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PURSUING A CIRCULAR ECONOMY: EXAMINING THE SOLID WASTE SEPARATION PRACTICES OF RESTAURANTS IN MADINA OF THE LA NKWANTANANG-MADINA MUNICIPALITY (LANMMA)

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DECLARATION

I, IVANA OBENG-ODEI, hereby declare that except for reference to other people's work which has been duly acknowledged, this dissertation is the result of my research carried out at the Institute of Statistical, Social and Economic Research (ISSER), University of Ghana under the supervision of DR SIMON BAWAKYILLENUO.

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ABSTRACT

Sustainable waste management has been particularly challenging for Ghana. There have been studies aimed at understanding and improving waste management systems however, most are focused on households; neglecting other sectors and their contributions to the waste situation in Ghana. This study pinpoints sustainable waste management practices in the restaurant industry of Madina – La Nkwantanang Municipality and how they can leverage the attainment of a circular economy paradigm of development. The study assessed restaurant personnel's knowledge on the benefits of solid waste separation and examined the enabling and constraining factors of the adoption of waste separation and eco-friendly alternatives in the industry.

One hundred and fifty-six (156) restaurant managers participated in the survey, which employed the use of semi-structured questionnaires. In addition, key resource persons from the municipal assembly and waste collectors were purposively sampled and interviewed. The results of the study revealed that there is an absence of waste separation agenda specific to the restaurant sector in Madina. Also, there is limited knowledge and practice of waste separation in restaurants in the study area; although, a significant number of restaurants are willing to incorporate environmentally sustainable practices in their business strategies. As per the findings, the study recommends educational and awareness campaigns for personnel of restaurants in Madina, the formulation and implementation of waste management policies for the sector, the provision of incentives like machinery and tax subsidies and the involvement of the private sector through partnerships.

DEDICATION

I dedicate this work to my mother, Joyce Botchway, whose faith in me and in my future keeps me going.

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I am only alive and able to complete this course because of God's mercy and grace towards me and for that I am most grateful. My deepest appreciation goes to my supervisor, Dr. Simon Bawakyillenuo, without whose patience and kindness, I could not have completed this work. Finally, to my two course mates – Portia and Richard - who were a constant source of encouragement and always had faith in my abilities, I am most grateful

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ABBREVIATIONS AND ACRONYMS

CE	Circular Economy
DOI	Diffusion of Innovation
EHSD	Environmental Health and Sanitation Directorate
EHSU	Environmental Health and Sanitation Unit
EPA	Environmental Protection Agency
EU	European Union
FAO	Food and Agricultural Organisation
GAMA	Greater Accra Metropolitan Assembly
GSA	Ghana Standard Authority
GTA	Ghana Tourism Authority
ISWM	Integrated Sustainable Waste Management
MC	Moisture Content
MMDAs	Metropolitan, Municipal/District Assembly
MSW	Municipal Solid Waste
MSWM	Municipal Solid Waste Management
LANMMA	La Nkwantanang Madina Municipal Assembly
OECD	Organisation for Economic Co-operation and Development
PPPs	Public-Private Partnerships
SD	Sustainable Development
SDGs	Sustainable Development Goals
SWM	Solid Waste Management
UNICEF	United Nations Children's Fund
WH	Waste Hierarchy
WCED	World Commission on Environment and Development

CHAPTER ONE

INTRODUCTION

1.1 Background

As countries attain higher levels of economic development and urbanisation, country and city administrators are bound to face the increasing complexities of waste management (Hoornweg & Bhada-Tata, 2012). Waste, when not properly managed, has devastating effects on the environment, on public health and on the economy of a country. Aside the destructive consequences of poorly managed waste, the world has transitioned into an era where sustainability and environmental awareness have become a predominant concern for many and is therefore attracting massive attention. Consequently, efficient waste management is progressively becoming a global matter; one of dire importance and a vital aspect of city and town management in countries around the world. Despite the efforts of developing countries to keep up with international standards of sanitation, they are faced with many complexities with regards to efficient waste management. Ghana is no exception.

"Waste" is defined as materials that are not prime products (that is, products produced for the market) for which the generator has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose (OECD, 2008). "Waste" is thus considered respectively to be the product or end product of the production and consumption process (The Cadmus Group, 2005). Waste generation is a result of economic activity (production and consumption) through any of the three basic sectors: the primary, secondary and tertiary. These sector categorisations represent a continuum of distance from the natural environment - beginning with primary economic activity. At this stage, a population's needs are met using raw materials from the earth. For instance, through agriculture or mining. Towards the end of this continuum is the tertiary sector, which is the most detached

from the processing of raw materials and includes activities like tourism, banking and transportation (Rosenberg, 2017). The further a country moves away from the primary sector, the more waste will be generated and the more diverse the composition of this waste will be. Consequently, developed economies tend to generate more waste than upcoming and transitioning economies (Hoornweg & Bhada-Tata, 2012). This implies that economic growth inevitably brings on an increase in waste generation. However, the processes of economic growth and waste generation can be decoupled as proven by countries like Japan, France, Canada, Germany and Hungary (OECD, 2009, OECD, 2019).

Economic systems operate within the larger environmental system – therefore there are constant and notable interactions between these two systems. When material inputs are made into any sector of the economy, they are returned to the environment as different forms of waste (Asafu-Adjaye, 2005,). In their broad categorisations, these wastes could be solid or liquid. A further classification of solid wastes will place these materials into classes of municipal solid waste, industrial waste, agricultural waste and hazardous waste (United Nations Economic and Social Commission for Asia and the Pacific, 2002). The rest of this thesis focuses primarily on municipal solid waste, its management and reduction of its negative impacts on the environment.

Municipal Solid Waste (MSW) is non-liquid waste generated from households, public facilities, small businesses and other institutions (United Nations Economic and Social Commission for Asia and the Pacific, 2002). The major components are food waste, paper, plastic, rags, metal and glass - although demolition and construction debris are often included in collected waste. There are also small quantities of hazardous waste, such as electric light bulbs, batteries, automotive parts and discarded medicines and chemicals included in MSW (ibid). In developing economies, MSW is generally defined as the waste produced in a municipality (Tanmoy *et al*, 2012). Municipal solid waste management (MSWM) deals with

the collection, transfer, resource recovery, recycling and treatment of waste. The sole objective of MSWM is to ensure that the health of the population is protected, to promote environmental quality and to develop sustainability (Henry *et al.*, 2006). Key approaches adopted in SWM include: reduction of waste being generated, deep burial, open space burning, landfills, recycling and reuse, mulching and composting. McDougall, White, Franke, & Hindle (2001) argued the point above, by conceptualizing SWM to involve waste reduction, re-use, recycle, incinerate and safe disposal of the residual at landfills.

Through research and innovation, there is a gradual shift in the use of potentially harmful materials in production and manufacturing processes so that there is less waste to be dealt with in the first place (McDonough & Braungart, 2010). Besides modifications in product design, innovative techniques and concepts are being applied in all the other stages of processing to make waste management more efficient; this basically, sums up the concept of a Circular Economy (CE). It is worth noting these progressive changes have mostly been observed in developed countries.

High income countries, have made much progress in the waste management field; adopting strategies like the circular economy (Stahel, 2016) or Integrated Sustainable Waste Management (ISWM) models. Middle- and low-income countries are however still grappling with waste operations. Typically, waste management operations cost the average African city between 20-50% of their budgets yet only 20-80% of their wastes are collected (Adebayo Bello & bin Ismail, 2016). Considering that the total quantity of waste generated in Sub Saharan Africa is expected to triple by 2050 (Kaza *et al.*, 2018), the situation could not be more dire. Open dumping is currently the norm in this region; with over two-thirds of waste being dumped in roads, open land, or waterways (ibid). Urgent action is needed to salvage the situation and to mitigate the impact of future waste growth (ibid).

1.2 Problem Statement

One extremely vital step in the adoption of more sustainable waste management models is the preliminary activity of waste separation. Waste separation is particularly helpful in managing already generated waste in the system (Tchobanoglous & Kreith, 2002). Waste separation *at source* is a rather common phenomenon in countries that are efficiently managing waste; mostly being done at generation level before the work of waste collection services begin. Household level separation of waste is highly encouraged in high income countries. Considering that 82% of MSW generated in Europe is from households (Tanmoy *et al*, 2012, Eurostat, 2013), it is only prudent that sustainable waste operations are encouraged and practised at this stage. Segregating waste allows for resource efficiency by promoting 2 R's of the 2008 Action Plan adopted by G8 ministers – these are reuse and recycle (OECD,2009). For high income countries, efforts to encourage waste segregation transcend the household level even to the commercial and industrial sectors; including the food and hospitality industries (Jamal *et al*, 2019).

The food and hospitality industries are major contributors to many economies due to international tourism growth, growing middle class and general lifestyle changes (Jan, 2019). Also, due to women's (who are usually the homemakers) increased participation in the labour force, long working hours and the convenience which restaurants offer, the commercial food service sector is rapidly growing around the world (Elmedulan, 2014). In many high- income countries, this sector is not left out in the efforts to sustainably manage waste; seeing that they produce quite a significant amount of it. For instance, each year, a typical Australian restaurant generates up to 17.5m³ of waste per employee (EPA,2016). An estimated 62% of this is food waste, 18% paper and cardboard, 4% mixed recycling, 4% in plastic wrap, bags

and plastic containers and 12% of other materials including textiles, wood, steel and residual waste (ibid). This implies that at least 80% of generated waste from Australian restaurants could be recycled or recovered and not end up in a landfill. Through deliberate initiatives, like using eco-friendly materials for packaging and serving, the amounts of waste generated in high income countries are reduced and reusable materials are reintegrated into the system. Just like at the household level, waste segregation at source is encouraged with the activities of commercial food vendors (Jamal *et al*, 2019). In Ghana, the food and hospitality sectors are under-researched; posing a major significant social challenge – firstly because of its sheer immensity and also because of the scarcity of data related to the field.

Over the years, the research that has been conducted on waste management practices in Ghana has been aimed at gaining understanding and finding solutions to the country's waste issues. A majority of the investigations tend to focus on the household level; enquiring on people's perceptions and attituded towards waste and their willingness to adopt more sustainable practice in their homes (Kyere *et al*, 2019; Miezah *et al*, 2015; Gyimah *et al*, 2019; Oduro-Kwarteng *et al*, 2016; Douti *et al*, 2017). Consequently, research findings and their subsequent policy changes are specific to waste management operations at the household level. The contributions of commercial food vendors towards municipal waste are disregarded even though restaurants and eateries keep emerging around the country – thus, are very significant. The neglect of this sector could be partly attributed to the fact that the food, hospitality and tourism industries are up and coming and therefore are not particularly well-ordered. However, their contribution to the overall economy cannot be overemphasised and thus must not be overlooked.

Beyond the general absence of data, Ghana's sanitation situation proves even more problematic. In 2015, Ghana was ranked the 7th dirtiest country in the world according to a report by UNICEF; reflective of the country's poor standing in issues regarding sustainable

waste operations (UNICEF, 2015). Whilst reliable or recent data on the amount and composition of waste generated by the Sub-Saharan country is absent, it is estimated that about 3000 tonnes of solid waste is generated in Ghana daily (Miezah *et al*, 2015). Approximately, 67% of this waste is organic in nature and 22% recyclable. These include textiles, rubber, plastics, metals and glass (ibid). Three-quarters of the daily generated waste are sent to public dumps or are burnt and a strikingly low 2% is recycled (ibid). An indication of the poorly managed waste is characteristically observed in the metropolises and municipalities. The streets of the capital city, Accra, are inundated with solid waste; landfills are filled beyond their capacities, heaps of rubbish are seen in open public spaces like markets and sewage systems are choked with garbage - which subsequently bring on secondary challenges like flooding and disease. Most of these challenges could be avoided and even further, solid waste could be capitalised on for economic benefit - as 86% of Ghana's generated waste is readily recoverable and valued at GHC 83 billion per annum (UNDP,2019). Incidentally, these economic benefits cannot be realised without the implementation of a more sustainable model of waste management; one which goes beyond the linear-economy or cradle-to-grave system which is currently largely practised in Ghana.

The Circular Economy of waste management is a fairly recent concept which is quickly gaining traction globally. Fundamentally, the idea looks beyond the current "take-use-discard" extractive industrial model by focussing on three main principles: designing out waste and pollution, keeping products and materials in use and regenerating natural systems (Ellen MacArthur Foundation, 2017). Rather than a cradle-to-grave approach, the concept espouses the "cradle-to-cradle" method. The adoption of the latter in a rapidly developing and urbanising country like Ghana could prove extremely beneficial for the country's overall socio-economic development. However, developing a strategy that will derive benefit from waste must be underpinned by thorough research. Innovation and behavioural change are also vital

elements for the success of the circular economy approach of waste management. As with changing culture through innovation, its diffusion may appear challenging at the initial stages but eventually, and with some effort, the general public picks up on the trend. This thesis explores the prospect of introducing measures that promote a circular economy in municipalities, particularly amongst commercial food vendors and the challenges that may arise with their implementation.

The immensity of Ghana's food vending industry cannot be understated. Aside conventional international-standard restaurants, street food vendors are regulars on the Ghanaian cultural scene. From little kiosks on street corners to local restaurants (usually referred to as *chop-bars*), there is an abundance of eateries around the country. The unorganised nature of the sector makes it difficult to assess the actual number of commercial food services in Ghana. According to one study, as of 2013, there were 203 licensed restaurants in the Greater Accra Region - representing 61% of all licensed restaurants in Ghana (Omari *et al*, 2013). Like with general

waste management issues in Ghana, there is very limited data to determine how much waste these restaurants produce. Normally, however, the choice of packaging for food and waste disposal practices of these eateries are not sustainable. For one, whereas there are traditionally eco-friendly options like using leaves or paper bags as wrappers for food, more vendors have now moved towards the use of plastic bags or styrofoam containers due to concerns for hygiene and convenience; rather to the detriment of the environment. The absence of a system where food waste and packaging could be collected and recycled or reused makes the use of these problematic. The result is an increase in the negative externalities related to food and plastic waste. Considering that commercial food services contribute a great deal to a nation's waste issues, it is prudent to look into the habits and possibilities of sustainable practices for food vendors.

This research aims to fill this knowledge gap regarding waste management and its drivers in the food sector, particularly in Madina of the La Nkwantamamg Madina Municipality.

The La Nkwantanang Municipal Assembly (LANMMA), like many other Metropolitan, Municipal and District Assemblies (MMDAs) in the Greater Accra Metropolitan Accra (GAMA), faces many challenges with collected Municipal Solid Waste (MSW). MSW is waste collected and treated by or for municipals. It covers waste from households including bulky waste, similar waste from commerce and trade, office buildings, institutions and small businesses, yards and gardens, street sweepings, content of litter containers and market cleansing (OECD, 2020). LANMMA waste collectors currently do not engage in solid waste segregation at source or waste recovery. Once waste is collected, it is sent off to the Kpone Katamanso landfill site for final disposal.

The Kpone Katamanso landfill site, which was previously managed by the Tema Metropolitan Assembly (TMA) has now been turned over to the private waste management organisation,

ZoomLion [1]. The landfill was opened in 2012 and was meant to accept 500 cubic tonnes of waste daily from the Tema area. The reality of this is different. The landfill currently receives waste in excess of 1,500 cubic tonnes including municipal waste from neighbouring municipalities like LANMMA[2]. The facility is now overburdened by the sheer amount of waste received as its lateral land space has been exhausted and air space has reached alarming levels. Not only is this aesthetically unappealing, but it also poses major public health risks as is evidenced by the rising number of residents reporting to health facilities with throat disease (ibid). This scenario unfortunately presents a rather characteristic depiction of the state of many landfill sites in Ghana. In 2017, the incumbent administration pledged to make Accra the cleanest city in Africa by the end of their 4th year in office (Graphic Online, 2017). This is a huge feat to accomplish seeing as Ghana's international rankings on sanitation is extremely poor. To realise this goal, Accra city managers must come up with innovative and practical ways to not only eliminate mismanaged waste which is already in the system, but also to reduce the amount of Municipal Solid Waste which will be generated. Source Separation into various components is a vital first step in attaining an efficient waste management system and an option worth considering if indeed Accra will be transformed into a clean city.

As earlier alluded to, the hospitality and food service industry under the tourism sector is arguably one of the fastest growing industries in Ghana. The LANMMA administration alone records over 800 food service providers in their jurisdiction (LANMMA Socio-economic Database Document, 2020). This is besides the numerous food vendors along the streets and in the heart of the commercial centre, Madina. Restaurants and food vendors generate a tremendous amount of solid waste: from kitchen waste and unsold food to the packaging of food and beverages, these businesses have the potential to create the most diverse forms of collected waste and this makes them, unquestionably, a great target for waste separation

[1] LANMMA Physical Planning Officer, 2021
[2] MyJoyOnline, 2019

activities. By separating biodegradable waste from non-biodegradable waste, LANMMA managers and waste collection services would be dealing with a major driver of poor sanitation that is linked to the Madina commercial centre and the municipality as a whole. They will also be taking the first step in pursuing Circular Economy practices, with its accompanying benefits, in their jurisdiction.

1.3 Aims and Objectives of the Study

The main aim of this study is to assess the waste separation behaviour of restaurants in Madina and factors that will influence the adoption of greener serving and packaging products. The objectives are as follows:

- To assess restaurants personnel's knowledge on the benefits of waste separation in Madina-LANMMA;
- To determine the different restaurant groups that are involved in waste separation and those that are not in Madina-LANMMA;
- To examine the determining factors of the adoption of waste separation in the restaurant industry of Madina-LANMMA;
- To assess the factors constraining the adoption of eco-friendly food packaging and serving options among Madina-LANMMA restaurants.

1.4 Research Questions

- What knowledge do Madina-LANMMA restaurants have on the benefits of waste segregation?
- Which group of Madina-LANMMA restaurants are involved in waste segregation and which are not?
- What factors influence the adoption of waste segregation in Madina-LANMMA restaurants?
- What factors constrain the adoption of eco-friendly food packaging and serving options practices in Madina-LANMMA restaurants?

1.5 Significance of the Study

Despite the continuing rise in awareness of the need for more efficient waste management strategies and practices amongst Ghanaians, a large percentage of the population are still unaware of the need for and benefits of these (Godfrey et al,2019). In cases where people have knowledge of these, they are often unmotivated to separate their waste because there are typically no formal structures to support the practices at the local or national level.

As reported by a staff member of the assembly's sanitation department during an interview, the sanitation situation of the municipality is in a deplorable state. According to him, the public are not usually compliant with environmental and sanitation regulations. This presents one of the biggest challenges in the municipality's administration as they continually have to deal with indiscriminate dumping of waste especially at Madina, the municipal's busy commercial capital.

This research would help gauge the appreciation level of a vital sustainable waste management practice (segregation) in a vital service industry by determining the extent of people's knowledge of the practice. It would highlight if (and how) stakeholders are facilitating sustainability practices; and by extension how these stakeholders can do more. The results of this study could be valuable in guiding the decisions and actions of policy makers in the La-Nkwantanang-Madina Municipality.

Also, by this singular study, the quality and efficiency of service delivery in solid waste management could be improved as dysfunctionalities in the system would be identified and recommendations would be made accordingly. Additionally, it would help establish whether the strategy of adopting eco-friendly services to reduce the voluminous amounts of generated solid waste in the municipality, will be well-received in the Madina hospitality industry.

Besides, this study will prove if implementing circular economy practices would be a practical

and economically viable venture for the municipality. It would determine the Madina restaurant owners' and manager's willingness to adopt and participate in circular economy strategies; hence giving the Assembly evidence to either pursue or eschew these strategies.

Considering that there is a general lack of data on waste management in Ghana, and even less on the tourism and food sector's contribution to local and national waste generation (despite the fact that they generate so much waste), this study aims at closing a key knowledge gap in this sector and further opening up the discussion by considering practical ways of pursuing and implementation the concept of a circular economy to attain sustainability.

1.6 Organisation of the Study

There are five (5) chapters in this dissertation. Chapter One (1) includes the introduction, problem statement, objectives of the study, research questions and the significance of the study. Chapter Two (2) presents the literature review and the conceptual framework of the study. Chapter Three (3) highlights the methodology employed to carry out this study. Chapter Four (4) presents the key findings and Chapter Five (5) summarises the main findings and presents the conclusion and recommendations

LITERATURE REVIEW, THEORY AND CONCEPTUAL FRAMEWORK

2.1 INTRODUCTION

This chapter explicates and conceptualises the relevant themes of the circular economy of waste management and waste separation through the review of pertinent literature. The meaning and scope of these concepts, their benefits and the practicality of its operationalisation in the study area will be reviewed in this chapter. Additionally, a review of the general food vending sector in Ghana will also be presented: their categorisations, national regulations on these businesses and the field's contributions to the waste situation in the country. Lastly, a theoretical underpinning of the study will also be highlighted.

2.2 CONCEPTUAL UNDERSTANDINGS OF CIRCULAR ECONOMY

The Circular Economy (CE) is a fairly new concept with most of its definitions arising in the last decade. Owing to its novelty, the concept is rather fuzzy as according to Gladek, 2017, there is not a single group with the acknowledged authority to define exactly what a Circular Economy means. However, there is no denying that the concept is intrinsically tied to the Sustainable Development (SD) discourse. In fact, it can be described as a pathway and an operationalising strategy in the pursuit of sustainable development. Hence, businesses, organisations or entire regions can practically employ circular or closed looped economies as tools to attain SD (Ghisellini *et al.*, 2016; Murray *et al.*, 2017).

Discourses on the CE have been developed by multiple actors - both in academia and by practitioners – therefore, there are some major distinctions in the definitions that have arisen. After analysing 114 definitions of the CE, one study highlights how the concept could mean different things to different groups of people (Kirchherr *et al*, 2017). The research further

categorises these nuances under 2 thematic areas: definitions that focus on the *R-frameworks* which predominantly focus on waste recovery and other definitions that emphasise a *Systems Approach* which focus on design and production as well (ibid). These 2 themes can be described as the core principles of the CE.

The R-frameworks have been in existence for a few decades; giving proponents of this approach a solid claim that CE is founded on already established thoughts (Blomsma & Brennan,2017, p.611). The R-frameworks can be considered as a list of approaches that ideally must be adopted to sustainably manage waste. The most prominent R-framework is the 3-R framework. Here, the three 3-Rs stand for **reduce**, **reuse** and **recycle**. Subsequently, the European Commission came up with the 4-R framework which introduced a 4th R that stands for **recover** (European Commission, 2008). The 4-Rs form the crux of the European Union's (EU) Waste Framework Directive. Yet, in recent times, the most elaborate R-framework is the 10-R framework as presented in **Table 2.1**. The framework was developed by Ellen MacArthur (2013) aimed at promoting the idea of a circular economy. The 10-R framework is more nuanced but is in fact far less referred to, both in theory and in practice, as compared to the lower R-frameworks (Reike *et al*, 2018). A number of the R-imperatives in the 10-R framework were added post-2010; when literature on CE proliferated within the space of five (5) years (ibid). After an analysis of 69 articles on value retention options, Reike *et al* (2018) provide a synthesis of 10 value retention options (or the 10 R-framework) and their implications for academia, policymaking and business. It is however imperative to note that, more R-imperatives keep arising and do differ from one sector to another. Additionally, various authors and groups in diverse fields assign different attributes to the various R-s; resulting in divergent conceptualisations of the CE principle in literature. The 10-R framework as elaborated in **Table 2.1** is a variation of Reike *et al*'s (2018) framework as presented

by the Netherlands Environmental Assessment Agency (2017). It starts with R-0 (refuse) through to R-9 (recovery). The lower R strategies are more preferable and most referred to in the sustainability discourse.

Table 2.1: R-10 Strategies in the Circular Economy

TYPE	R#	NAME	STRATEGY
Smarter product use and manufacture	R0	Refuse	Make product redundant by abandoning its function or by offering the same function with a radically different product
	R1	Rethink	Make product use more intensive (e.g., through sharing products, or by putting multi-functional products on the market)
	R2	Reduce	Increase efficiency in product manufacture or use by consuming fewer natural resources and materials
Extend the lifespan of the products or its parts	R3	Re-use	Re-use by another consumer of discarded product which is still in good condition and fulfils its original function
	R4	Repair	Repair and maintenance of defective product so it can be used with its original function
	R5	Refurbish	Restore an old product and bring it up to date
	R6	Remanufacture	Use parts of a discarded product in a new product with the same function
	R7	Repurpose	Use discarded product or its parts in a new product with a different function
Useful application of materials	R8	Recycle	Process materials to obtain the same (high grade) or (lower grade) quality
	R9	Recover	Incineration of materials with energy recovery

Source: Planbureau voor de Leefomgeving | Netherlands Environmental Assessment Agency, 2017, pp46

The term "waste hierarchy" is sometimes used interchangeably with the "R-strategies". It denotes a preferential order of waste treatment options aimed at reducing environmental

impacts by prioritising the strategies for implementing the R-imperatives (Hultman and Corvellec, 2012). Dijkgraaf and Vollebergh, (2004), describe it as a tool in evaluating the waste management process and in many developed countries, it serves as a guide for waste management. According to Gamberini *et al* (2014), Directive 2008/98/EC specifies principles for mitigating the negative effects of waste generation and treatment, reducing its negative impact on human health, the atmosphere, and natural resource scarcity. Waste Hierarchy (WH) is the subject of Article 4 of the Directive, which specifies five actions to be developed in a particular order of priority based on their importance for proper waste management. (1) Prevention; (2) Preparing for re-use; (3) Recycling; (4) Other recovery; and (5) Disposal are the five actions listed. This hierarchy is illustrated using an inverted pyramid; with the vertex upturned and separated into five horizontal layers. The waste hierarchy aims to avoid the generation of excesses of waste and to obtain the maximum benefits from resources or products by diverting waste from landfills (Ewijk & Stegemann, 2014). When properly applied, the waste hierarchy can be highly beneficial to all aspects of socio-economic and environmental development; particularly by reducing pollution and the emission of greenhouse gases, conserving resources and energy, stimulating the development of green technologies and improving livelihoods by creating jobs (Wijkman & Skånberg, 2015; Korhonen *et al*, 2018).

2.2.2. The Systems Thinking Approach

The systems thinking approach is another core principle in CE discourses. This perspective advocates for an overhauling of systems already in place that encourage material production that increases waste. It enjoins a systemic reform of human activities in order to transition to the CE system (Yuan *et al*, 2008, p.5; Kirchherr *et al* (2017) are of the view that, definitions of the CE have significantly changed perspectives unto the systems approach since the year 2012.

Thinking systemically involves seeing the bigger picture i.e., identifying connections between the different parts of the system, understanding patterns that exist between them and engaging

different perspectives on the issue (Bassi *et al*, 2021; Boardman & Sauser, 2006). More definitions of the CE are acknowledging the fact that the world is complex and interconnected hence solutions need to be more comprehensive (Meadow, 1982). Consequently, in recent times, more writers are adducing to the shift in advocacy for the system's approach rather than the R-framework alone.

The R-imperatives usually provide solutions for waste already in the system by reintroducing "waste" materials into the supply chain and keeping them in use. This approach is **reductionist** as it only deals with a section of the waste problem, thus, is less impactful (Viva *et al*, 2020). However, the systems approach, which involves other elements like a change in production design; change in consumer preferences and the discussion and adoption of the CE at international levels, is more effective because of its holistic approach to waste management. Writers are advocating more for the systems approach because it presents a broader view of a system's interrelations and its embedding context and thus, facilitates innovative solutions to complex problems (ibid).

2.2.3 Objectives of the Circular Economy

The ultimate objective of the CE, despite the different contextualising accounts, remain the same i.e., Sustainable Development (Ghisellini *et al*., 2016; Ellen MacArthur Foundation; 2013). The term 'sustainable development' was coined by the World Commission of Environment and Development (WCED) in 1987. The Commission's report 'Our Common Future' (otherwise known as the Brundtland Report) defines sustainable development as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). With the introduction of "future generations", this definition introduces a **time element** to SD in addition to the three main pillars attributed to SD - the *economic, environmental* and *social pillars.* These elements are all interconnected and ideally must be pursued simultaneously. The concept of the CE, which

is inherently tied to SD, can be said to espouse these notions as well - hence pursues these as the targets for the circular economy (Bassi *et al*, 2021; Winans *et al*, 2017; Korhonen *et al*, 2018).

For the purposes on this thesis, it should be highlighted that waste separation, which is being explored here, falls more appropriately under the R-frameworks as the point of waste separation is to the end that wastage of resources can be reduced (R2) so materials can be repurposed (R7) or recycled (R8).

2.3 WASTE SEPARATION

Waste separation (otherwise known as waste sorting or waste segregation) involves collecting "wet waste" (food waste, organic matter) and "dry waste" (recyclables), and possibly other streams of waste into different containers (Hoornweg & Bhada-Tata, 2012). The extent and intensity of separation varies over regions globally with local regulations determining how and if waste is separated at all (ibid). According to a report by Kaza *et al*, 2018, waste separation in low-income countries is significantly lower than in higher-income countries with very little or no regulations on waste separation in these territories. Again, the World Bank report indicates that, in low-income countries, over 90% of waste is often disposed in unregulated dumps or openly burned. Low-income countries collect about 48 percent of waste in cities, but this proportion drops drastically to 26 percent outside of urban areas. Out of the amount of waste collected, only 4% is separated while Europe and Central Asia and North America collect at least 90 percent of waste and separate 38% of it (ibid).

Waste separation in lower-income countries is usually done by informal waste pickers who are largely motivated by the monetary benefits that segregating offers (ibid). Not being in formally organised groups and without the backing of sound waste management policies make the work of these pickers less impactful (Kaza *et al*, 2018). In low-income administrations, MSW is not typically sorted before disposal as done in more developed countries; rather recyclable or

reusable materials are picked after the collection process or at the final disposal sites (ibid). A major drawback of this method of sorting is the poor quality of salvaged secondary materials and a likely reduction in the total amount of materials recovered. Sorting mixed wastes post-disposal is additionally taxing due to the contamination of recovered waste; which eventually reduces the marketing possibilities. Source separation and separate collection of waste streams present extra costs in the waste management process but eventually there is added value and a greater impact for promoting a circular economy on the whole. In fact, waste separation is a realistic indicator of the presence and practice of the circular economy of waste managemet.

2.3.2. Waste Separation at Source and Waste Characterisation

Despite the numerous benefits attributed to waste separation at source, not many developing countries have incorporated this activity in the management of their MSW. In India, Construction and Demolition debris (C&D), plastic wastes, commercial and industrial refuses, and e-waste are all disposed of in almost no segregated manner (Buenrostro & Bocco, 2003). In most countries in the Sub-Saharan region, source separation is at the very early stages. Even in cases where source separation is observed, it is usually at the household rather than at commercial levels.

The success of waste separation strategies is largely dependent on public acceptance which can be measured by the public's participation rate. The sway that local stakeholders hold cannot be ignored in waste separation decision-making processes as this group is both the subject and object of waste management services (Garnett and Copper, 2014). The performance of waste separation could be dependent on a number of factors including culture, social background or demographic features like age, income level, the type of households/businesses amongst others (Meidiana *et al*, 2017). Identification and thorough knowledge of the determining factors of waste separation, especially the reasons why it is effective within a particular local area, can be extremely beneficial in designing a successful waste separation scheme (ibid). Bearing in mind that there are major differences in every region, local situation and business makes

designing a waste separation scheme more relevant. This also implies that even though the scheme might be successful in one vicinity, its success may not be replicated in another.

The issue of waste separation is closely tied to *waste characterization* which involves analysing waste streams to determine the quantity of solid waste generated and its composition (EPA – Ireland, 1996). Waste stream analysis involves a logical and systematic approach to obtaining and analysing data on one or more waste streams or sub-streams (ibid). Waste characterisation is extremely relevant to waste separation as data gathered helps in planning effective waste recovery interventions and helps to ascertain the true value of the recovered waste.

Municipal Solid Waste (MSW) amounts and characteristics vary not only by nation, but also by area and neighbourhood, even within the same city. These variations are influenced by people's socioeconomic status, income level, consumption, and use patterns (Banar and Ozkan, 2008). A thorough understanding of the characterization of solid wastes to be disposed of is needed for an effective MSW management system. Physical characteristics of solid wastes are important factors in the selection and operation of storage and transportation equipment, energy conversion, recoverable matter studies, and the selection and design of proper disposal methods (Fudala-Ksiazek *et al*., 2016). Because of their heterogeneous nature, solid waste management may present some peculiar challenges. As a result, physical characteristics of solid wastes - such as moisture content, calorific value, higher heating values (HHV) and composition - should be well understood in order to treat them effectively. Solid wastes have Moisture Content (MC) ranging from 15% to 40%. Although there is a wide range of MC due to regional characteristics and socioeconomic structure, the average MC is estimated to be 20% (Tchobanoglous, 1993). According to the literature (Hui, 2006), MC can exceed 60–70% from time to time, depending on solid waste composition and climate conditions, among other factors. Calorific value is a significant parameter that is a determinant in the design of procedures, such as combustion, widely used for the recovery of solid wastes, and it is closely

related to MC. Proper knowledge and application of waste separation and characterisation will most likely facilitate effective planning and implementation of CE strategies.

2.4 OVERVIEW OF THE FOOD SERVICE INDUSTRY IN GHANA

The hospitality industry, particularly food services, is often one of the most undervalued industries in less-economically developed countries. Administrators of national and municipal jurisdictions may either be unaware of the potential the industry carries in contributing towards the overall Gross Domestic Product (GDP) or may otherwise have prioritised other industries which they assume more pressing. Consequently, the food industry in low-income countries is underdeveloped; lacking adequate infrastructure, skilled labour and the appropriate technology to enhance operations and outcomes (Affum and Wang, 2019). The food industry in developed countries, however, presents a different scenario; debunking any likely misconceptions of unprofitability of the industry to national development (ibid). In the United States of America (USA) alone, the industry has over the past 60 years seen an exponential increase – with a total GDP contribution of 25% in 1955 to 48% by 2017 (ibid).

The service sector in Ghana is growing rapidly and this can be attributed to a myriad of reasons. According to the Ministry of Finance and Economic Planning (2018), the service sector contributed 54.6% to GDP in 2015, 56.8% in 2016 and 55.9% in 2017 alone. On one hand, this growth can be attributed to globalisation and exposure to western civilisation - whose service provision industry is much further developed – have affected the preferences and expectations of Ghanaian consumers. Consumers are hence less likely to compromise on quality and expect value for their money (Berry, 2018).

Another reason that accounts for the growth in the service sector is the nature of policies being pursued in the political arena in the bid to close inequality gaps and to raise the standard of living of people Amin (2003). These policies include reducing the cost of doing business in

Ghana which promotes investor confidence in the country. Other policies include; on-going privatisation in key economic sectors like the hospitality industry (KPMG, 2020).

These political strategies have significantly increased the percentage of the middle working classes; with more people gaining an appreciable level of income and being able to afford more extravagant lifestyles including eating out frequently (Adam & Dercon, 2009)

2.4.2. Categorisations of the Food Service Industry in Ghana

For the purposes of this dissertation, the food services industry refers to out-of-home eating options which include restaurants, canteens, fast food joints and catering houses. These are re-categorised into 3 groups following the work of Affum & Wang (2019): traditional food services, semi-advanced food services and advanced food services as shown in Figure 2.1.

Traditional Food Services (C1)	Semi-Advanced Food Services (C2)	Advanced Food Services (C3)
• Small-scale • Low level or only adopted technology • Low quality personnel • No visible assembly line • Largely on-the-table service • Verbal feedback system	• Medium-scale • Adopted and modified technology • Few quality personnel • Minimum advertising • On-the-table service with few external orders • Quality-driven with no intention to innovate	• New materials input • Medium/large scale • Visible assembly line • High-tech equipment • Mobile/Online sales • Online ordering/ payment system • High Quality personnel • Electronic based feedback system • Improved technology • Patents

Table 2.1: Categories of Food Services in Ghana
Source: Adapted and modified from Affum & Wang (2019)

Street food vending largely falls under the traditional food service sector in Column 1(C1). According to the Food and Agricultural Organisation (FAO), street food is any ready-to-eat food or beverage sold and sometimes prepared in outdoor public spaces (e.g. streets, squares, parks, open-air markets, etc.) by vendors or cooks, either itinerant or stationary, either on foot or from mobile outlets (e.g. vans, carts, bicycles), removable outlets (e.g. stalls), fixed outlets

without indoor space to accommodate consumers (e.g. kiosks or take-away shop with kitchen overlooking the street) (FAO, 2016). This kind of street food business has proliferated over the last few decades; particularly as a result of urbanisation.

Fast food services in Ghana usually fall under Column 2 (C2). The original concept of fast-food is a cheap and quick western style meals for people on the move. However, for developing countries like Ghana, there has been a major reconceptualisation as fast-food services have become places where people not only go to eat, but also sit and socialise (Yan, 2005; Traphagan & Brown, 2002). Besides, fast food services in Ghana cannot be considered as particularly cheap. In fact, being able to frequent such eateries as against those in the C1 grouping implicitly implies that C2 service users are of a certain status and hence there is a certain prestige attached to frequenting such places. Coupled with the overhead costs of running such eateries, these venues and the services they provide tend to be more expensive to patronise. Another distinct feature of such eateries is that in more recent years, they have gone beyond the western inspired foods and there has been an infusion of African dishes, oriental meals and other cultural influences – a form of hybridisation (Yamashita & Eades, 2002). The diversity being provided is significantly changing the face and nature of the dining-out experience in Ghana.

Finally, there are the advanced food services as characterised in Column 3 (C3). These are largely on the rise with the advent of technology and social media. More food businesses have taken to social media platforms and delivery services which provide a wider market for their services. Aside their sophistication through the use of technology, the presentation and packaging options of this last category are usually better and well branded to promote their businesses.

The Ghana Standards Authority (GSA) defines a restaurant as "any establishment, well-appointed and formally fitted, for the preparation and serving of food and beverage for

consumption on the premises" (Ghana Standards Authority, 2009, p25). The Authority outlines a set of requirements for restaurants in the Ghana Standards Catalogue (GS 965–1:2009). They must have facilities such as dining rooms, kitchens, cold rooms, washing up areas or pantries with running water and drainage, guests and staff toilets, and services such as waiter and self-service. These establishments are registered under the formal sector and are different from traditional setting restaurants known as "*chop-bars*" or unsanctioned food joints in that they are more structured and have been "modernised". Only after meeting these criteria will the establishment qualify for an operational licence.

definition of a *restaurant* will be adopted but also broadened to include food establishments with properties which fall under the C1 and C2 groups in Table 2.1 above. Therefore, street food vending will be included in the operational definition of "*restaurant"* in this paper.

The Ghana Tourism Authority also introduces a grading system; not only for restaurants but also for hotel facilities (GTA, 2015). Regulations, 1979 (L.I 1205) specify issues that have to do with lighting, ventilation, display of rates, and a properly maintained facility in a good state of repair and a properly maintained drainage system. Other topics addressed in the L.I.1205 are the comfort of the guest - including the provision of clearly marked toilets and baths, the provision of the lift where the facility is more than three floors and the provision of alternative lighting devices in the event of power failure. Other provisions in the regulation take care of the health needs of the guests. Hotel gradings are however better known and consumers are more aware of these when choosing lodging and accommodation facilities. A recognised framework for grading the food service industry, especially for consumer purposes, is in reality practically non-existent in Ghana (Ababio and Lovatt, 2015). This makes it slightly more challenging to assess the performance of eateries and their compliance to hygiene and environmental standards. (Kissi & Owusu Mintah, 2015)

In other parts of the world, consumers are able to make informed choices with regards to dining options based on the knowledge and use of grading systems; some of which are known the world over (Surlemont & Johnson, 2005). The Michelin Guide - originating from France - is a prime example of a grading system for haute-cuisine in Europe (Johnson, Surlemont, Nicod & Revaz, 2005). Even though Ghanaian restaurants may not have such classifications in place, the advent of social media and the internet provides a platform for consumers to share their experiences, reviews and expectations of restaurant facilities with others. The pitfall of relying solely on individual experiences is that, there are no fixed standards that run across; neither are there any common indicators when assessing restaurants. Hence, quality management and quality assurance of the Ghanaian restaurant industry can be problematic (Kissi & Owusu-Mintah, 2015).

2.4.3. Certification and Permits in the Ghanaian Food Sector

In October 2016, the Food and Drugs Authority (FDA) Ghana announced its intentions to introduce a grading system for eateries around the country with the aim of *"giving consumers the opportunity to make informed choices whenever selecting food joints in the country [and] to foster healthy competition"* while complying with hygienic standards (Food and Drugs Authority, 2016). According to the FDA, the authority charged with the responsibility of issuing Food Hygiene Permits to food operators, food establishments would be categorised "A", "B" or "C" depending on how well they maintain their establishments – which includes maintaining floors, ceilings, drainage systems. Restaurants under Category A/ Grade 1 are safe, up to code and free of violations; Category B/ Grade 2 restaurants have some problems regarding the above-mentioned areas that need addressing; and Category C/Grade 3 restaurants may be dangerous to the public and could be on the verge of closure (ibid).

As prescribed by the laws of Ghana, all food vendors - including the C1 category - need to be properly licenced and annually inspected by officials in order to keep operating. Section 130 of the Public Health Act, 2012 (Act 851) states that:

> *"A person shall not manufacture for sale, sell, supply or store product regulated under this Part (Food and Drugs) except in the premises registered for that purpose under this Part. An application for the registration or renewal of the registration of premises shall be made to the Food and Drugs Authority in the prescribed form and shall be accompanied with the prescribed fees".*

At the institutional level, the Food and Drugs Authority (FDA) of the Ministry of Health (MOH); the Environmental Health and Sanitation Units (EHSUs) of the Municipal, Metropolitan and District Assemblies (MMDAs) under the Environmental Health and Sanitation Directorate (EHSD) are all responsible for inspecting and regulating the activities of food vendors. All food hygiene and safety legislation are passed by Parliament of Ghana with the President's assent at the national level. Meanwhile, at the local level, MMDAs are legally recognised as local authorities with the authority to enact food hygiene and safety bylaws. The FDA and the Ghana Tourism Authority (GTA) are both responsible for registering and inspecting catering businesses, while the EHSUs of MMDAs are in charge of protecting public health at the local level. As part of their duties, the EHSU also conducts food premises inspections and monitors the condition of food vendors' medical examinations.

2.4.4. Criticisms Against the Food Service Industry in Ghana

There have been many criticisms levelled against food services – top amongst them being the repercussions on public health and well-being, loss of cultural values and environmental pollution (which is most pertinent to this paper).

Fast food services are perceived as a risk factor for obesity, cardiovascular disease and diabetes (Seubsman *et al*, 2009; Rosenheck, 2008; Pereira *et al,* 2005; Mahna *et al*, 2004) Research has shown that urban populations in Africa, Latin America and Asia have shown great spikes in diet-related ailments like obesity, Type-2 diabetes or cardiovascular problems; these which can

be linked to the establishment of corporate chain restaurants (e.g., Matejowsky, 2007; Popkin *et al*., 2002). The Ghana Health Service reports increasing statistics of these cases and it is believed that a shift from the typical high-fibre and unrefined-carbohydrates diets to highly-refined westernised diets could be a contributing factor to this menace (Ministry of Health, 2013; Sanuade *et al*, 2018).

The loss of traditional food cultures is another criticism levelled against the food service industry. Apparently, the establishment and abundance of non-traditional eateries threatens national cultures and identities (Harrington, 2005; Watson & Caldwell, 2007). This is however inevitable with the intensification of globalisation. One author argues that Ghana's cultural food traditions and values have seen a constant decline in a period of a century and certain indigenous foods have permanently gone out of existence (Anquandah,2006; Mak *et al*, 2012) . It is however worth noting that attitudes are changing in this regard. There has been a surge in the restaurants and food services that provide and serve traditional foods but have introduced some innovative practices in their preparation and delivery. Hence there are "modern" restaurants providing indigenous food options and also encourage the use of local produce in their preparation.

Finally, environmental pollution is another relevant issue that comes up in the discussion of the pitfalls of the catering industry - which is the major focus of this study. In the introductory chapter of this paper, reference was made to the contribution of the catering industry to environmental pollution through waste generation. The use of large volumes of plastics in the industry cannot be overlooked in the pursuit of sustainable development. Aside having to deal with littering and management of large volumes of municipal waste, there are secondary repercussions on the environment. These include flooding from blocked drains, pollution of beaches, loss of biodiversity and sanitation-related diseases like cholera (Omari, 2014). Ghana is currently in the throes of a plastic waste management menace and is struggling to find ways

to efficiently deal with it. In the last two (2) decades, Ghanaian food businesses have most favoured plastic materials for packaging food and this has immensely contributed to the rise in their proportions in the waste streams in Ghana (Fobil, 2000). The situation is worsened by the absence of interventions by national and local administrations that address the disposal issue. Meanwhile consumers continue to adopt an irresponsible plastic use and disposal culture which, in the long run, would have adverse effects on the economy as a whole.

2.5 ECO-FRIENDLY PRACTICES IN RESTAURANTS

The idea of eco-friendly restaurants is steadily gaining popularity in higher income countries (Dutta *et al*, 2008). The idea denotes a restaurant which is environmentally sustainable and takes conscious steps to reduce its impact on the environment by implementing various green practices - both in the administration of the business and in their food preparation and distribution/packaging. An eco-friendly restaurant would be concerned about the reduction of food waste in their businesses, waste recovery, adopting clean energy, improving inventory management to avoid excess orders and even introducing vegan menu options (Wang *et al*, 2013). More restaurants in high income countries are pursuing the green restaurant agenda as studies show the many benefits that come along with it. Green restaurants can save businesses costs and boost sales and profits for instance through the installation of energy efficient appliances or investment in renewable energy (Johnson, 2009; Butler, 2008; Carbonara, 2007). Aside the economic benefits, green restaurants ultimately are advantageous to environmental protection (Tan & Yeap, 2012). Waste recovery interventions, minimising food waste and purchasing reusable supplies eventually reduce the residual waste that would be finally deposited back into the environment and gives city/town administrators less waste to manage thereby saving the national administration some resources (ibid).

In places where green restaurants operate effectively, research has shown that consumers are willing to pay more for their services knowing that restaurants' activities are environmentally

friendly (Namkung & Jang, 2017). This however boils down to consumers having knowledge and sound understanding of the benefits of having a healthy environment – a matter of dire importance in more developed countries (Hu *et al*, 2010). There are various motivations for running environmentally sustainable restaurants but economic benefits (for example profits to the business and saving business extra costs) are usually the main reasons for pursuing environmentalism is small businesses (Karim & Ismail, 2011).

Ghana is still a long way away from operating such establishments, especially on a large scale, as the country is still in the early stages of pursuing environmental sustainability. However, pursuing waste separation interventions is a step in the right direction for the food service industry - and the country as a whole - in their attempts to pursue environmentally sustainable practices.

2.6 GAPS IN LITERATURE

The focus of this study is to assess the waste separation knowledge and activities of catering services in Madina of the La Nkwantanang Municipality. There is very **limited literature on the hospitality industry in Ghana** and even less information on the waste separation activities in the restaurant sector. This goes beyond Ghana and can be observed in other parts of Sub-Saharan Africa (Rogerson, 2012).This implies waste management operations end up being a lower priority agenda for these administrations (Kaza *et al*, 2018, pp 77).

Higher income countries have however explored this subject matter a bit further. Researchers, Filimonau *et al* (2019), conducted an explorative study on restaurants in Plovdiv, Bulgaria. The study investigates the challenge of restaurant food waste in the South-Eastern European city. It identifies the main drivers of restaurant food waste and recommends managerial approaches to mitigate it. It also elaborates on the need to change policies and consumer mindsets. Incidentally, the researchers mentioned how under-researched the problem of restaurant food waste is and how it hampers a comprehensive understanding of the subject. Their research was

largely based on food waste alone rather than a mixed stream of waste; which calls for waste characterisation and segregation.

Tehrani, Fulton and Schmutz (2020) also investigated the waste management operations of the restaurant industry in three cities designated as "Green Cities": Providence and Springfield (both in the USA) and Nancy (in France). It would have been expected that these "Green Cities" would better manage waste operations in the food and catering industry however the results proved otherwise. Restaurant managers from all three cities strongly believed that sustainable practices enhance their financial performance, the reputation of the restaurant and attraction of customers. Despite this deduction, a significant percentage of the wastes and by-products of the operations of the studied restaurants were still being unsustainably discarded. The researchers cited the fragmentation of the very large industry and a lack of training of restaurant managers as some of the principal reasons underlying unsustainable WM practices. Their recommendation was to encourage Private-Public Partnerships (PPPs) "to enhance the operational efficiency of different businesses" (ibid). This research was carried out in fairly economically-advanced cities, unlike Ghana, which are more advanced in the pursuit of environmental sustainability and hence does that give a clear representation of the Ghanaian and African perspective.

In 2018, Matinise *et al* (2018) published their work on *"Implementing the Waste Hierarchy – Assessing the Recycling Potential of Restaurant Waste"* in South Africa. The waste characterisation study was conducted to assess the potential for diversion of mixed restaurant waste away from landfills. The study highlighted that more than 74% of waste generated by the 20 sampled restaurants from two (2) South African malls could be recovered through recycling or composting and also that food waste accounted for close to 50% of restaurant waste (ibid). Ultimately, this research highlighted the need to improve waste management

practices in restaurants by implementing source separation schemes, encouraging green purchasing, training staff on sustainable waste disposal methods and measuring food waste.

In Ghana, a lot of research has been done on waste characterisation and segregation however these predominantly focus on the household level rather than on commercial ventures especially in hospitality (Miezah *et al*, 2015; Anarfi, 2013; Oteng-Ababio, 2011; Owusu & Sundberg, 2013; Addo-Yobo & Ali, 2003). There is yet to be a study on the waste separation activities in restaurants.

2.7 THEORETICAL FRAMEWORK

The Diffusion of Innovation (DOI) theory expounded by Rogers (1995) is a critical theoretical underpinning to this dissertation. It explains how a new idea, technology or a product spreads through a social system in the course of time (Rogers,1995). There are many factors that influence and direct the adoption of new ideas or an innovation for a business. Usually, the process starts with weighing out the pros and cons of the proposed idea before a decision is made to further pursue the idea (Hall & Khan, 2003). This study rests on the DOI Theory to explain restaurants' knowledge and their willingness to practise waste separation in their establishments.

Four elements come to play in discussions of this theory: *innovation, communication channel, social systems and time*; these which can be aligned to this study. According to Rogers, the proponent of the theory, **innovation** "is an idea, practice or object that is perceived as new by an individual or group or organisation" (Rogers, 2003, p12). He described **communication** as "the process by which participants create and share information to one another in order to reach a mutual understanding" (Rogers, 2003, p18), whereas **time** involved in the innovation-decision process, the time taken to adopt an innovation by the adopter and the adoption rate across the social system. Finally, **social systems** are a set of interrelated social units (e.g., individuals, informal groups, organisations) that are engaged in problem solving to achieve a

common goal". (Rogers, 2003, p23). Social systems determine the boundary for a diffusion process; it can be affected by norms, and the degree to which individuals can influence one another.

Relating the four elements to this study, the idea of waste separation represents the innovation and the communication channel is the agency for knowledge acquisition and transfer on the subject of waste segregation. The social systems are all relevant stakeholders whose actions or inactions affect the ability to carry out the process of waste separation. The social system also includes those who will benefit from the activity. Evidently, all these elements take place within a timeframe as total integration can only be accomplished within an extended period of time.

Being a theory centred on human behaviour, there is the human attribute of agency coming into play. Before committing to or adopting an idea or an innovation, users would assess compatibility, complexity, trialability and observability (Rogers, 1995). Restaurant managers would need to be convinced about waste separation's practicality, its ability to fit into their business plans and its perceived benefits before taking it on. This brings into perspective the five necessary acceptance and implementation stages highlighted by Rogers in his theory (ibid). The *Knowledge Stage* where restaurants need to be informed on waste separation - what is involved, how it will affect the running of their business and its long-term benefits to the establishment. The *Persuasion Stage* allows them to weigh all options presented to them following the knowledge acquired in stage one. The third stage is the *Decision Stage* where the restaurants make a decision to pursue a separation intervention or not. If they decide to pursue one, they enter into the *Implementation Stage*. The final stage is the *Confirmation Stage* which is where the businesses are encouraged to perpetuate the segregation activities through constant information gathering which assures them of its continuous benefits and possibly advancements in its implementation.

The theorist also points out that ideas are not always adopted immediately by all persons in the social system. In fact, there are five (5) identifiable groups of adopters of new ideas: the innovators, early adopters, the early majority, late majority and laggards. In any target group, the innovators are the earliest to take on a new idea and the laggards the last to adopt the idea. Knowledge of these groups will allow for better assessment restaurants' intent to implement waste segregation interventions.

2.8 CONCEPTUAL FRAMEWORK

The conceptual framework for this study draws on the work of Chou, Chen & Wang (2012), who used the DOI theory to determine the factors that influence a restaurant's decision to adopt any green practice. They draw on the five *Perceived Innovation Characteristics (PIC)* expounded by Rogers (1995) – i.e., relative advantage, compatibility, complexity, observability and triability. The paper also highlights how processes of adopting innovation in an organisation are different from those of individuals. Typically, for organisations, external environments, organisational scales, structures and attitudes toward the innovation must be considered before adopting the new idea. The factors that influence the adoption of green practices were sub-categorised into two groups – internal- or external-environment factors.

These influencing variables serve as a guide to identifying the underlying factors that directly shape the decision of restaurants to pursue and implement waste separation interventions. The framework also gives a better understanding of restaurants willingness/ unwillingness to adopt green practices and ultimately could help in shaping policy in the adoption of green practices by the restaurant industry.

The conceptual framework is illustrated in Figure 2.2 below.

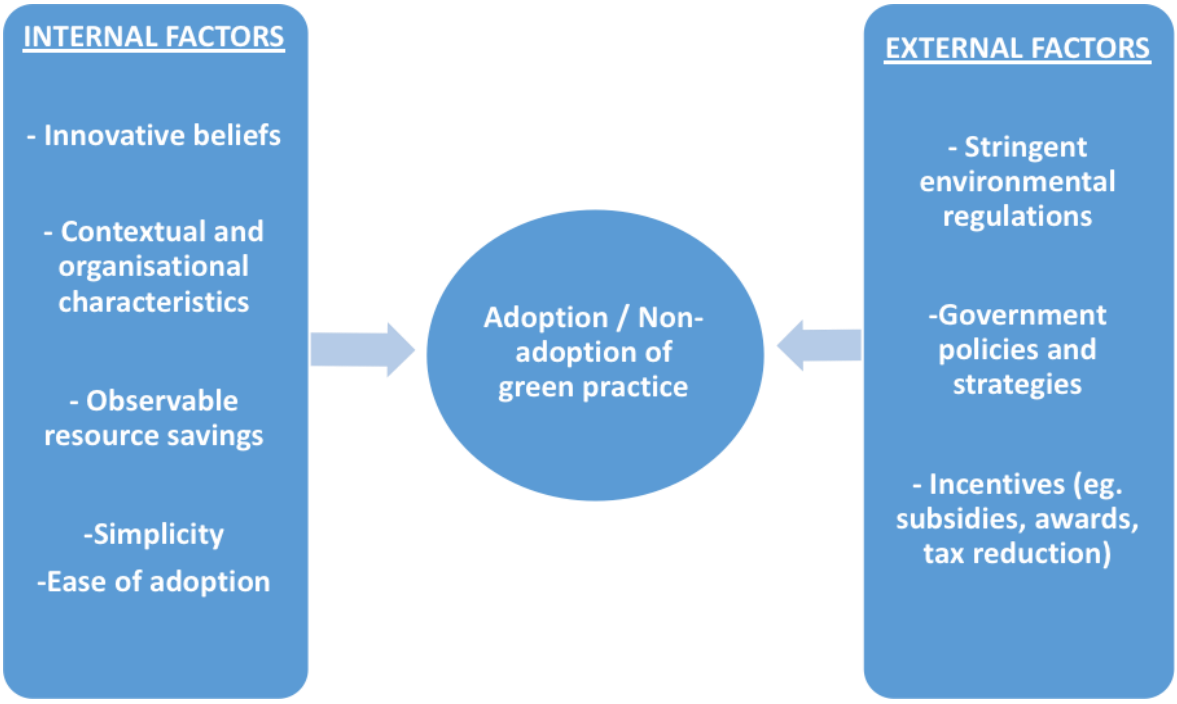


Figure 2.1: Conceptual Framework on the Adoption of a Circular Economy by Stakeholders in Madina of La Nkwantanang Municipality
Source: Author's own construct based on Chou, Chen & Wang (2012)

The findings of the above-mentioned study highlight the fact that certain factors are normally taken into account when restaurants implement green practices, in this case, waste separation. These considerations are largely related to how the establishment views the intervention's benefits. The greater the potential advantages, the more likely it is that the intervention would be implemented. The benefits may not always be monetary or economic in nature, but may also take the form of enhanced brand recognition, convenience or customer loyalty; even though restaurants are usually expected to make decisions based on financial gain.

Similarly, the nature and characteristics of the enterprise can affect the adoption of green practices. Characteristics like the size of the restaurant, the average sales per year and the establishment's curtilage, influence the establishment's decision to pursue waste separation or not. Restaurants will find it easier to implement green practices if these practices do not deviate too much from their usual routines; which underlines the internal factors of flexibility and ease of adoption.

Environmental regulations are one of the external variables that restaurants must consider when making decisions. Although Chou *et al* (2012) found that Taiwanese restaurants primarily adhere to environmentally friendly practices as a result of regulations and laws in place, the same may not be true in the Ghanaian context. While the legislation will encourage restaurants and companies to use environmentally friendly practices, due to compliance and monitoring issues, this impact may only be temporary.

Incentives (such as grants, awards, and tax reductions) on the other hand, have the ability to encourage restaurants to follow green practices.

2.9 CONCLUSION

This chapter has extensively reviewed pertinent information on the themes of the circular economy and waste separation. It has also explored literature on the food service industry, especially in Ghana and the practicalities of implementing waste separation interventions in the sector. The review has been anchored in the Diffusion of Innovation (DOI) theory and a conceptual framework was developed to illustrate the influencing factors for waste separation in the restaurants. The gap in literature that this study aims to fill was identified; thus, providing a strong basis for the focus of this study.

CHAPTER THREE

RESEARCH METHODOLOGY AND PROFILE OF STUDY AREA

3.1 Introduction

The chapter discusses the research methodology underpinning the work and the profile of the study area, Madina of the La-Nkwantanang Municipality (LANMMA); situated in the Greater Accra Region of Southern Ghana. The research methodology focuses on the research design sources of data and collection methods, target population, sampling procedures and techniques, and analysis of the data.

3.2 Research Design

The purpose of this study was to assess the waste separation behaviour of food vendors in Madina - LANMMA and factors that influence the adoption of greener serving and packaging products.

In this research, quantitative data was generated by examining the waste separation practices of the restaurants in the study area. The quantitative data highlighted the current adoption or non-adoption levels of the restaurant. The qualitative interviews on the other hand helped elucidate the underlying factors behind their actions/inactions of waste separation. There was an assessment of expert knowledge and attitudes in the waste management and restaurant industries; and the extent of the local administrative body's support to waste separation in their municipality's hospitality sector.

3.3 Types and Sources of Data

Primary and Secondary sources were employed in this study. Primary data was obtained through questionnaires and interview guides that were administered to participants. Participants included restaurant staff, a key government official in the municipality and head of the locality's informal waste-pickers association. The aim was not only to ascertain challenges that restaurants face in

their waste management process, but also to determine what strategies authorities have put in place to support waste separation especially in the food business. The instruments also sought to highlight the local authorities' role in encouraging restaurants to pursue waste separation. They also assessed the willingness of the restaurants to adopt sustainable practices in their restaurants.

Secondary data was obtained from publications, journals and internet sources on waste management and the circular economy. Also, references were made to policy documents on waste management in the country; providing a backdrop and context to the topic at hand.

3.4 Methods of Data Collection

3.4.1 Quantitative Method of Data Collection

A semi-structured questionnaire (Appendix A) was administered to respondents from various restaurants within the study area of Madina of the La Nkwantanang Municipality. The targeted respondents were managers or supervisors of the restaurants. The questionnaires included both close-ended and open-ended questions and were sub-divided into sections to allow for easy organisation of collected data.

The sections included the socio-demographic details of the respondents, the characteristics of the restaurant, their waste generation levels, knowledge and practice of waste separation and the factors that shape the decision of greener practices in the restaurants.

3.4.2 Qualitative Method of Data Collection

Qualitative data was collected through two (2) in-depth interviews using interview guides (Appendix B and C). The interviews were face-to-face in order to observe likely non-verbal cues. They were recorded and subsequently transcribed. The interview guides addressed themes relating to the knowledge and intention of the local authority to pursue a circular economy through waste separation and challenges that waste-pickers faced with waste separation and management in the restaurant industry within the study area. The interviewees included a member of staff of the Planning Unit of the La Nkwantanang-Madina Municipal

Assembly and the Head of Madina Informal Waste-Workers Association. The aim of the interviews was to gather information on their experiences with waste separation and the constraints waste pickers face in the line of duty. It was also an opportunity to gain expert advice on the way forward regarding waste separation activities in restaurants.

3.5 Target Population

This study primarily focused on restaurants in the Madina commercial area. The market has a large transient population which makes provision of food services in this area a lucrative business. Therefore, there are many varieties of restaurants and food services located here; ensuring that the study was not fixated on a particular genre of food vendors but cut across the different categories of restaurants.

According to data provided by the Assembly, there are 854 registered restaurants in the entire La Nkwantanang-Madina Municipal area and 189 in the Madina district i.e., the study area. (LANMMA Socio-Economic Database, 2020). Only registered restaurants in the Madina area were included in this study. For the purposes of this study, *restaurants* are facilities that have been duly registered and recognised by the laws of Ghana and local governance administration as food provision services.

In-depth interviews were carried out with two (2) people. One was the Head of the Development Planning Department. The other was the Head of the Madina Informal Waste-Workers Association.

3.6 Sample Size and Sampling Procedure

The sample size for the study was based on Yamane's (1967) proposal - as cited in Israel (1992). They proposed a simple formula for working out sample sizes as:

$$n = \frac{N}{1+N\,(e)^2} n = \frac{N}{1+N\,(e)^2}$$

Where, ***n***= sample size; ***N***= population size and ***e***= level of precision at a 95% confidence interval.

There are **189 restaurants in the Madina area**. All registered restaurants have been placed into one of three categories - either category A, B or C. LANMMA provided a comprehensive list of registered restaurants in their jurisdiction; which included the category each restaurant falls in. Restaurants in this database were first stratified to restaurants found in Madina alone; then further stratified to restaurants in Categories A, B or C. Subsequently, the total numbers of each category were used as the population size (N) in the formula. Therefore, the sample size of all three categories were worked independently to attain a sample size which was representative of the entire population.

The resulting sample sizes for each category are recorded in Table 3.1 below.

Table 3.1: Sample Determination for Selected Respondents

CATEGORY	NUMBER OF REGISTERED REST IN MADINA	SAMPLE SIZE
Category A	22	$n = \frac{22}{1 + 22\ (0.05)^2}$

		$n = \frac{22}{1.055}$ = 21
Category B	90	$n = \frac{90}{1 + 90(0.05)^2}$ $n = \frac{90}{1.225}$ = 73
Category C	74	$n = \frac{74}{1 + 74\ (0.05)^2}$ $n = \frac{74}{1.185}$ = 62
TOTAL	**186**	**156**

Source: Author's Own Construct (2021)

Therefore, this study sampled **one hundred and fifty-six (156) restaurants in the Madina area.**

All 156 restaurants were purposively drawn from Madina. Restaurant staff who were well-acquainted with the activities of their establishments were the target of the administered questionnaires.

Two (2) people were purposively sampled for in-depth interviews. They included the Head of the Municipality's Development Planning Department and the Head of the Madina Informal Waste-Workers Association. The perspectives of these two individuals were crucial in explaining some of the issues highlighted by the survey from the restaurants and in perceiving the Municipality's stance on waste separation.

3.7 Data Processing and Analysis

The STATA statistical analysis software was used to code and analyse quantitative data collected from the field. The analysis involved the use of descriptive statistics to derive frequencies and percentages which were represented by bar and pie charts. To determine and ascertain the relationship between variables, cross tabulations, frequency tables and chi-squares were employed.

Qualitative data obtained from the interviews were transcribed and the information was used to support data from the quantitative analysis. **Table 3.2** lays out the linkages between the research objectives and analysis.

Table 3.2 Linkages Between Research Objectives, Methods of Data Collection and Analysis

Objectives	Research Questions	Type Of Data	Sampling Method	Method Of Data Collection	Unit Of Data Collection	Analytical Technique
To assess restaurant personnel's knowledge on the benefits of waste separation	What knowledge do Madina-LANMMA restaurants have on the benefits of waste separation?	Primary data	Stratified then convenience sampling	Semi-structured questionnaire	Restaurant staff	Descriptive Statistics
To determine which different restaurant groups are involved in waste separation and those that are not	Which group of Madina-LANMMA restaurants are involved in waste segregation and which are not?	Primary data	Stratified then convenience sampling	Semi-structured questionnaire	Restaurant staff	Descriptive Statistics

To examine the determining factors of the adoption of Waste Separation in Madina restaurants	What factors influence the adoption of a Waste Separation in Madina restaurants?	Primary and Secondary data	Stratified then convenience sampling; Purposive sampling	Semi-structured questionnaire; Interview guide	Restaurant Manager/Owner Municipal resource person Waste Collector/Manager	Descriptive Statistics and Content Analysis
To assess the factors constraining the adoption of eco-friendly food packaging and serving options in Madina restaurants	What factors constrain the adoption of eco-friendly food packaging and serving options in Madina restaurants?	Primary data	Stratified then convenience sampling; Purposive sampling	Semi-structured questionnaire; Interview guide	Restaurant Manager/Owner Municipal resource person Waste Collector/Manager	Descriptive Statistics and Content Analysis

Source: Author's Own Construct (2021)

3.8 PROFILE OF THE STUDY AREA

3.8.1 Background Characteristics of LANMMA

The La Nkwantanang-Madina Municipality was carved out of the Ga East Municipal in June 2012 by Legislative Instrument (LI) 2131 in accordance with the government's objective of decentralising power and making Metropolitan, Municipals and District Assemblies more manageable.

3.8.2. Location and Size

LANMMA is situated in the Greater Accra Region of Southern Ghana. The total land area of the municipality is 70.887 sq. km. and it occupies about 2.18 % of the Greater Accra Regional land area (whose land size is 3,245 sq. km). The municipality lies between Latitudes 5^0 81"3" N and 5^0 67 "7" N and Longitude 0^0 24"0" W and 0^0 13 "1" W. LANMMA is predominantly urban; with 84% of the population residing in urban areas (GSS, 2010).

Five other municipalities share a boundary with LANMMA. These are the Akwapim South District Assembly to the North; Kpone Katamanso Municipal Assembly in the North East; Ga East Municipal Assembly to the West; Adentan Municipal Assembly to its East and finally the Ayawaso West Municipal Assembly to the South. There are about 23 settlements in the La Nkwantanang-Madina Municipality. The major settlements include Madina, Pantang, Oyarifa, Ayimensa, Otinibi, Kweiman and Teiman (Ghana Statistical Service, 2010).

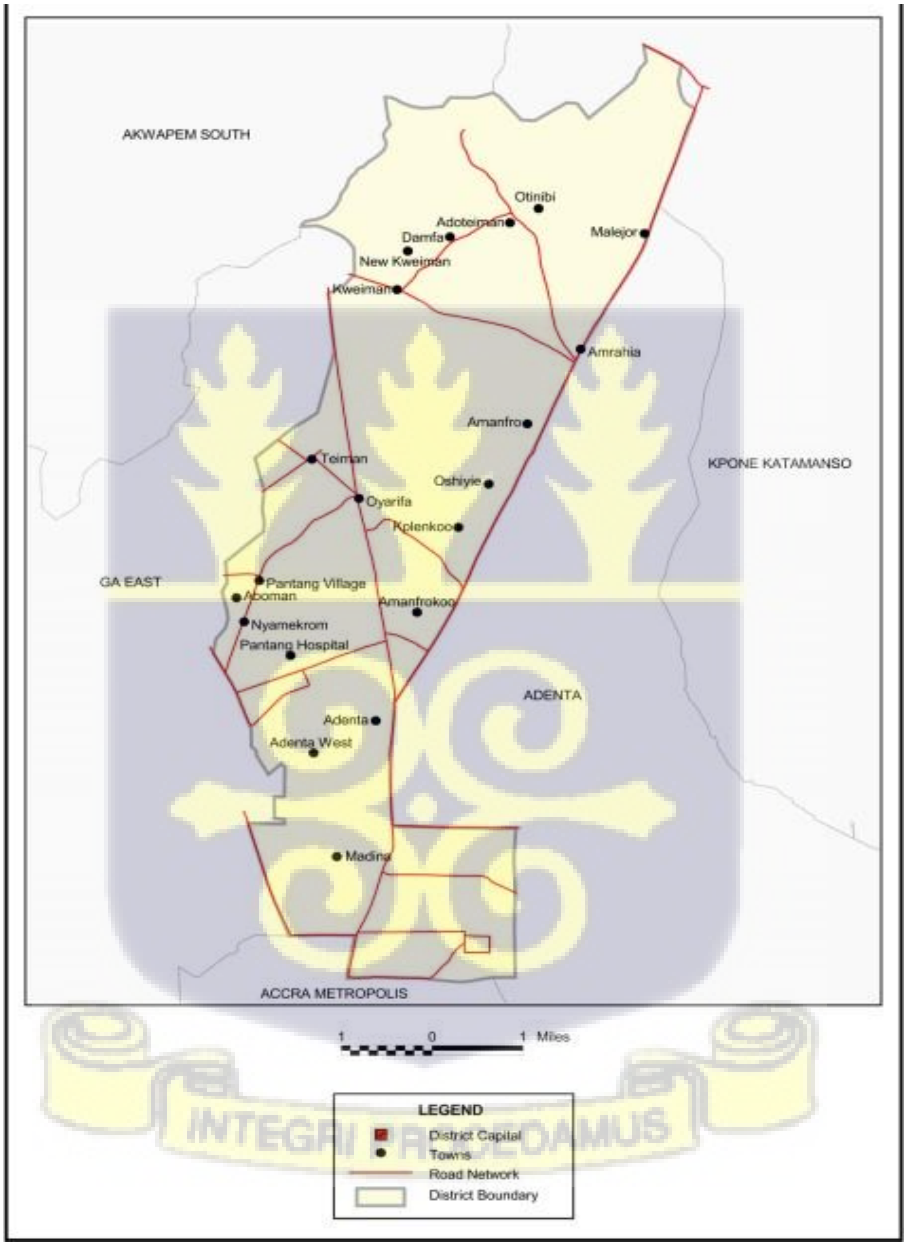


Figure 3.2 Location of La Nkwantanang-Madina Municipality in the Greater Accra Region

Source: GhanaStatistical Service (GSS) , 2010

3.8.3. Population Structure

As per the 2010 Population and Housing Census, the total population of LANNMA is 111,926. Males represented the minority class at 48.5% whilst females were more than half of the population at 51.5%.

There are 28,270 households (residences) with a household population (occupants) of 108,051 leaving the average household size as 3.9 persons. The population density is 1,909 people per square kilometre (MPCU,2019)

3.8.4. Physical Characteristics

The municipality's land area consists of mainly of plains but in the southern and western parts, these plains have dispersed undulating topography. The Akwapim Togo Range is a main feature of this area; rising steeply above the northern part of the municipality. The municipality is by nature very rocky. Five different types of soil can be found in the municipality namely; the Fete Consociation, the Nyigbenya Hatso Complex Association, the Oyarifa-Manfe Complex Associations, the Danfa-Dome Association and he Fete Bediesi Complex Association. Two major waterbodies that run through the municipality are the Sisami and Dakubi. The area is underlain by Precambrian rocks and a strain of metamorphic rocks - consisting of granite, gneiss and schist – can be seen there. These rocks are broken down and carried away by run-offs towards the plains. The low-lying areas of the municipal area are covered by grasslands but moving towards the north, the type of vegetation changes to shrubs and wood thickets.

3.8.5. Climatic Conditions

The Akwapim-Togo Range plays a major role in the heavy rainfall pattern of the municipality. The leeward side of the Range – to its north – receives more rainfall and dew (moisture) than the other parts of the municipality and this creates a slightly different ecological zone. The average annual temperature ranges between 25.1° C (in August) and 28.4°C (in February and

March); making February and March usually the hottest months of the year (Dickson and Benneh, 2001)

3.8.6. Economic Activities

The La Nkwantanang-Madina Municipality has a vibrant local economy which can be structured into three main sectors: commerce/services, agriculture and industrial.

Trading is the principal economic activity of the area and the busy and vibrant Madina market is instrumental in this. The market contributes greatly to the local economy of the La Nkwantanang-Madina Municipality. It is the largest commercial and trading hub in the area and generates the highest employment and revenues to residents and the local economy (Ministry of Finance, 2019). The banking, hospitality, telecommunications, beauty and fashion sectors are some of the key services provided in municipal area. The commerce and services sectors are rapidly growing sectors of the Municipal economy.

Agriculture is another major economic activity of the municipal area. Four types of agricultural activities have been identified in the municipality i.e., crop farming, livestock rearing, fish farming and tree planting. Crop farming and livestock rearing are however the dominant activities in the area (PHC 2010). The crops grown usually include cereals, tubers and vegetables. Teiman, Ayimensa, Pantang and Oyarifa are some of the areas where livestock and poultry farming are most prevalent. Mushroom and snail production, grass cutter rearing and rabbit farming are other agricultural activities that are being explored in the area.

The growing industrial sector and its contribution to the municipal's economy cannot be overlooked. The Industrial sector is dominated by light manufacturing, food processing, packaging and fabrication (Ministry of Finance, 2019). For instance, Nkulenu Industries - that processes large amounts of vegetables and fruits - and the Special Ice Water company are both

located in the municipality and these are but a few of other industries operating from the area. The construction industry is another sector that is relevant for the municipality. There has been a surge in building and construction as real estate developers are investing in areas like Pantang and Danfa; all under LANNMA jurisdiction. This has resulted in the boost of businesses like block factories, stone quarrying and sale of building materials. The services of masons, carpenters and other related occupations are consequently in higher demand.

3.8.7 Landscape of Restaurants in LANMMA.

According to the Socio-economic Database of the La-Nkwantanang Municipal Assembly (2020), the municipality has **854 registered restaurants**. The "registered" status is conferred after the establishment has met laid-down requirements by the Ghana Standards Authority; as listed in the Ghana Standards Catalogue (GS 965–1:2009). The Assembly's Environmental Health Division must provide a report to approve of the premises before the business can start. Besides the report, proof of ownership or tenancy of the premises, a police clearance certificate and a fire safety certificate must also be provided (Ghana Tourism Authority, 2016).

The Assembly's data sub-categorises the registered restaurants into three (3) groups: Category A/Grade 1, Category B/Grade 2 and Category C/Grade 3. A restaurants category depends on quality of the restaurant's facilities such as dining rooms, kitchens, cold rooms, washing up areas or pantries with running water and drainage, guests and staff toilets, and services such as waiter and self-service. Category A/ Grade1 was is the highest quality facility while Category B/Grade 3 is the lowest.

The 854 restaurants are scattered across the Assembly's territory; out of which one hundred and eighty-six (186) are situated in the Madina area. This implies that **approximately 22%,** or close to a quarter, of registered restaurants are found in the Municipality's busy commercial

capital. This is a significant percentage considering that there are about 23 settlements in the entire Municipality (Ghana Statistical Service, 2010).

Out of the 186 restaurants in the Madina area, twenty-two **(22)** are Category A/Grade 1 restaurants, ninety **(90)** are Category B/Grade 2 restaurants and seventy-four **(74)** are Category C/Grade 3 restaurants. Therefore, a majority (approximately 89%) of the restaurants in Madina fall in the lower-grade categories i.e., they have low- to moderate- quality facilities and services (LANNMA Socio-economic Database, 2020).

3.9. Study Limitations

Due to the Covid-19 pandemic, a handful of respondents had temporarily changed their business scope from providing food services to other services and others had resorted to delivery services instead of the dining-in option. Also, owing to the busy schedules of restaurant staff, there were some unforeseen delays in the data collection process. A number of respondents only engaged in the survey after they had seen to their business; resulting in long waiting-times until respondents were ready to start the survey. There were also a few responses that seemed rushed as respondents were occupied with their clients. Additionally, it was challenging to get some of the respondents to partake in the survey and some were generally reluctant to answer questions that were futuristic or that involved making decisions about recycling targets.

Finally, some restaurants only operated at specific times in the day (i.e., morning or evening); hence telephone interviews were resorted to. As this is a study on a particular area, its findings may not be applicable to other settings, sectors or geographical areas.

3.10. Conclusion

This chapter focusses on the methodology for the study and profile of the study area. The research methodology details the research design, sources of data, data collection methods, sampling technique and research design. The study adopted a mixed method; using both primary and secondary data. The study area's profile provides the backdrop for the study with its information on the background of the Municipality's assembly, the municipality's location and size, its population structure and some physical characteristics. It also outlined some of the main economic activities undertaken in the municipal area.

CHAPTER FOUR

RESULTS AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter presents the analysis of the results and discussion of the findings from the data. The discussions in the chapter are grouped under socio-demographic and economic characteristics of respondents; waste generation characteristics of restaurants; knowledge and practice of waste separation activities of restaurants; factors influencing the adoption of waste separation practices and factors constraining the adoption of green packaging and serving options.

4.2 Socio-demographic and Economic Characteristics of Respondents

The study targeted managers or supervisors of restaurants in the Madina area of the La-Nkwantanang Municipality. All respondents were senior staff members and wielded decision-making powers in the establishment. The sex, age, educational level of the respondents and years of experience in the restaurant business are presented in Table 4.1 ~~below~~. Majority (60.51%) of the managers or supervisors of the restaurants were female. Additionally, more than half of the respondents (54%) fell within the 30-49 age category alone; implying that a majority of the individuals in the supervisory position were young. Most of the respondents had been in the restaurant industry for five (5) or more years and can therefore be said to have substantial experience in the field. Most of the respondents were secondary school certificate holders (32%), followed by graduates from tertiary institutions (27%) and then diploma holders (15%).

Table 4.1: Socio-demographic and Economic Characteristics of Respondents

Characteristic	Frequency	Percentage (%)
Gender		
Female	95	60.51
Male	61	39.49
Total	**156**	**100**
Age (Years)		
Below 20	1	0.64
20 - 29	31	19.75
30 – 39	44	28.03
40 - 49	41	26.11
50 - 59	24	15.29
60 -69	12	7.64
70 and above	3	2.55
Total	**156**	**100**
Level of Education		
No Education	10	6.37
Basic Education	22	14.01
Junior High School	2	1.27
Senior High School	50	31.85
Diploma	24	15.29
Tertiary	43	27.39
Master's Degree	4	2.55
Ph.D.	1	1.27
Total	**156**	**100**
Years of Experience in Restaurant Business		
Less than 1 year	3	1.91

1-3 years	49	31.21
4-5 years	38	24.2
Above 5 years	66	42.68
Total	**156**	**100**

Source: Fieldwork, 2021

4.3 Business Characteristics of the Restaurants

The restaurants were placed in either one of three (3) categories based on a set of criteria for restaurant-rating which are decided by the Ghana Tourism Authority - one of the regulatory bodies in charge of restaurants. Fourteen percent (14%) of the participating restaurants were Category A/Grade 1 restaurants.; Forty-seven percent (47%) were Category B/Grade 2 and thirty-nine percent (39%) were Category C/Grade 3 restaurants as captured in Table 4.2. As the sample was representative of the entire population of restaurants in Madina, it is clear from the results that there are more low-grade restaurants in Madina than high-grade ones. This finding is consistent with studies by Liao *et al* (2016), Moore *et al* (2006) and Morland *et al* (2002); which all established that the availability of large or small/medium-sized food facilities is determined by city-income levels. This implies that lower-income urban areas like Madina, are expected to have an abundance of relatively small/medium-sized restaurants as compared to higher-income cities.

Table 4.2 Categorisation of Madina's Restaurants

Category/Grade	Frequency	Percentage (%)
Category A / Grade 1	22	14.01
Category B / Grade 2	73	46.5
Category C / Grade 3	61	39.49
Total:	**156**	**100**

Source: Fieldwork, 2021

Majority of the interviewed restaurants had been in existence for 1-4 years; representing 35.9% of the sampled population. 29.5% of the restaurants had been in existence for 5-9 years; 17.9% of the restaurants had been in existence for 10-14 years; 8.3% had been operation for over 20 years; 6.4% had been operating between 15-19 years and just 1.9% had been operating for less than a year. These are shown in Table 4.3.

Table 4.3 Years of Restaurant's Operation

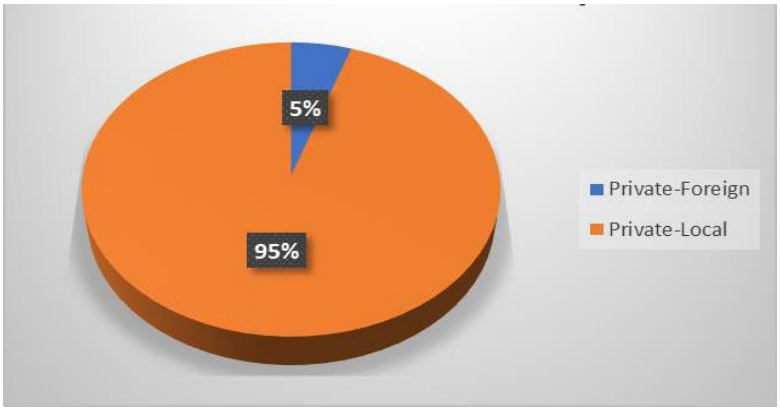
Years of Operation	Frequency	Percentage (%)
Less than 1 year	3	1.91%
1-4 years	56	35.67%
5-9 years	47	29.94%
10-14 years	28	17.83%
14 - 19 years	10	6.37%
20 years and above	12	8.28%
Total	**156**	**100%**

Source: Fieldwork, 2021

From Table 4.3, it can be observed that restaurants operating from 1-9 years had the highest frequencies. This gives an indication of the proliferation of the restaurant industry in the last decade as projected by a study by Simopoulus & Bhat (2000).

In terms of ownership, an overwhelming majority (94.8%) of the restaurants are owned privately by locals, with only five percent (5%) being owned by foreigners (Figure 4.1). None

of the restaurants were state or corporate-owned. This is an indication of the high level of involvement of local entrepreneurs in the food service industry in Madina.



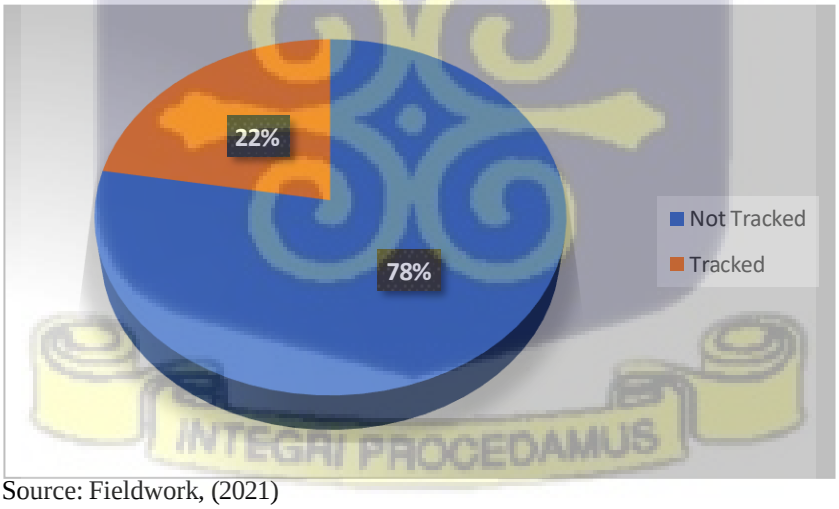
Source: Fieldwork, 2021

Figure 4.1: Ownership of Restaurants

4.4 WASTE GENERATION CHARACTERISTICS OF RESTAURANTS

4.4.1 Tracking of Waste Streams

Twenty-two percent (22%) of the respondents indicated that their restaurants do a general tracking of wastes generated; whilst a majority of seventy-eight percent (78%) admitted to not tracking their generated wastes as depicted in Figure 4.2.



Source: Fieldwork, (2021)

Figure 4.2: Tracking of Waste Streams by Restaurants

Two Chi-tests were carried out to determine if the time factor had any implication for the tracking of wastes by restaurants. Firstly, the years of operation of the business were tested as

against their waste tracking activities and subsequently the managers' years of experience in the restaurant business. The results are shown in Tables 4.4 and Table 4.5 respectively.

Table 4.4 Results of Pearson's Chi Test on Restaurants' Years of Operation and Waste Tracking Activities

Years of Operation of Restaurant	Waste Tracking (No)	Waste Tracking (Yes)	Total
1-4 years	49	7	56
5-9 years	36	11	47
10-14 years	20	8	28
14-19 years	8	2	10
20 years and above	7	5	13
TOTAL	**122**	**34**	**156**

Pearson Chi2 (5) = 8.2848 Pr =0.141

Source: Fieldwork, 2021

Results of the Chi test on Restaurants' Years of Operation and Waste Tracking Activities reveal that, at a 95% confidence interval, there is no significant relationship between the years of operation of a restaurant and its decision to track waste in its establishment i.e., an operation which tracks its wastes may or may not have been in operation for a long or short number of years.

Table 4.5 Results of Pearson's Chi Test on Managers' Years of Experience and Waste Tracking Activities

Years of Experience in Restaurant Business	Waste Tracking (No)	Waste Tracking (Yes)	Total
Less than a year	2	1	3
1-3 years	41	8	49
4-5 years	30	8	38
Above 5 years	48	18	67
TOTAL	**121**	**35**	**156**

Pearson chi2 (3) = 2.0605 Pr = 0.560

Source: Fieldwork,2021

Results of the Pearson's chi2 test on restaurants managers' years of experience and the decision of restaurants to track waste also show that there was a non-significant relationship between the two variables at a 95% confidence interval. This implies that a restaurant manager with or without many years of experience, may decide to track waste in the establishment.

The results of the chi tests (shown in Table 4.4 and Table 4.5) are in line with a research by Kazim &Ismail (2012) on the barriers and drivers of pursuing environmental sustainability in restaurants. Their research also highlights that the time factor; whether in length of manager's experience or in the restaurant years of operation, is not greatly significant in a restaurant's sustainability efforts.

Because majority of the sampled respondents do not track their wastes, they were unable to establish the volumes of waste that they generate on periodic basis. This corroborates the assumptions by Hoornweg and Bhada-Tata (2012) in a World Bank Report that data on waste disposal are particularly tasking to collect especially in developing regions. They also highlight that quantitative data is not readily available; and when they are, they are unreliable as the methodology for the calculation of waste is generally not known or inconsistent across a geographical area (ibid). This was evident in that, as per the survey, half (50%) of the respondents could not ascertain the volume of waste generated by their establishments on a daily basis. However, about nineteen percent (19%) of the restaurants claimed to generate between 6-10kg of waste; almost seventeen percent (17%) generated between 11-15kg and almost fourteen percent (14%) generated 5kg or less waste daily. These are shown in Table 4.6

Table 4.6 Knowledge of Volume of Generated Waste

Daily Waste Produced	Frequency	Percent (%)
0-5kg	5	13.89
6-10kg	7	19.44
11-15kg	6	16.67
I do not know	18	50
TOTAL	**36**	**100**

Source: Fieldwork, 2021

Tracking of generated waste is important in effectively pursuing a circular economy (Alaranta & Turunen, 2021). A majority of Madina restaurants not monitoring or evaluating their waste streams suggests a nonchalant and impassive attitude of restaurants in sustainably managing waste and a potential challenge in pursuing and achieving a circular economy of waste in the Madina area as posited by the authors (ibid). This highlights the need for city administrators to prioritise waste auditing and put a practical and appropriate structure in place to make it possible.

Figure 4.3 shows waste materials that are typically generated by restaurants in Madina-La Nkwantanang. It is clear in Figure 4.3 that plastics are the most generated waste materials; followed by food and organic wastes; then glass, metals and paper -– which is the least generated waste material. One restaurant indicated that it did not know which materials were most generated. These results are indicative of the fact that, restaurants in Madina equally produce large quantity of plastic and organic residuals just like the domestic sector (Miezah *et al*, 2015). This knowledge will be essential in planning and implementing waste separation strategies for the district.

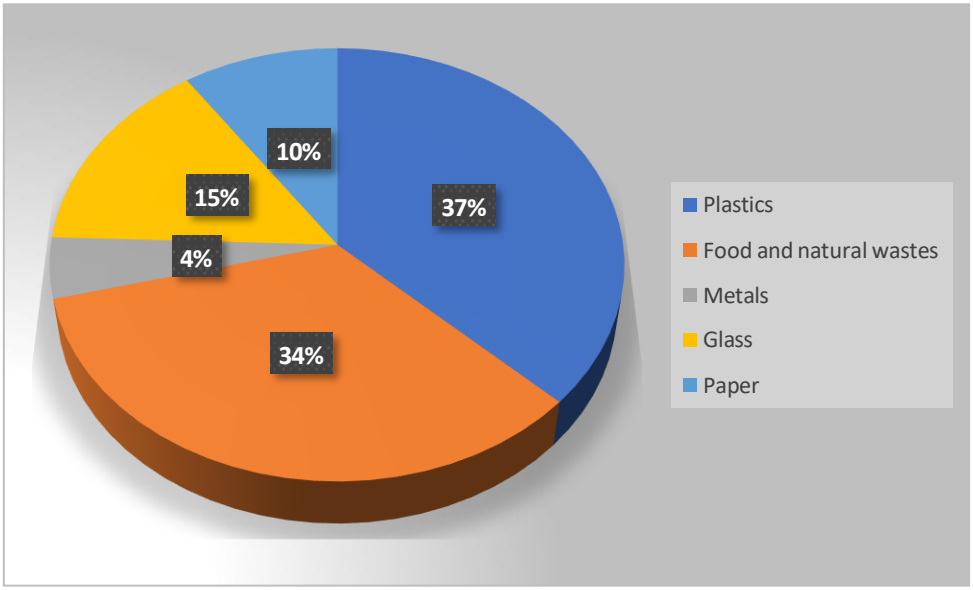


Figure 4.3 Types of Waste Materials Generated Daily by Restaurants

Source: Fieldwork,2021

Table 4.7 presents the efforts being made by restaurants to reduce the generation of waste in their operations. The results revealed that almost 75 percent (74.8%) of restaurants were not making any efforts to reduce the generation of wastes compared to twenty-five percent (25%) of restaurants that are taking various steps to reduce the generation of wastes.

Table 4.7: Efforts to Reduce Generation of Wastes

Efforts being made or not	**Frequency**	**Percentage (%)**
No efforts being made	116	74.84
Efforts being made	39	25.16
TOTAL:	**155**	**100**

Source: Fieldwork, 2021

Efforts made by the latter group of restaurants include: the use of less plastic packaging; the use of eco-friendly packaging; separation of plastic waste from organic waste; preparing food upon request/ pre-order and separation of biodegradable waste from non-biodegradable. *Use*

of environmentally-friendly packaging was the most stated endeavour made by restaurants to reduce generated waste.

To establish if the nature of a restaurant (its category/grade) has a bearing on its efforts to reduce generated waste as posited by Tehrani *et al* (2020) and Filimonau *et al* (2019), a Pearson chi2 test was carried out to determine if there was a significant relationship between the Category/Grade of restaurants and their efforts to reduce generated waste. The results are shown in Table 4.8. The results of the test, which had a probability value of 0.6 at a 95% confidence level, indicates that there is no relationship between the grade/category of the restaurant and its decision to separate waste. This is opposed to studies by Jang & Zheng (2020), Tehrani *et al* (2020) and Filimonau *et al* (2019) whose studies observed that restaurants' sustainability performance was influenced by the type/ category of their studied restaurants.

Table 4.8:Results on Pearson's Chi Test on Grade of Resturants and Efforts to Reduce Waste

Category/Grade of Restaurant	Efforts to Reduce Generated Waste (No)	Efforts to Reduce Generated Waste (Yes)	Total
Category A/Grade 1	15	7	22
Category B/ Grade 2	54	19	73
Category C/ Grade 3	47	13	60
TOTAL	**116**	**39**	**155**

Pearson chi2(2) = 0.9359 Pr = 0.626

Source: Fieldwork, 2021

4.4.2 Collection of Waste from Restaurants

Waste collection services for the Madina restaurants are mainly provided by private informal waste handlers – 74.7% of restaurants have their waste collected by them. Thirteen percent (13%) of the restaurants dispose of their wastes themselves (self-service) by taking it to communal collection points whilst the remaining 12.3% of restaurants have their waste

collected by municipal waste services. These statistics are an indication of the private sector's heavy involvement in waste management in Madina of the La-Nkwantanang Municipality and are consistent with findings by Kaza *et al* (2018) and Hoornweg & Bhada-Tata (2012).

The following statement made by the LANMMA Development Planning Officer during a key informant interview explains the heavy participation of the private-sector in managing the municipality's waste:

> *"The overall responsibility for managing and regulating the waste management process is vested in the Municipal Assembly. However, the Assembly recognises that it cannot do this alone hence, the Assembly has created some latitude for the private sector to join the waste management process in the Municipality. The Assembly lacks sufficient human capacity; there are insufficient resources in terms of machinery and infrastructure and there is also inadequate financial resources. These factors have necessitated the need for the Assembly to open up and operate an open-door policy as far as waste management is concerned."* (Interview with Head of Development Planning, LANMMA on 17th June, 2021)

The Development Planning Officer also mentioned that:

> *"The private sector players like ZoomLion company has been contracted by the Assembly [*LANMMA] *for assistance but there are areas that cannot be left entirely to ZoomLion because of the costs involved as they are a profit-oriented business. To cut costs, the Assembly has engaged in franchise-agreements with smaller private entities to collect household wastes. So, when it comes to collection at the household* 63 *level, the Assembly is not directly involved."* (Interview with Head of Development Planning, LANMMA on 17th June, 2021)

These accounts corroborate the work by Kaza *et al* (2018) that waste collection in lower-income countries is usually done by informal waste pickers who are largely motivated by the monetary benefits that collection offers. Despite the informal waste pickers being the main waste collectors (74.7%) in the Madina area, the Municipal Assembly works with them on ad hoc basis only and have not mandated the group as the principal waste collection service providers in the area. During an interview with the head of Madina Waste Pickers Association, the interviewee expressed frustration at the Assembly's bureaucratic systems and their lack of

consistent support for the Association's work. She stated:

> "*In Ghana if you want to [pursue an initiative], you will die before [you finish getting clearance and] sorting paperwork because it will take up all your money."* (Interview with Head of Informal Waste Pickers Association-Madina, on 21st June 2021).

Almost all of the self-service restaurants claimed to dispose of their waste at landfills or community waste collection points on a daily basis; after their working hours. The few remaining ones dispose of their waste at landfills or community waste collection points on a weekly basis. According to the survey results, majority of restaurants (57%) who were offered pick-up services, had their waste collected every day; whilst 31% of the restaurants had their waste collected once a week. The remaining restaurants had other arrangements with the collection services. These statistics are shown in the table 4.9.

Table 4.9: Waste Collection Frequency of Restaurants

Collection Frequency	Frequency	Percentage (%)
Everyday	89	57.42%
Once a week	48	30.97%
Other arrangements	18	11.6%
TOTAL	**156**	**100%**

Source: Fieldwork, 2021

These statistics are not a deviation from the norm as studies like that of Kaza *et al* (2018) and of the United Nations Economic Commission for Africa – UNECA- (2009) have stated that waste collection in Sub-Saharan Africa is usually done at a predetermined frequency and collection is done with small vehicles or handcarts. They also highlighted how final waste disposal usually involves dumping in a central container or collection point (ibid) which was the case of the Madina area.

4.5 WASTE SEPARATION ACTIVITIES

4.5.1 Knowledge and Practice of Waste Separation Activities

Like similar researches before, analysis of the field data indicates that majority (in the case of Madina restaurants, about 56.8%) had an idea what waste separation involves; however, their knowledge did not translate to practice (Abagale et al, 2012; Oduro-Kwarteng *et al* 2016). Upon further probing to determine the extent of their knowledge, the elicited responses mainly included: separation of plastic waste from other wastes as plastics are non-biodegradable; separation of plastic materials from non-plastic materials to reduce total volume of waste; separating bio-degradable waste from non-biodegradable waste to reduce the general cost of managing waste; that waste separation was useful and a beneficial activity for the environment.

About forty-three percent (43.2%) however admitted to not having knowledge about waste separation. Even though this is a minority group, the proportion of the group is rather large and hence significant to the study as almost half of the represented population of restaurants do not know what waste separation is about.

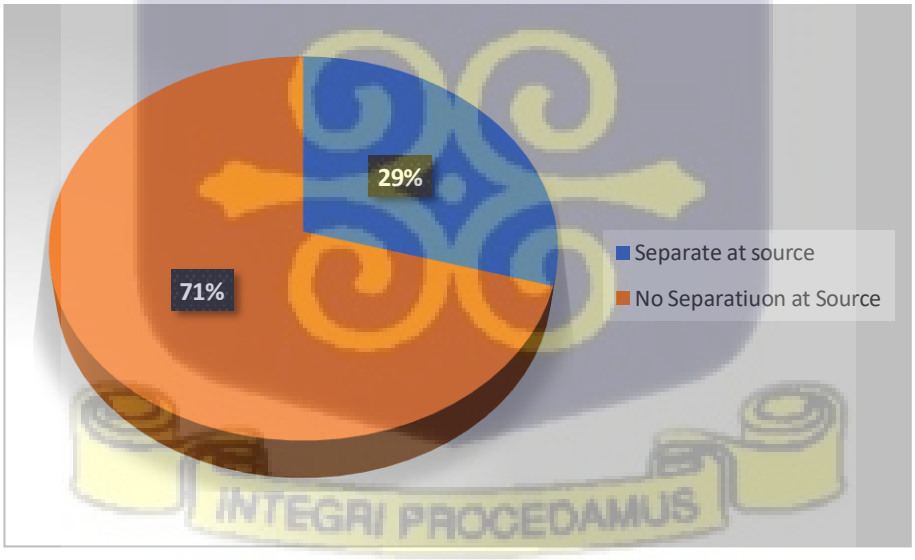


Figure 4.4: Waste Separation at Source amongst Restaurants
Source: Fieldwork, 2021

Among the restaurants that separate, about seventy-one (71%) of the restaurants do not separate their wastes at source. This pattern is similar to waste separation practices observed in households in Ghana (Gyimah *et al*, 2019; Ansah, 2014). Some of the significant reasons

provided for not pursuing this waste separation were: a lack of recycling facilities after separation was done hence the practice was a waste of time and eventually proved futile; claims that separation was the duty of the waste collection services and not for the restaurants; the busy nature of the restaurant business does not leave enough time to ensure that separation is done; low volumes of waste were generated so there was no need to separate and a lack of infrastructure to support the process. A number of the staff clearly stated that they had not been informed to do so by authorities while others admitted that they were used to mixing their waste streams and had no particular reason to separate them. These reasons are clear indications of a knowledge gap on the reasons for waste separation in the restaurant industry in Madina. This observation is supported by findings by Debrah *et al*, 2021 and Suttibak & Nitivattanano (2008) who argue that not only should awareness must be raised but clear lines of responsibility must be established for all stakeholders, otherwise an environmental initiative risks failure.

The restaurants also highlighted a lack of institutional support for these businesses to separate waste. This is consistent with research by Revell (2002) who posited that there is a strong sentiment amongst restauranteurs that local government's provision of certain services is what assures success of environmental innovations. The lack of policy mechanism in the study site, to ensure that restaurants handle wastes separation in a certain manner was affirmed by the municipality's Development Planning officer:

> *"As a municipality or a district, there is no general policy to enforce waste separation; however, it is* [now] *being started on pilot basis"* (Interview with Head of Development Planning, LANMMA on 17th June, 2021).

The lack of policy or regulatory framework for waste separation has created an open field of guesstimates among stakeholders as to who is responsible for wastes separation. On the one hand, managers of restaurants think it is the mandate of waste collectors. However, in an interview with a key informant in the Madina waste management space, this stakeholder had this to say:

> *"As waste collectors, we do segregate but not much. We just pick the obvious recoverable materials on the surface of the waste piles but the ones deep within end up at the landfill and other pickers may also go and pick them".* (Interview with Head of Informal Waste Pickers Association-Madina, on 21st June 2021).

There is an absence of a structure or enforcements to ensure that recoverable materials are reused after waste separation. Thus, out of the sampled population, 29% (i.e., 45 restaurants) separated recyclable waste at source. Out of these, 68.3% do not ensure that recyclable materials are sent to recyclers; making their initial separation efforts futile. This undermines the realisation of a circular economy.

In the study area, private waste handlers collected most (88.9%) of the recyclable materials of restaurants. The remaining restaurants either transported recyclable waste to the final disposal site (an open dump) or had them collected by the municipal waste collection service. Table 4.9 shows the distribution of waste collection providers for recyclable waste in Madina restaurants. These statistics highlight a lack of practice despite knowledge of waste separation (Debrah *et al,* 2021; Abagale *et al,* 2012; Oduro-Kwarteng *et al* 2016).

4.10

Table 4.10: Waste Collection Service for Recyclable Wastes

Waste Collection Service for Recyclable Waste	Frequency	Percentage (%)
Private Waste Handler	40	88.89%
Self-service	4	8.9%
Municipality	1	2.89%
TOTAL	**45**	**100**

Source: Fieldwork, 2021

Results of a Pearson Chi2 Squared Test showed a positive relationship between the level of education of restaurant managers and the activity of separating waste at source in the study area. The results of the Test are presents in Table 4.11.

Table 4.11: Results of Pearson's Chi Test on Level of Education and Waste Separation at Source

Level of Education of Restaurant Managers	No waste Separation at Source	Waste Separation at Source	Total
Basic Education	16	4	20
Diploma	19	4	23
Junior High School	1	1	2
Master's Degree	2	2	4
No Education	10	0	10
Ph.D.	0	2	2
Senior High School	40	8	48
Tertiary	17	23	40
Total	**105**	**44**	**149**

Pearson chi2 (7) = 31.5268 Pr = 0.000

Source: Fieldwork, (2021)

From the probability value (p-value = 0.000) of the chi-square test, it can be concluded that there is a significant relationship between the level of education and the respondent's choice to separate waste at source. The evidence suggests that restaurant managers that have had some degree of formal education are more likely to separate waste at source. This is consistent with literature by Debrah *et al*, 2021and Alaya-ay *et al*, 2012 whose studies observed that formal education had a significant positive influence on environmental awareness and the pursuit of sustainability.

4.5.2 Factors Influencing the Adoption of Wastes Separation Activities

Figure 4.5 captures factors influencing wastes separation among restaurants in Madina. Environmental consciousness (95.7%), business outlook (84.8%) and education on the benefits of wastes separation activities (65.2%) were the top reasons why restaurants in Madina separated their waste.

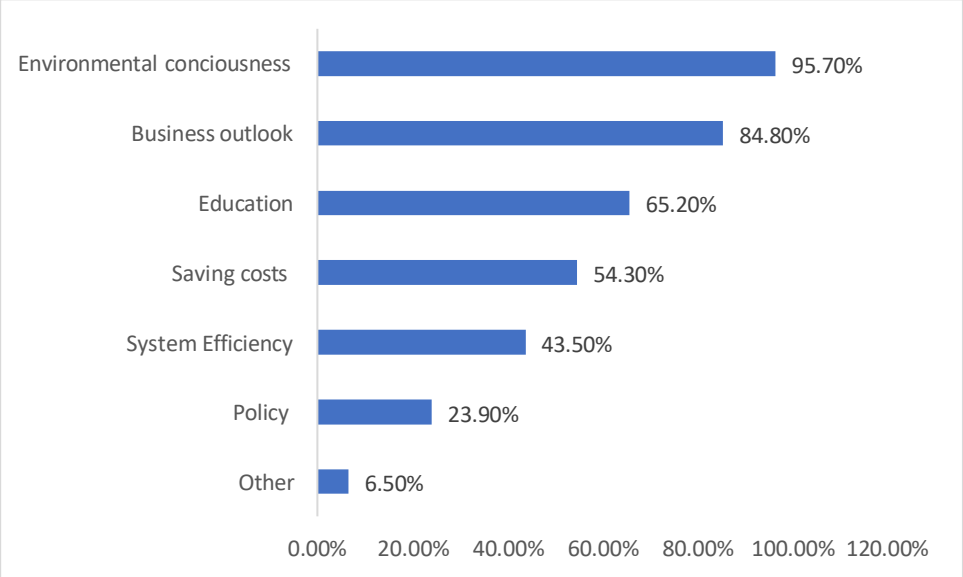


Figure 4.5:Influencing Factors of Wastes Separation in Madina

Source: Fieldwork, 2021

Ninety percent (90%) of restaurants indicated that they would consider pursuing waste separation if it was proven beneficial to their establishment (Figure 4.6). The benefits that most influenced their choice to separate wastes included reward systems, additional profits or income for the business and a clean environment for the business to operate in. Their elaborated responses were however indicative of the real intentions of the businesses – an overwhelming majority would pursue waste separation ~~for~~ largely because of economic benefits rather than environmental benefits as highlighted by authors including Kasim &Ismail (2011), Hoornweg & Bhada-Tata (2012) and Kaza *et al* (2018) whose works stated that economic incentives were often motivation for pursuing environmentally sustainable practices in Sub-Saharan Africa.

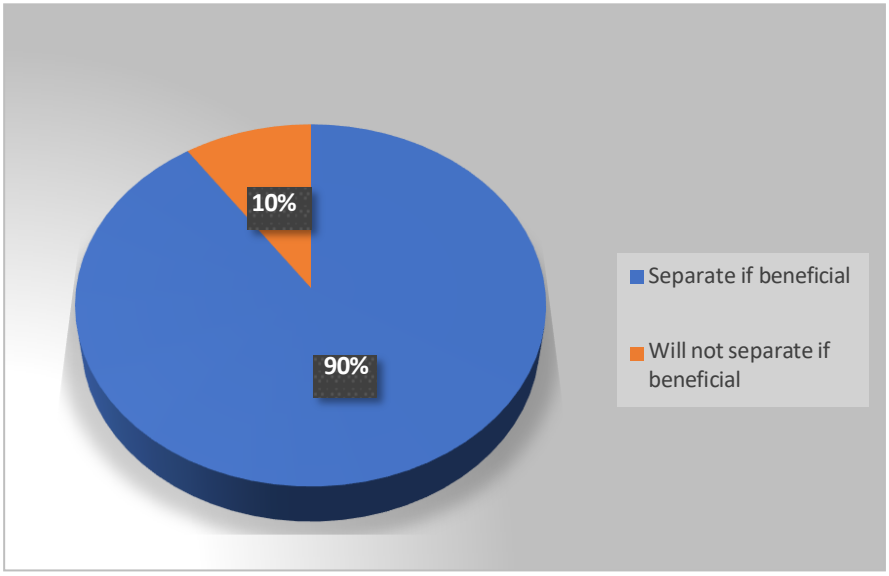


Figure 4.6 Decision to Separate Waste if Proven Beneficial

Source: Fieldwork,(2021)

For restaurants who did not have waste separation strategies in place, when further probed why, their top reasons included: a lack of regulatory support; extra costs to implement and the size of their establishment not being accommodating for such a practice. Another predominant reason was that, they had not been informed by the authorities to separate waste and hence they did not see the reason to. These factors influencing non-separation are consistent with Chou, Cheng & Wang (2012) whose work established that businesses adopting a new environmentally-friendly initiative are likely to be influenced by factors like the business' stance on environmental and innovative issues, observable resource earnings or savings, ease of adoption; the motivation of receiving incentives etc. Also, the concern of implementation costs is consistent with Galarotti (1995) view that managers usually assume that environmentally practices will financially cost their establishments.

4.6 ECO-FRIENDLY PACKAGING AND SERVING OPTIONS

4.6.1 Use of Eco-friendly Packaging and Serving Options

The study gathered data on the willingness of restaurants to adopt the use of eco-friendly alternatives to serve and package various dishes. The results revealed that about seventy-four

percent (74%) of the managers of restaurants interviewed indicated that they would be willing to consider eco-friendly strategies and other alternative options in order to reduce the volumes of waste they generate (whilst twenty-six percent (26%) of restaurants were unwilling to adopt eco-friendly alternatives (Table 4.12)

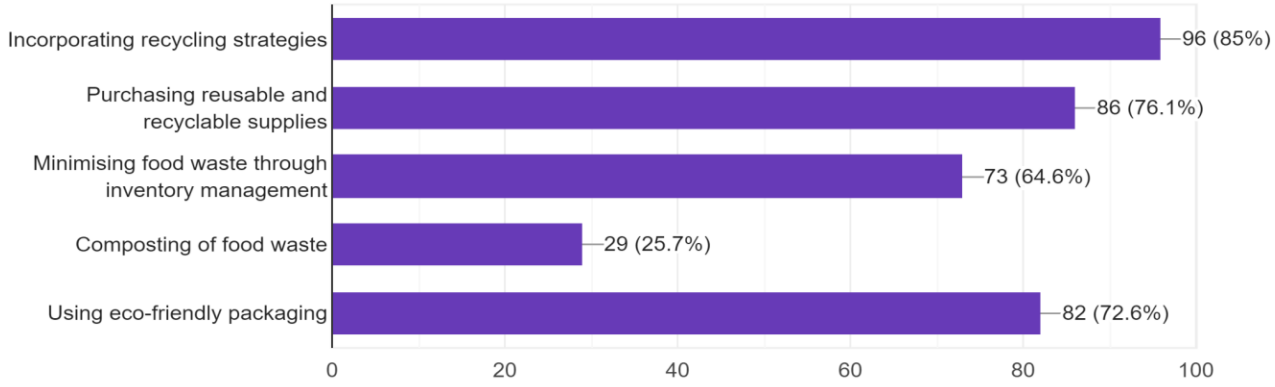
Table 4.12: Willingness to adopt Eco-friendly Packaging and Serving Options

Willingness to Adopt	Frequency	Percentage (%)
Not willing to adopt	41	26.45
Willing to adopt	114	73.55
Total:	**155**	**100**

Source: Fieldwork, 2021

For the seventy-four percent (74%) of restaurants that were willing to adopt alternative practices. Figure 4.7 depicts the kinds of eco-friendly strategies and alternatives they were willing to adopt. From most significant to the least significant, the responses included: incorporating recycling strategies; purchasing reusable and recyclable supplies; using eco-friendly packaging; minimising food waste through inventory management to reduce food waste and composting of food waste. This is indicative of the high number of restaurants willingness to partake in this behavioural change exercise to promote environmental sustainability. Over 70% of restaurants in Madina are ready to adopt alternative and eco-friendly approaches. The business owners' willingness to adapt their strategies cannot be underemphasised as Tilley (1999) and Brammer *et al* (2012) highlight that changing environmental behaviour is less effective when coercion is used however small business must have a degree of desire for change.

Figure 4.7 Eco-friendly Strategies to Adopt



Source: Fieldwork, 2021

A chi squared test was carried out to ascertain if managerial experience affected a restaurant's willingness to incorporate eco-friendly services and food packaging in their business. The results of the test (Table 4.13), with a probability value of 0.05 at a 95% confidence interval, reveal that there is a significant relationship between managerial experience and willingness to adopt eco-friendly alternatives. This implies that managers with more years of experience may be more willing to pursue more sustainable strategies in their restaurant businesses in Madina. This is consistent with a study by Wu *et al* (2017) which highlighted that manager with more professional history and experiences are usually more likely to take high-risk strategic decisions. This knowledge is helpful for targeting and rolling out sustainable programmes and initiatives in the restaurant sector in Madina.

Table 4.13: Results of Pearson Chi Test on Managers' Years of Experience and Willingness to adopt Eco-friendly Alternatives

Managers' Years of Experience in Restaurant Business	Willingness to adopt Eco-friendly Alternatives (No)	Willingness to adopt Eco-friendly Alternatives (Yes)	Total
Less than 1 year	2	1	3

1-3 years	15	34	49
4-5 years	13	24	37
Above 5 years	11	55	66
Total	**41**	**114**	**155**

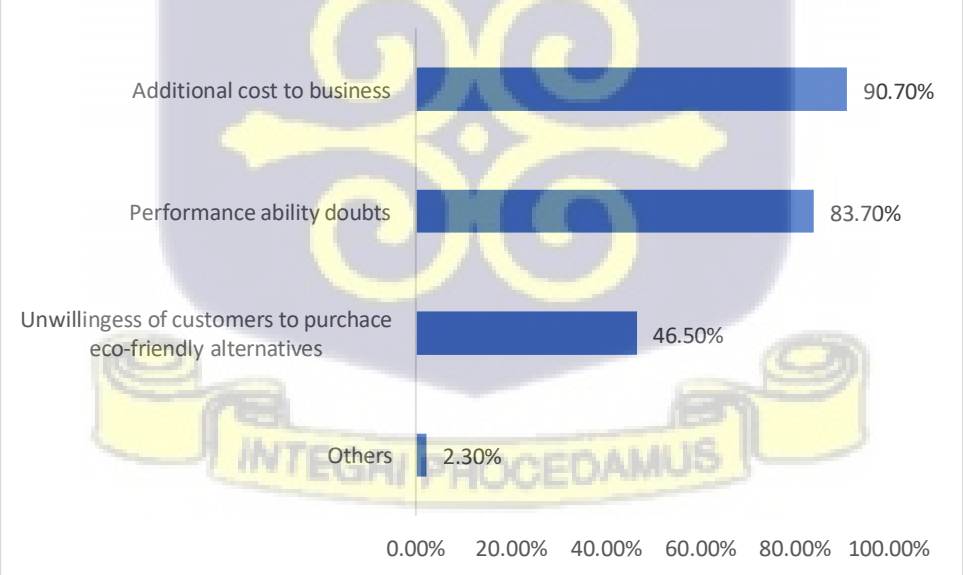
Pearson chi2 (3) = 7.6121 Pr = 0.055

Source: Fieldwork, 2021

4.6.2 Factors Constraining the Adoption of Eco-Friendly Packaging and Serving Options

Factors constraining the adoption of innovation can be in different forms. Thus, it was important to understand why the 26% of restaurants are not willing to adopt the use of eco-friendly packaging and serving options. The results revealed that managers assumed adopting eco-friendly alternatives strategies would incur additional costs to running their businesses. There were also doubts over performance ability of such practices and concerns about willingness of customers to purchase eco-friendly packaging. The constraints are shown in Figure 4.8. Their reasons are corroborated by studies which highlighted that, when managers of small businesses fail to see immediate economic benefits of pursuing environmental management, they are not motivated to pursue environmentally friendly practices. (Revell & Blackburn, 2007: Brammer *et al,* 2012). Knowledge of this is beneficial for policy and designing awareness strategies as they highlight the need to focus on educating businesses on benefits of environmental management which goes beyond economic benefits alone.

Figure 4.8 Constraints to the Adoption of Eco-friendly Packaging and Serving Options



Source: Fieldwork,2021

4.6.2.1 Absence of Regulatory and Infrastructural Framework for Restaurants

The absence of regulatory and infrastructural framework to pursue environmental sustainability is an additional constraint to restaurant's adoption of eco-friendly packaging and serving alternatives (Revell, 2002). Revell (2002) argued that restaurant managers were of the opinion that with the local administrators support and involvement of sustainable practices, they were bound to fail. Restaurants are therefore unwilling to pursue green initiatives unless they are assured regulatory support from the local government. As has been discussed previously, the respondents in this study in Madina do not have full confidence that there is enough support from the Municipal Assembly to manage their wastes efficiently and sustainably. This viewpoint was certainly proven correct per the feedback of the LANMMA Development Planning Officer in an interview:

> *"The focus* [when advocating and pursing environmentally-friendly alternatives] *has not specifically been for restaurants. We are looking at all users in totality and all users of polythene products in totality. So even though there have been efforts of advocacy in this direction, they are not restaurant-focused. They are more focused on schools and the markets."* (Interview with the Head of Development Planning, LANNMA on 17th June,2021)

Interactions with key decision-makers of the Municipal Assembly and a key player in Madina's waste management services revealed that there is no regulatory support for restaurants; neither are there specific structures or infrastructure put in place by the local administration to support restaurants to pursue a circular economy. This is a striking finding which implies that, **food and catering services in the LANMMA municipality are not specifically targeted in waste management endeavours** and thus are left to their own devices in handling and managing their waste. The lack of initiative and engagement by the local administration to this sector demonstrates institutional ineffectiveness in the sector. This finding is consistent with research by Kaza *et al* (2018) which confirms that local administrations in Sub-Saharan Africa do not provide adequate support for waste management operations; even though it is their duty to do

so.

In this study, the Municipal Assembly's (LANMMA) lack of regulatory and infrastructural support was confirmed during interactions with the Assembly's representative by the following statement:

> *"It is the Municipal Assembly's responsibility to implement waste management regulations and also to provide waste management infrastructure which include vehicles, machinery, engineered landfill sites, waste collection bins and communal containers. But the Assembly does not have the financial capacity to provide these* [on its own]. *Hence, we partner private entities to provide infrastructure* [amongst other things]*".* - (Interview with the Development Planning Officer, LANMMA on 17th June 2021)

Chou, Cheng & Wang (2012) highlighted in their study, how external factors like environmental regulations, policies and regulations and incentives can influence the adoption or non-adoption of a green initiative. In the case of this study, the absence of these external influences, or the lack of implementation of them, have prevented the pursuit of waste separation as well as the adoption of eco-friendly practices within the restaurant sector in Madina.

The issue of the absence of regulatory and infrastructural support was emphasised during the interview with the Head of Informal Waste Pickers Association for Madina:

> *"There are talks about mandating informal waste pickers to become the principal waste collection services in the municipality however this has not been approved by the Municipal Assembly. We have been promised several times how the by-laws will be enforced to mandate us as the main collectors of waste in the municipality but they just promise and talk and do not implement them. Should they do this it will help improve the indiscriminate dumping of waste by making our collection services more effective. We are already organised and have personal data on all our workers. They only need to formally partner with us."* (Interview with the Head of Madina Informal Waste Pickers Association-Madina on 22nd June 2021)

With regards to infrastructure, the key informant further stated that:

> *"There is no compost site to send rotten fruits and food to. The only compost site is ACARP at Adjen Kotoku on the Nsawam road. It is a long distance to travel with only rotten food. However, if these are not collected, they end up becoming a nuisance to*

> *the municipality. If a compost site is set up for the municipality, it would help with managing organic waste". (*Interview with the Head of Madina Informal Waste Pickers Association-Madina on 22nd June, 2021)

This assertion proves the point made by Kaza *et al* (2018) that without the backing of sound waste management policies, the work of informal waste pickers is less impactful.

It is, however, worth noting that a successful segregation plan in Madina is a possibility as this has been piloted in the past by informal waste pickers. During the interview with the key informant interviewee from the informal waste pickers association she stated the following:

> "*We* [informal waste collectors] *started a waste separation programme in Madina with a group of researchers. When it was started, different coloured 240-litre wastebin liners were shared amongst residents of Madina. We taught them which waste goes into which bag. People were compliant until the wastebin bags were filled and there was no one to pick them. We registered over 100 homes and the calls were endless. However,* ***we reduced almost 70% of their waste****; this is because they did not add plastics, paper, bottles and metals. We always start such initiatives with Madina and inform the Municipal Assembly when we do but the bureaucratic processes are long and waiting for them to get us on board stalls progress. It is better to go ahead and implement such strategies than engaging in endless, fruitless talk".* (Interview with the Head of Madina Informal Waste Pickers Association-Madina on 22nd June, 2021)

Inferring from these interactions, the role of the private sector, environmental legislation and institutional support cannot be overlooked in the pursuit and promotion of a circular economy of waste management in the restaurant sector.

4.7 Conclusion

This chapter examined pertinent issues that were highlighted by the field survey. It covered the socio-demographic and economic characteristics of respondents; the business characteristics; the waste generation characteristics of restaurants; waste separation activities; the adoption of eco-friendly packaging and serving options and absence of regulatory and infrastructural support to pursue a circular economy in the restaurant industry in Madina.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATION

5.1 Introduction

This chapter presents a summary of key findings from the analysis and discussion apropos of the objectives of the study. It subsequently draws conclusions and makes recommendations based on the findings.

5.2 Summary of Key Findings

The study examined the adoption of a circular economy by the restaurant industry in Madina. Using waste separation as the major indicator, it assessed the knowledge and waste separation practices and the determining factors of these practices of restaurants in the Madina area. It also examined the factors that influence or constrain the adoption of environmentally-friendly food packaging and serving options in the study area.

Employing quantitative and qualitative research methods, involving the use of semi-structured questionnaires and interview guides, data was on the various themes that inform the topic. The research was equally underpinned by a conceptual framework to provide direction. The key findings from the study are discussed in the sub-sections below.

5.2.1 Absence of Waste Separation Agenda Specific to Restaurant Industry

It emerged that there was no waste management strategy or agenda specific to restaurants in place; despite the fact that the sector, like every other, has specific waste management needs. Restaurant waste is collected and treated in the same way as household wastes in Madina. Whereas the administration had made general efforts to sustainably manage waste generated in their jurisdiction, they have not paid special attention to the food services industry which is a major contributor to plastic waste pollution in the country. There were also no intentions or plans by the local assembly to incorporate sustainable waste practises into the activities of restaurants in the near future.

5.2.2 Limited Knowledge and Practice of Waste Separation amongst Restaurants

A majority (56.8%) of the study population did not know about waste separation; and close to three-quarters (70.5%) of restaurants in Madina did not practise it. Restaurants in Madina are not required by law, by the local authorities or by waste collectors to separate their waste into the various streams (i.e., plastics, glass and organic wastes); therefore, a vast majority of the restaurants do not separate their waste. Unsegregated waste is usually picked up by private waste collection services or dropped off at collection points by restaurant staff.

5.2.3 Education is Significant to the Pursuit of Sustainable Waste Management Practices

It was observed from the study that the restaurant decision makers who had attained higher levels of education pursued (or were more likely to pursue) waste separation in their establishments. On the other hand, the restaurant's grade or its facilities and its years of operation did not have a direct bearing on their waste separation activities. The higher educated staff of the restaurants were more environmentally conscious and willing to go the extra mile to pursue sustainable waste management practices. Also, managers with more professional experience were more willing to take strategic business decisions towards environmental sustainability.

5.2.4 Environmental and Economic Benefits as Major Factors for Waste Separation

Majority (95.7%) of the restaurants that practised waste separation did so for its environmental benefits and this was very closely followed by the economic benefits that separation could offer the business – either by selling the wastes or saving the business money or resources. Most of the businesses (91%) were willing to pursue waste separation activities if there were some form of financial incentives.

It also emerged that the four top reasons why most restaurants did not have waste separation strategies in place were (in descending order of significance): lack of regulatory support, extra

costs of implementing waste separation strategies, the size of the establishment and concerns of non-compliance.

5.2.5 Implementation Costs as Main Constraining Factor for the Adoption of Eco-Friendly Packaging and Services

Majority (73.4%) of restaurants were willing to adopt eco-friendly packaging and services to reduce the volumes of waste they generated. The environmentally friendly alternatives Madina restaurants were willing to try were (in descending order of significance): incorporating recycling strategies; purchasing reusable and recyclable supplies; using eco-friendly packaging; minimising food waste through inventory management and composting of organic waste.

However, for those unwilling to adopt the sustainable alternatives, the driving factors that emerged from the study were (in descending order of significance): additional costs to running their business, doubts over performance and ability to sustain the new practices and unwillingness of customers to patronise the new eco-friendly. Many of the restaurants, however, were of the opinion that waste separation should be encouraged in restaurants but to make it effective, must be backed by legal and institutional structures.

5.3 Conclusion

The study aimed at examining the pursuit of a circular economy of waste management in restaurants in Madina particularly through waste separation and the use of eco-friendly serving packaging and services. As established in various studies, Ghana is grappling with sustainably managing waste all across the country. However, there are limited studies on specific sectors, their activities and how they contribute to the waste menace in the country.

This study highlights waste management issues specific to the restaurant industry in Madina: the restaurants' knowledge of sustainable waste practice of separation, their efforts in this

regard and factors that enable or constrain the decision to separate waste. It also assessed the factors that constrain the adoption of environmentally-friendly alternatives to packaging and serving food in their establishments.

The results of the study revealed an absence of an agenda for sustainably managing waste amongst restaurants; neither were there any intentions to formulate or implement such by the Municipal Assembly. Moreover, a vast majority of the population did not know or practise waste separation in their establishments. They were however willing to implement such practices if there were known benefits to pursuing these; particularly economic benefits to their businesses. Changing their packaging and providing eco-friendly food service alternatives was also an option majority of the restaurants were willing to consider. However, the additional costs it will incur on the business and the absence of regulatory support for such endeavours is a major deterrent and therefore, a barrier to the pursuit of a circular economy and sustainable waste management.

The study's findings are consistent with the findings of the conceptual framework which investigated the adoption of innovative green-practices in the Taiwanese restaurant industry. The framework highlighted the internal and external factors which usually determine the adoption of an innovation green idea. All the factors highlighted in the conceptual framework were observed in this study.

5.4 Recommendations

- Education and Awareness Creation

There is the need to create awareness of and educate decisionmakers in the restaurant industry about waste separation and also the use of environmentally friendly products to serve and package their food. This is because even though some knew the benefits of waste separation, majority of the restaurants did not know about it or practise it. Besides, many of the restaurants were of the view that waste separation practices were not in their remit as a business. Rather

this was a job of waste collectors. Restaurants' decisionmakers must be educated on their role in contributing to environmental sustainability.

Also, most of the restaurants assumed that eco-friendly services are expensive to implement without having even tried them. Educating food businesses on the sustainable options that are available to them and highlighting that these costs are not as expensive as presumed, and could even save their businesses some money, will increase the rate of adoption of sustainable waste practices in the food services industry.

- Formulation of Policies and Municipal-led Strategies

A number of restaurants expressed concerns about the lack of legal, regulatory and institutional support for sustainable waste management activities. This made them not only doubt the effectiveness of their efforts to be sustainable, but also gave them the sense that they were wasting resources by running environmentally-sustainable businesses.

Similarly, waste collectors who are eager to join the sustainable waste management bandwagon are often frustrated by the non-compliance of service users and expressed their wishes for authorities to put measures in place (at national and local levels) compelling food service providers to be compliant. Formulating and implementing legislation regarding proper handling of waste, compulsory waste separation, the adoption of environmentally-friendly services and subsequently, putting sanctions in place for perpetrators will keep all stakeholders in check; knowing that their actions or inactions would cost them. It will also encourage and increase the adoption rate of green practices in the municipality and beyond.

- Provision of Incentives

As highlighted by the study, a vast majority of restaurants were more willing to participate in waste separation if there were certain economic benefits. Similarly, waste collectors expressed that they would be more dedicated to proper waste separation if there were some advantages in

doing so. The presence of incentives like subsidies on waste management machinery, tax reductions and rewards for restaurants and waste management businesses would be instrumental in getting more food service businesses and individuals to get aboard the sustainability cause. A representative of waste collectors expressed how expensive it was to procure machinery to recover and convert waste into valuable products and also expressed how providing incentives would make a positive impact of their jobs. Also, until there is legislation to compel people to manage their waste sustainably, a reward system is a good way to motivate people to do so.

- Set-up of waste management facilities and provision of infrastructure

The local authority and waste collection services expressed how difficult it was to efficiently and sustainably manage waste with proper infrastructure like separating bins, various trucks for different streams of waste and an engineered landfill site. As it stands, the municipality shares a final disposal site with at least four (4) other municipalities. The facility, which is now private-run, is overburdened as it is managing more than its capacity can handle. Besides, the facility is a two-hour drive from the municipality and waste truck drivers have to deal with traffic delays and long-waiting times at the facility. The setup of a facility and provision of infrastructure for the municipality and neighbouring municipalities would be instrumental in promoting sustainable waste practices by making the process less painstaking for all stakeholders.

- Involvement of the Private Sector and Partnerships

The waste management scene in the LANMMA municipality is already heavily infiltrated by private entrepreneurs. According to the administrators of the Municipal Assembly, this is the only way the Assembly can make significant progress at the moment because the assembly alone lacks adequate financial resources to put elaborate sustainable waste management

strategies in place. Besides, waste is so much in abundance that the Municipal Assembly will need all hands onboard to properly manage it. Hence the need for partnerships; not only with private investors but also with waste management businesses (including small and medium scale businesses), associations and cooperatives like the tricycle riders' cooperatives. These partnerships must be formalised and properly documented to establish the extent of involvement of partners and to give boundaries to the powers they wield. As stated by a representative of the Assembly, private entities have proven to be more effective in handling business and would be a great asset in promoting sustainability in the municipality.

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APPENDICES

APPENDIX A: QUESTIONNAIRE FOR RESTAURANT PERSONNEL

INSTITUTE OF STATISTICAL, SOCIAL AND ECONOMIC RESEARCH (ISSER)
MA DEVELOPMENT STUDIES (2019/2020)
UNIVERSITY OF GHANA, LEGON

FOR RESTAURANT PERSONNEL

This questionnaire is for a research study concerned with promoting a circular economy by pursuing waste separation strategies in restaurants in Madina - La Nkwantanang Municipality (LANMMA). The research is purely for academic purpose and all information provided will be treated with the utmost confidentiality. Thank you.

Questionnaire number……

Name and Category of Restaurant…….

PURSUING A CIRCULAR ECONOMY: EXAMINING THE SOLID WASTE SEPARATION PRACTICES OF RESTAURANTS IN MADINA - LA NKWANTANANG MUNICIPALITY (LANMMA)

You have been selected as the manager or part of the management body or food vendor of your facility to participate in this study. Please confirm your willingness to participate in this interview. 1. Yes [ ] 2. No [ ]

Please tick the appropriate option and fill in where required.

Section 1: Socio-demographic characteristics

1. **Age (years):** 1. Below 20 [ ] 2. 20 – 29 [ ] 3.30-39 [ ] 4. 40-49 [ ] 5.50-59 [ ]

6. 60-69 [ ] 7. 70 and above [ ]

2. **Gender:** 1. Male [ ] 2. Female [ ]

3. **Level of Education:** 1. Senior High School [ ] 2. Diploma [ ] 3. Tertiary [ ] 4. Master's Degree [ ] 5. Ph.D. [ ] 6. Others (Please Specify) ……

4. Years of Experience in Restaurant Business: 1. Less than 1 year [ ] 2. 1-3 years [ ] 3. 4-5 years [ ] 4. above 5 years [ ]

Section 2: Characteristics of Restaurant

5. How long has this restaurant been in operation? 1. Less than 1 year [ ] 2. 1 – 4 years [ ] 3. 5 – 9 years [ ] 4. . 10 – 14 years [ ] 5. 14 – 19 years [ ] 6. 20 years and above [ ]

6. Restaurant Ownership: 1. Private-Local [ ] 2. Private-Foreign [ ] 3. Corporate owned [ ] 4. State-owned [ ]

7. What is the category/grade of your restaurant? 1. Category A / Grade 1 [ ] 2. Category B / Grade 2 [ ] 3. Category C / Grade 3[ ]

Section 3: Waste Generation

8. What kind of materials do you typically see in your waste streams? **(Please tick as applicable)**

1. Plastics [ ] 2. Food and natural wastes [ ] 3. Metals (including tins) 4. Glass [ ] 5. Paper [ ] 6. I don't know [ ] 7. Others (Please Specify) .....

9. Indicate which waste materials are generated most. ***Using numbers from 1 (most generated) to 4 (least generated).*** Plastics [ ] Food and natural wastes [ ] Metals (including tins) Glass [ ] Paper [ ] I don't know [ ] Others (Please Specify)

.....

10. Do you track the waste you generate? 1. Yes [ ] 2. No [ ] *If **NO,** skip to question 12*

11. If **YES** to question 10, how much waste is produced daily from your facility?

1. 0-5 kg [ ] 2. 6-10 kg [ ] 3. 11-15 kg [ ] 4. I don't know [ ] 5. Others (Please Specify)

….....

12. Have efforts been made to reduce the amount of waste you generate? Yes [ ] No [ ] *If no, skip to question 14*

13. If **YES** to question 12, please specify how.

……

…….....

Section 4: Waste Management

14. Who provides waste collection services for your restaurant? 1. Private waste handler [ ] 2. Municipality [ ] 3. Self-Service [ ]

If response to question 14 is ***Private Waste Handler*** or ***Municipality***, please skip to question 16

15. If response to question 14 is ***Self-Service***, please explain the process and frequency.

……

…….....

16. What is the collection frequency? 1. Every day [ ] 2. Once a week [ ] 3. Once a month 4.Other [ ] (please specify).....

17. Do you know about waste separation? 1. Yes [ ] 2. No [ ] If **NO**, skip to question 28

18. If **YES** to question 17, please specify what you know.

.....

.....

.....

19. Do you separate your waste at source? Yes [ ] No [ ] If **YES**, please skip to question 21.

20. If **NO** to question 19, why not?

……

…….....

21. If **YES** to question 19, do you send recyclable materials to be recycled? 1. Yes [ ] 2. No [ ] If **YES,** please skip to question 23.

22. If **NO** to question 21, why not?

.....

.....

23. If **YES** to question 21, what estimated amount of recyclable waste do you send for recycling per week? 1. 0-5 kg [ ] 2. 6-10 kg [ ] 3. 11-15 kg [ ] 4. I don't know [ ] 5. Others (Please Specify) .....

24. Who collects your recyclable material? 1. Private waste handler [ ] 2. Municipality [ ] 3. Self-delivery to recyclers [ ]

25. How frequent is collection/delivery? 1. Every day [ ] 2. Once a week [ ] 3. Once a month [ ] 4. Other [ ] (please specify).....

26. What influenced your decision to separate waste? **(please tick as many as applicable)** 1. Business Outlook [ ] 2. Saving Costs [ ] 3. System Efficiency [ ] 4. Environment consciousness [ ] 5. Policy [ ] 6. Education [ ] 7. Other (please specify)

……
…….....

27. Further explain how your choice(s) in question 26 contributed to your decision.

……..……..……
……
……
…….....
.....
.....

28. What do you do with your left-over food? 1. Dispose with other unseparated waste [ ] 2. Donate [ ] 3. Give staff members [ ] 4. Dispose as food waste [ ] 5. Other [ ] (please specify).....

29. If waste separation could be proven beneficial to your establishment, would you consider pursuing it? 1. Yes [ ] 2. No [ ]

30. Please give reasons for your choice in question 29.

.....

.....

.....

.....

.....

Section 6: Underlying Reasons for Pursuing Waste Separation and Greener Practices

31. Do you have waste separation strategies in place? Yes [ ] No [ ]

If **NO**, please skip to question 35.

32. If **YES** to question 31, please describe these strategies in details

.....

.....

33. If **YES** to question 31, are these strategies documented or verbally communicated? 1. Documented [ ] 2. Verbally Communicated [ ]

34. If **YES** to question 31, why were these strategies developed?

.....

.....

35. If **NO** to question 31, would you be willing to adopt waste separation strategies in your establishment? Yes [ ] No [ ]

36. If **NO** to question 31, why do you not have waste strategies in place?

(please tick as many as applicable) 1. Extra costs to Implement [ ] 2.Lack of Regulatory Support [ ] 3. Size of establishment [ ] 4. Concerns of Non-compliance [ ] 5. Others (Please specify)

.....

.....

37. Please explain into details your choice(s) in question 36.

.....

.....

.....

38. Would you be more willing to adopt waste separation practices if there were some incentives? 1. Yes [ ] 2. No [ ] If **NO,** please skip to question 40.

39. If **YES** to question 38, what forms of incentives will make you more willing to adopt waste separation
practices?.....
.....
.....

40. If **NO** to question 38, why
not?.....
.....
.....

41. Are you willing to consider eco-friendly strategies and serving alternatives in order to reduce generated waste? 1. Yes [ ] 2. No [ ] If **NO**, skip to question 43

42. If **YES** in question 41, please specify which kinds of eco-friendly alternatives you will consider. ***(Please tick as applicable)*** 1. Incorporating recycling strategies [ ] 2. Purchasing reusable and recyclable supplies [ ] 3. Minimising food waste through inventory management [ ] 4. Composting of food waste [ ] 5. Using eco-friendly packaging [ ]

43. If **NO** to question 41 please indicate why ***(Please tick as applicable)***

1. Additional cost to business [ ] 2. Unwillingness of customers to purchase eco-friendly packaging [ ]

3. Doubt over performance ability [ ] 4. Others (please specify) :
……..

44. Please give **specific ways** you expect to implement the particular choice(s) in **question 42**.

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45. In your opinion, should waste separation be encouraged **in the food industry?** (please give reasons for your response)

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46. Is there any other information related to waste management that you feel we should take note

of?.....

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.....

47. Are you a registered business? 1. Yes [ ] 2. No [ ]

THANK YOU FOR TAKING TIME TO PARTICIPATE

APPENDIX B: INTERVIEW GUIDE FOR RESOURCE PERSON AT THE MUNICIPAL ASSEMBLY

INSTITUTE OF STATISTICAL, SOCIAL AND ECONOMIC RESEARCH (ISSER)

MASTER'S OF DEVELOPMENT STUDIES (2019/2020)

UNIVERSITY OF GHANA, LEGON

INTERVIEW GUIDE FOR RESOURCE PERSON AT THE MUNICIPAL ASSEMBLY

PURSUING A CIRCULAR ECONOMY: EXAMINING THE SOLID WASTE SEPARATION PRACTICES OF RESTAURANTS IN THE LA NKWANTANANG-MADINA MUNICIPALITY (LANMMA)

1. What is your position and your scope of work in the Municipal Assembly?
2. What is the waste generation situation across various sectors in this municipality?
3. What is the waste generation situation particularly for restaurants?
4. What is your department's role in addressing waste management in the restaurant industry?
5. How often do you advocate for the adoption of waste separation practices especially amongst restaurants?
6. Are there any guidelines for waste separation promotion in the municipality, and particularly for restaurants? If **YES**, elaborate on the rationale behind it, and if **NO**, why not?
7. How has your department advocated for the use of more environmentally friendly alternatives to packaging in the food service industry?
8. What are the opportunities and challenges for the adoption of waste separation practices in the restaurant sector?
9. Have you considered adopting Circular Economy practices? If **YES,** please elaborate, if **NO**, why not?
10. What pertinent issues should be tackled to enhance the adoption of circular economy practices amongst food vendors in the municipality?

11. How often do you interact with restaurant owners or managers in the municipality?

APPENDIX C: INTERVIEW GUIDE FOR WASTE COLLECTORS IN THE MUNICIPALITY

1. What is your role and your scope of work?

2. Are you self-employed, employed by a private waste organisation or employed by the Municipal Assembly?

3. How long have you been in this role?

4. What is the general waste generation and management situation in Madina?

5. Do some sectors (eg. household, markets, shops etc) produce more waste than others?

6. Are restaurants some of your main clients?

7. Are there special waste service agreements with food establishments/restaurants? If YES please elaborate, If NO, why not?

8. How do you dispose of restaurant waste?

9. How would it be beneficial to you if restaurants segregated their waste before collection?

10. Are you interested in handling certain kinds of waste because of the value they carry or the opportunities they present?

11. Do you have a general diversification/expansion plan? If Yes, how can restaurants help you to achieve it?

12. If there were added incentives, would you be willing to ensure restaurants segregated waste before collection? If **YES,** please specify which kind of incentives. If **NO**, why not?

13. How can waste separation be encouraged in the restaurant industry?

14. What is the average salary of a waste collector?