Macau. *Waste Management*, *130*, 107-116.

Liu, H., Gómez-Miñambres, J., & Qi, D. (2022). Menu-dependent food choices and food waste. *Resources, Conservation and Recycling*, *176*, 105919.

Liu, T., Juvan, E., Qiu, H., & Dolnicar, S. (2022). Context-and culture-dependent behaviors for the greater good: a comparative analysis of plate waste generation. *Journal of Sustainable Tourism*, *30*(6), 1200-1218.

Mahesh Kumar, G., Irshad, A., Raghunath, B. V., & Rajarajan, G. (2016). Waste management in food packaging industry. *Integrated Waste Management in India: Status and Future Prospects for Environmental Sustainability*, 265-277.

Maitre-Ekern, E. (2021). Re-thinking producer responsibility for a sustainable circular economy from extended producer responsibility to pre-market producer responsibility. *Journal of Cleaner Production*, *286*, 125454.

Martin-Rios, C., Demen-Meier, C., Gössling, S., & Cornuz, C. (2018). Food waste management innovations in the foodservice industry. *Waste management*, *79*, 196-206.

Martin-Rios, C., Hofmann, A., & Mackenzie, N. (2020). Sustainability-oriented innovations in food waste management technology. *Sustainability*, *13*(1), 210.

McAdams, B., von Massow, M., Gallant, M., & Hayhoe, M. A. (2019). A cross industry evaluation of food waste in restaurants. *Journal of Foodservice Business Research*, *22*(5), 449-466.

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

Mendedo, E. K., Berhane, Y., & Haile, B. T. (2017). Factors associated with sanitary conditions of food and drinking establishments in Addis Ababa, Ethiopia: cross-sectional study. *Pan African Medical Journal*, *28*(1).

Merkle, E. (2021). *Barriers and Incentives for Food Waste Reduction: A Case Study of NYC Restaurants* (Doctoral dissertation, Central European University).

Milios, L., & Dalhammar, C. (2020). Ascending the waste hierarchy: Re-use potential in Swedish recycling centres. *Detritus*, *9*, 27-37.

Mukherjee, C., Denney, J., Mbonimpa, E. G., Slagley, J., & Bhowmik, R. (2020). A review on municipal solid waste-to-energy trends in the USA. *Renewable and Sustainable Energy Reviews*, *119*, 109512.

Narasimmalu, A., & Ramasamy, R. (2020, November). Food Processing Industry Waste and Circular Economy. In *IOP Conference Series: Materials Science and Engineering* (Vol. 955, No. 1, p. 012089). IOP Publishing.

Negri, C., Ricci, M., Zilio, M., D'Imporzano, G., Qiao, W., Dong, R., & Adani, F. (2020). Anaerobic digestion of food waste for bio-energy production in China and Southeast Asia: A review. *Renewable and Sustainable Energy Reviews*, *133*, 110138.

Ng, P. Y., & Sia, J. K. M. (2023). Managers' perspectives on restaurant food waste separation intention: The roles of institutional pressures and internal forces. *International Journal of Hospitality Management*, *108*, 103362.

Nguyen, T. H. (2022). Guideline for food waste reduction in Hospitality Industry-Study Case: Hotel F6, Helsinki (*Bachelor's Thesis, Haaga-Helia University of Applied Sciences*).

Nickerson, C. (2022). Interpretivism paradigm & research philosophy. *Simply Sociology*, *5*.

Nikiema, J., Asamoah, B., Egblewogbe, M. N., Akomea-Agyin, J., Cofie, O. O., Hughes, A. F., ... & Njenga, M. (2022). Impact of material composition and food waste decomposition on characteristics of fuel briquettes. *Resources, Conservation & Recycling Advances*, *15*, 200095.

Obuobi, B., Zhang, Y., Adu-Gyamfi, G., Nketiah, E., Grant, M. K., Adjei, M., & Cudjoe, D. (2022). Fruits and vegetable waste management behavior among retailers in Kumasi, Ghana. *Journal of Retailing and Consumer Services*, *67*, 102971.

O'Connor, J., Mickan, B. S., Rinklebe, J., Song, H., Siddique, K. H., Wang, H., ... & Bolan, N. S. (2022). Environmental implications, potential value, and future of food-waste anaerobic digestate management: A review. *Journal of Environmental Management*, *318*, 115519.

O'Hare, P. (2017). *Recovering requeche and classifying clasificadores: An ethnography of hygienic enclosure and Montevideo's waste commons* (Doctoral dissertation, University of Cambridge).

115

Ohene-Darko, S. (2018). *Food safety governance in the Cape Coast Metropolis, Ghana* (Doctoral dissertation, University of Cape Coast).

Oishi, R. (2019). Food loss and waste in Japan. *New Food Industry*, *61*(12), 908-914.

Okumus, B. (2020). How do hotels manage food waste? Evidence from hotels in Orlando, Florida. *Journal of Hospitality Marketing & Management*, *29*(3), 291-309.

Osei-Tutu, B. (2018). Evaluation of food safety management systems of food service establishments within the greater Accra region. *International Journal of Nutrition and Food Engineering*, *12*(1), 17-21.

Papargyropoulou, E., Lozano, R., Steinberger, J. K., Wright, N., & bin Ujang, Z. (2014). The food waste hierarchy as a framework for the management of food surplus and food waste. *Journal of cleaner production*, *76*, 106-115.

Papargyropoulou, E., Steinberger, J. K., Wright, N., Lozano, R., Padfield, R., & Ujang, Z. (2019). Patterns and causes of food waste in the hospitality and food service sector: Food waste prevention insights from Malaysia. *Sustainability*, *11*(21), 6016.

Paritosh, K., Kushwaha, S. K., Yadav, M., Pareek, N., Chawade, A., & Vivekanand, V. (2017). Food waste to energy: an overview of sustainable approaches for food waste management and nutrient recycling. *BioMed research international.*

Patnaik, S. & Pandey, S.C. (2019). Case Study Research. In Subudhi, R.N. & Mishra, S. (Ed.), *Methodological Issues in Management Research: Advances, Challenges, and the Way Ahead*. Bingley: Emerald Publishing Limited, 163-179.

Pinto, R. S., dos Santos Pinto, R. M., Melo, F. F. S., Campos, S. S., & Cordovil, C. M. D. S. (2018). A simple awareness campaign to promote food waste reduction in a university canteen. *Waste management*, *76*, 28-38.

Pirani, S. I., & Arafat, H. A. (2016). Reduction of food waste generation in the hospitality industry. *Journal of cleaner production*, *132*, 129-145.

Pires, A., & Martinho, G. (2019). Waste hierarchy index for circular economy in waste management. *Waste Management*, *95*, 298-305.

Priefer, C., Jörissen, J., & Bräutigam, K. R. (2016). Food waste prevention in Europe–A cause-driven approach to identify the most relevant leverage points for action. *Resources, Conservation and Recycling*, *109*, 155-165.

Principato, L., Pratesi, C. A., & Secondi, L. (2018). Towards zero waste: An exploratory study on restaurant managers. *International Journal of Hospitality Management*, *74*, 130-137.

Ratliff, A. (2023). *Strategies to Reduce Food Waste in Restaurants* (Doctoral dissertation, Walden University).

Redlingshöfer, B., Barles, S., & Weisz, H. (2020). Are waste hierarchies effective in reducing environmental impacts from food waste? A systematic review for OECD countries. *Resources, Conservation and Recycling*, *156*, 104723.

117

Riesenegger, L., & Hübner, A. (2022). Reducing food waste at retail stores—An explorative study. *Sustainability*, *14*(5), 2494.

Sakaguchi, L., Pak, N., & Potts, M. D. (2018). Tackling the issue of food waste in restaurants: Options for measurement method, reduction, and behavioral change. *Journal of Cleaner Production*, *180*, 430-436.

Sánchez, A. (2022). Decentralised composting of food waste: a perspective on scientific knowledge. *Frontiers in Chemical Engineering*, *4*, 38.

Saric, N. (2019). *Restaurant Waste Management; Perception of Restaurant Managers on the New Practices and Challenges in Dubrovnik*. RIT.

Saunois, M., Stavert, A. R., Poulter, B., Bousquet, P., Canadell, J. G., Jackson, R. B., ... & Zhuang, Q. (2020). The global methane budget 2000–2017. *Earth system science data*, *12*(3), 1561-1623.

Sauve, G., & Van Acker, K. (2020). The environmental impacts of municipal solid waste landfills in Europe: A life cycle assessment of proper reference cases to support decision making. *Journal of environmental management*, *261*, 110216.

Schinkel, J. (2019, August). Review of policy instruments and recommendations for effective food waste prevention. In *Proceedings of the institution of civil engineers-waste and resource management* (Vol. 172, No. 3, pp. 92-101). Thomas Telford Ltd.

Scottish Government. (2013). Guidance on applying the waste hierarchy. Retrieved from https://www.gov.scot/publications/guidance-applying-waste-hierarchy/. (Accessed 24-05-2023)

Seberini, A. (2020). Economic, social, and environmental world impacts of food waste on society and zero waste as a global approach to their elimination. In *SHS Web of Conferences* (Vol. 74, p. 03010). EDP Sciences.

Seidu, J. A. (2020). *Food safety knowledge and practices of food handlers in restaurants in the tamale metropolis, Ghana* (Doctoral dissertation, University of Cape Coast).

Sharma, H. B., Vanapalli, K. R., Cheela, V. S., Ranjan, V. P., Jaglan, A. K., Dubey, B., ... & Bhattacharya, J. (2020). Challenges, opportunities, and innovations for effective solid waste management during and post COVID-19 pandemic. *Resources, conservation, and recycling*, *162*, 105052.

Sheahan, M., & Barrett, C. B. (2017). Food loss and waste in Sub-Saharan Africa: A critical review. *Food Policy*, *70*, 1–12.

Sheets, J. P., Yang, L., Ge, X., Wang, Z., & Li, Y. (2015). Beyond land application: Emerging technologies for the treatment and re-use of anaerobically digested agricultural and food waste. *Waste Management*, *44*, 94-115.

Shooshtarian, S., Maqsood, T., Wong, P. S., Khalfan, M., & Yang, R. J. (2021). Extended producer responsibility in the Australian construction industry. *Sustainability*, *13*(2), 620.

Silvennoinen, K., Heikkilä, L., Katajajuuri, J. M., & Reinikainen, A. (2015). Food waste volume and origin: Case studies in the Finnish food service sector. *Waste management*, *46*, 140-145.

Singh, P., & Sharma, V. P. (2016). Integrated plastic waste management: environmental and improved health approaches. *Procedia Environmental Sciences*, *35*, 692-700.

Sisson, L. G. (2016). Food recovery program at farmers' markets increases access to fresh fruits and vegetables for food insecure individuals. *Journal of Hunger & Environmental Nutrition*, *11*(3), 337-339.

Sloan, P., Legrand, W., & Chen, J. S. (2014). Factors influencing German Restaurants' attitudes toward environmental management. *Advances in the Hospitality and Leisure*, 1, 179-188.

Soori, M., Arezoo, B., & Dastres, R. (2023). Internet of things for smart factories in industry 4.0, a review. *Internet of Things and Cyber-Physical Systems*, 3, 192 – 204.

Srijuntrapun, P., Sukwong, P., & Marshall, A. (2022). The role of food waste hierarchy as Thai hotels seeks to fulfill their corporate social responsibility. *Heliyon*, *8*(10), e11201.

Sucheran, S., & Olanrewaju, O. A. (2021). Food waste management of restaurants in Kwazulu-Natal, South Africa. In *Proceedings of the International Conference on Industrial Engineering and Operations Management* (pp. 58-69).

Thamagasorn, M., & Pharino, C. (2019). An analysis of food waste from a flight catering business for sustainable food waste management: A case study of halal food production process. *Journal of Cleaner Production*, *228*, 845-855.

Thomas, A., & Turk, R. (2023). Food insecurity in Nigeria: Food supply matters. *IMF Selected Issues Paper:* Washington, DC, USA.

Van Ewijk, S., & Stegemann, J. A. (2016). Limitations of the waste hierarchy for achieving absolute reductions in material throughput. *Journal of Cleaner Production*, *132*, 122-128.

Waste and Resources Action Programme (WRAP). (2017). Overview of waste in the hospitality and food service sector. Banbury: WRAP. Available from: http://www.wrap.org.uk/content/overview-waste-hospitality-and-food-service-sector.

Wen, Z., Hu, S., Clercq, D., Beck, M, B., Zhang, H., Zhang, H., Fei, F. & Liu, J. (2018). Design, Implementation, and Evaluation of an Internet of Things (loT) Network System for Restaurant Food Waste Management. *Waste Management*, 73, 26-38.

Wilkinson, D. (1999). Time to discard the concept of waste?. *Environmental Law Review*, *1*(3), 172-195.

Wilkinson, D. (2002). Waste Law, in: *Waste in Ecological Economics*. Edward Elgar Publishing, pp. 101–113.

WRAP. (2013). *Overview of waste in the hospitality and food service sector*. Waste and Resources Action Programme. Retrieved from https://wrap.org.uk

Wu, C. M. E., & Teng, C. C. (2023). Reducing Food Waste in Buffet Restaurants: A Corporate Management Approach. *Foods*, *12*(162), 1–12.

Yeo, J., Chopra, S. S., Zhang, L., & An, A. K. (2019). Life cycle assessment (LCA) of food waste treatment in Hong Kong: On-site fermentation methodology. *Journal of environmental management*, *240*, 343-351.

Zhang, C., Hu, M., Di Maio, F., Sprecher, B., Yang, X., & Tukker, A. (2022). An overview of the waste hierarchy framework for analysing the circularity in construction and demolition waste management in Europe. *Science of the Total Environment*, *803*, 149892.

APPENDIX

APPENDIX I: INTERVIEW GUIDE FOR COOKS AND RECEPTIONISTS

Title: **Food Waste Management Practices Among Restaurants in The Cape Coast Metropolitan Area.**

Dear Sir/Madam,

I am Helena Afram, a postgraduate student at the Department of Geography and Regional Planning, University of Cape Coast. This interview guide aims to gather information for a study on food waste management practices among Cape Coast Metropolitan Area restaurants. I humbly want to seek your consent to participate in this study. Your participation is voluntary, and you may refuse to participate in or withdraw from this study. However, your participation in this study is relevant since the intention is to aid in policy drafting and implementation. The interview would last between 30 and 40 minutes. Thank you.

Section A: Background Information

1. Can you give a brief information about yourself?

    a. Education

    b. Marital Status

    c. Religion

2. How long have you been working as a cook/receptionist?

3. How many restaurants have you worked in before joining this restaurant?

4. What is your role in the kitchen? (For Cooks Only)

5. Can you briefly describe the menu and cuisine of your restaurant? (For Cooks Only)

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6. How do you manage customer order and request about food waste? (For receptionist Only)

7. What are some common complaints or feedback received from customers regarding food waste?

8. Are there any other sustainability initiatives the restaurant has implemented, such as energy or water conservation?

9. What is the staff's general attitude or awareness level toward food waste management?

10. Have you received any training or resources on food waste reduction or sustainability practices?

Section B: Food Waste Disposal Practices

11. How does your restaurant dispose of food waste? (Briefly explain the processes and methods).

12. What percentage of the food produced in the restaurant is wasted?

   a. What is the weight of the food thrown away or the number of plates disposed of over the total number of plates prepared?

13. Do you have any specific procedures or guidelines for food waste disposal?

Section C: Food Waste Reduction Strategies

14. Does your restaurant have any food waste reduction strategies in place?

15. What are some specific measures you take to reduce food waste?

16. How do you measure the effectiveness of these measures?

17. Have you noticed any cost savings or benefits from implementing these measures?

Section D: Challenges Faced by Restaurants in Managing Food Waste

18. What are some of the challenges your restaurants face in managing food waste?

19. Are there any regulatory or legal requirements related to food waste management that you struggle to comply with?

20. Do you face any food waste storage, transportation, or disposal challenges?

21. Are any external factors such as customer behaviour or supply chain issues contributing to food waste?

    a. If there are any, can you explain?

Section D: Strategies to Improve Food Waste Management

22. In your opinion, what strategies could be implemented to improve food waste management in the metropolis?

23. How do you think restaurants in Cape Coast could work together to reduce food waste?

24. Are there any technological solutions that could help improve food waste management?

25. Are there any training or awareness programs that could be useful in reducing food waste?

APPENDIX II: INTERVIEW GUIDE FOR RESPONDENTS IN

RESTAURANTS (MANAGERS)

Title: **Food Waste Management Practices Among Restaurants in The Cape**

Coast Metropolitan Area.

Dear Sir/Madam,

I am Helena Afram, a postgraduate student at the Department of Geography and Regional Planning, University of Cape Coast. This interview guide aims to gather information for a study on food waste management practices among Cape Coast Metropolitan Area restaurants. I humbly want to seek your consent to participate in this study. Your participation is voluntary, and you may refuse to participate in or withdraw from this study. However, your participation in this study is relevant since the intention is to aid in policy drafting and implementation. The interview would last between 30 and 40 minutes. Thank you.

Section A: Background Information

1. Can you tell us a bit about your restaurant and its operations?

2. How long have you been managing this restaurant?

Section B: Food Waste Disposal Practices

3. How do you dispose of food waste in your restaurant?

4. Can you describe your waste management process?

5. What percentage of food waste is currently recycled or disposed of?

6. Are there any regulations or guidelines you follow to dispose of food waste?

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Section C: Food Waste Reduction Strategies

7. What strategies have you implemented to reduce food waste in your restaurant?

8. Have these strategies been effective in reducing food waste?

9. Are there any new strategies that you plan to implement in the future?

10. Are there any challenges that you face in implementing these strategies?

Section D: Challenges Faced in managing food waste

11. What are your main challenges in managing food waste in your restaurant?

12. Are there any external factors that contribute to these challenges?

13. How do you currently address these challenges?

Section E: Strategies to improve food waste management

14. In your opinion, what strategies can be implemented to improve food waste management in the metropolis?

15. Are there any incentives or programs that would encourage restaurants to improve their food waste management practices?

16. Could collaboration among restaurants solve food waste management challenges in the metropolis?

17. Is there anything else you want to add about food waste management practices in your restaurant or the metropolis?

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APPENDIX III: OBSERVATIONAL CHECKLIST

	Parameters	Yes	No	Other
Food Waste Disposal Practices				
1	Are there separate bins for food waste, recyclables, and non-recyclables?			
2	Are the bins easily accessible for staff and customers?			
3	Is the food waste bin covered or sealed?			
4	Is the bin emptied regularly?			
5	Is the food waste being collected for composting or recycling?			
Food Waste Reduction Strategies				
6	Are portion sizes appropriate and consistent?			
7	Are there systems in place to manage inventory and reduce overproduction?			
8	Are there signs of overproduction or wastage?			
9	Are the staff trained in food waste reduction strategies?			
10	Is there any surplus food being donated to charitable organizations?			
Challenges Faced in Managing Food Waste				
11	Are there visible signs of food waste or overproduction in the restaurant?			
12	Are the staff disposing of food waste in bins?			
13	Are the staff disposing of food waste in other ways?			
14	Are there any issues with pests or odors caused by food waste?			
15	Are any factors contributing to food waste, such as spoiled or damaged products upon delivery?			
Strategies to improve food waste management				
16	Are there visible signs of food waste reduction strategies in place?			
17	Are the staff actively engaged in reducing food waste?			
18	Are there any signs or posters promoting food waste reduction strategies?			
19	Are there any staff incentives in place to encourage food waste reduction?			

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	Overall Impression	
21	What is your overall impression of the restaurant's food waste management practices?	
22	Are there any areas for improvement?	
23	What could be done to improve further food waste management practices in the restaurant or the metropolis	

NB: The "Other" column can add notes or comments.

APPENDIX IV: ETHICAL REVIEW LETTER

UNIVERSITY OF CAPE COAST

INSTITUTIONAL REVIEW BOARD SECRETARIAT

TEL: 0558093143 / 0508878599
E-MAIL: irb@ucc.edu.gh
OUR REF: IRB/C3/Vol.2/0006
YOUR REF:
OMB NO: 0990-0279
IORG #: IORG0011497

8ᵀᴴ APRIL, 2024

Ms. Helena Afram
Department of Geography and Regional Planning
University of Cape Coast

Dear Ms. Afram,
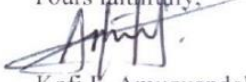
ETHICAL CLEARANCE – ID (UCCIRB/CHLS/2023/138)

The University of Cape Coast Institutional Review Board (UCCIRB) has granted Provisional Approval for the implementation of your **Food Waste Management Practices Among Restaurants in the Cape Coast Metropolis.** This approval is valid from **8ᵗʰ April 2024 to 7ᵗʰ April 2025.** You may apply for an extension of ethical approval if the study lasts for more than 12 months.

Please note that any modification to the project must first receive renewal clearance from the UCCIRB before its implementation. You are required to submit a periodic review of the protocol to the Board and a final full review to the UCCIRB on completion of the research. The UCCIRB may observe or cause to be observed procedures and records of the research during and after implementation.

You are also required to report all serious adverse events related to this study to the UCCIRB within seven days verbally and fourteen days in writing.

Always quote the protocol identification number in all future correspondence with us about this protocol.

Yours faithfully,

Kofi F. Amuquandoh
Ag. Administrator

INSTITUTIONAL ADMINISTRATOR
UNIVERSITY OF REVIEW BOARD
CAPE COAST

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APPENDIX V: RESTAURANT MENUS

* BEEF / CHICKEN BURGER
* SHAWAMA
* FRIED RICE WITH CHICKEN/FISH
* PLAIN RICE WITH CHICKEN / FISH
* JOLLOF RICE WITH CHICKEN / FISH
* BANKU & TILAPIA WITH PEPPER
* KENKEY WITH FISH
* CHIPS AND CHICKEN
* CHICKEN PIZZA
* BEEF PIZZA
* BEEF/CHICKEN PIZZA
* VEGETABLE PIZZA

WE CATER FOR
* Weddings/Engagements
* Birthday Parties/Funerals
* Co-perate Functions Etc..

BREAKFAST CORNER
CAPITOL BREAKFAST PLATE	55.00GH¢
ENGLISH BREAKFAST	48.00GH¢
SIMIT BREAKFAST PLATE	40.00GH¢
OMELETTES	30.00GH¢
FRIED EGGS	20.00GH¢
MENEMEN	32.00GH¢
PANCAKE	40.00GH¢
GOZLEME (TORTILLA CHEESE)	32.00GH¢

APPETIZERS & WRAPS
SPRING ROLLS	26.00GH¢
BUFFALO WINGS	55.00GH¢
CHICKEN FINGERS	50.00GH¢
FRIED POTATO CHIPS	22.00GH¢
MIXED COMBO PLATE	74.00GH¢
STEAK WRAP	58.00GH¢
CHICKEN WRAP	52.00GH¢
VEGGIE WRAP	48.00GH¢
MOZERELLA STICKS	28.00GH¢
ONION RINGS	22.00GH¢

SALAD
GRILLED CHICKEN CAESAR SALAD	60.00GH¢
GARDEN SALAD	50.00GH¢
CHOBAN SALAD	30.00GH¢
BEEF SALAD	60.00GH¢
TUNA FISH SALAD	62.00GH¢

BURGERS
CLASSIC BURGER	50.00GH¢
CHEESE BURGER	56.00GH¢
CAPITOL BURGER	64.00GH¢
CHICKEN BURGER	48.00GH¢
VEGGIE BURGER	54.00GH¢

PASTA / MACARONI
PENNE ARABBIATA	48.00GH¢
TUNA PENNE	58.00GH¢
SPAGHETTI NAPOLITAN	44.00GH¢
SPAGHETTI BOLOGNAISE	50.00GH¢
FETTUCINE ALFREDO	58.00GH¢
SHRIMP FETTUCINE	76.00GH¢
BEEF NOODLE	66.00GH¢
CHICKEN NOODLE	64.00GH¢
SHRIMP NOODLE	84.00GH¢
ABK SPECIAL NOODLES	70.00GH¢
TURKISH MANTI	65.00GH¢

MAIN COURSES
BEEF LOQUOM	86.00GH¢
BISTECCA	80.00GH¢
BEEF SHASHLIK	86.00GH¢
PEPPER STEAK	86.00GH¢
PHILLY CHEESE STEAK SANDWICH	70.00GH¢
STEAK FAJITA	82.00GH¢
KAVURMA	78.00GH¢
BUTCHER'S MEATBALL	68.00GH¢
LAMB SHASHLIK	86.00GH¢
MEXICAN CHILLI BEANS	58.00GH¢
CAPITOL MIX KEBAB	245.00GH¢
LAMP CHOPS	110.00GH¢
ADANA KEBAB	74.00GH¢
ADANA KEBAB WRAP	68.00GH¢
SHREDDED BEEF (CHINESE STYLE)	80.00GH¢

(ALL PRICES ARE VAT INCLUSIVE)

DESSERTS
CHEESE CAKE
TIRAMISU
FRUIT SALAD
KUNEFEH
KUNEFEH & ICE CREAM
ICE CREAM (PER SCOOP)

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Green Salad	¢10.00
Moyin Moyin	¢12.00
Smoked Chicken Salad	¢22.00
Tuna & Egg Salad	¢18.00
Barbequed Chicken Wings	¢20.00

NIGERIAN MAIN DISHES

Orisirisi Stew with Ewedu	¢25.00
Orisirisi Stew with Egusi	¢28.00
Ogbonno and Okro Soup	¢28.00
Fresh Fish Soup *Red Fish*	¢30.00
Tilapia	¢35.00

GHANAIAN MAIN DISHES

Gari Fotor *(Fish/Meat/Chicken)*	¢40.00
Beans Stew *(Fish/Meat)*	¢25.00
Kontonmire Stew *(Fish/Meat)*	¢28.00
Fetri Detsi	¢28.00
Jollof Rice ONLY	¢22.00
Waakye with Goat, Fish or Beef	
(Available 12-3pm only)	¢40.00
Guinea Fowl Groundnut Soup	¢28.00
Goat Meat Light Soup	¢28.00

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