UNIVERSITY OF CAPE COAST

THE ROLE OF SCRAP COLLECTORS IN ACHIEVING SUSTAINABLE SOLID WASTE MANAGEMENT IN THE CAPE COAST METROPOLIS- GHANA.

DANIEL KOOMSON

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BY

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DECLARATION

Candidate's Declaration

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

Candidate's Signature…….... Date…….

Candidate's Name: Daniel Koomson

Supervisors' Declaration

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

Supervisor's Signature…….……..... Date……...

Supervisor's Name: Professor Simon Mariwah

ABSTRACT

Waste is an inevitable by-product of human activity, and as a result, waste management has evolved into a worldwide problem. The study's specific goal was to look into the amount of scraps collected as well as the sources from which they came, scrap collector activities, an assessment of the challenges scrap collectors face, and an investigation into how scrap collection could be incorporated into the formal waste management system. This study, which was conducted within the Cape Coast metropolitan area in the Central Region of Ghana, used a descriptive research design. The collectors of scrap metal, traders in scraps, and the Waste Management Department of the Cape Coast Metropolitan Assembly, made up the target demographic (CCMA). One officer from the CCMA was included in the sample along with twenty-two scrap collectors and two scrap dealers. Snowball and purposive sampling were used. The primary data were gathered through preliminary observations made on the field and interviews conducted face to face. With the help of theme analysis, the data was processed and analysed qualitatively. Findings from this research, showed that scrap collection is primarily performed by men. It was also found that both the formal and informal waste management systems contribute to sanitation; however, scrap collectors with their precarious operations are not included in the formal waste management system, which presents a challenge in the pursuit of sustainable waste management in the Cape Coast Metropolis and Ghana as a whole. In conclusion the Cape Coast Metropolitan Assembly's waste management division need to establish procedures to formally recognise scrap collectors as the first response team in

sustainable waste management and equip them with the tools they need to expand their service area.

KEYWORDS

Cape Coast Metropolis

Scrap collectors

Solid waste

Sustainable

Waste management

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DEDICATION

To my family

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CHAPTER ONE

INTRODUCTION

Background to the Study

Waste is an inevitable by-product of human activity, and as a result, waste management has evolved into a worldwide problem. Prior to the public's focus on water and air pollution, Chandrappa (2016) established that solid waste existed as a challenge. Any item or product that must be discarded because it is damaged, worn out, polluted, or rotten is considered waste. This includes scrap material, effluent, and other undesirable surplus substances generated during the implementation of a process (Department for Environment Food & Rural Affairs, 2016). Any material or object that the holder discards or plans to discard can be considered garbage. The source may be the person who generates the waste or the person who has physical possession of the rubbish (Chalam, et al 2015). To complicate matters, the concept of "waste" is very contextual; what one person considers to be waste, another may view as a useful commodity (Williams, 2010). Packaging design, grass clippings, furniture, apparel, bottles, food scraps, newspapers, electronics, and batteries are all examples of Solid Wastes (SW) generated by households, institutions, restaurants, grocery stores, and other commercial establishments (Zerbock, 2020; United States Environmental Protection Agency, 2013 as cited in Gyimah, 2018).

Waste disposal has emerged as a global concern for both the economy and the ecosystem. Nevertheless, in the twenty-first century, waste production has risen at a rate that exceeds urbanisation (Hoornway & Bhada-Tata, 2012; World Bank, 2012). In 2009, a projected 2.9 billion people were living in

cities producing 0.68 billion metric tonnes of Municipal Solid Waste annually. A decade later, in 2019, the number of urban inhabitants has surged to just about 3 billion (a less than 3% increase), whereas the generation of municipal solid trash has risen to 1.3 billion metric tonnes per year (an approximately 100% increase). This trend, which shows a roughly doubling of municipal solid trash creation over ten years despite a correspondingly small rise in the population that produced this waste, serves to demonstrate the expanding difficulty of waste management. The World Bank analysis predicts that by 2025, the number of people living in urban areas will reach 4.3 billion, while the amount of municipal solid waste produced annually would reach 2.2 billion tonnes. At least 33 percent of the 2.01 billion tonnes of municipal solid garbage produced each year globally is not managed in an eco-friendly way (Kaza, Yao, Bhada-Tata, & Van Woerden, 2018). By 2050, it's estimated that the amount of garbage produced worldwide would have increased to 3.40 billion metric tonnes (Kaza et al., 2018). In addition, it is anticipated that by 2050, the overall amount of waste produced in low-income nations will grow by more than three to four times.

Lack of harmony between humans and their natural surroundings can be traced back to factors such as the global rising population, the spread of rapid industrialization and urbanization, the rise of an uncontrolled consumer culture, and the challenges of regulating individual behaviour. Due to human activities, the natural balance between humans and their environment has been disrupted, leading to an increase of waste (World Bank, 2012).

Increases in residential and industrial waste production in Africa are cyclical, mirroring increases in economic activity and per capita spending

(Achankeng, 2016). Waste production in African countries is on the rise and might double in a decade as a result of rising populations and higher standards of living (AFDB, 2012).

Despite major efforts by some governments in recent years to improve solid waste management practises, many towns in growing countries still encounter significant challenges in efficiently managing the ever-increasing quantities of waste produced by individuals (Kaseva & Mbuligwe, 2003; Kitbuah, Asase, Yusif, Mensah& Fischer, 2009). Zerbock (2020) estimates that solid waste management accounts for 20–50% of city budgets in developing nations. It has been suggested by Zerbock (2020) that even if emerging economies spend between 20 and 50 percent of urban income on solid waste management, this is still not enough to keep up with the growing problem. Less than half the population is being served, and between 40 and 70 percent of the urban solid waste is not being gathered (UNEP, 2014). A growing challenge for all emerging nations is the lack of accessible landfills for the solid waste management even more so than urbanisation and rising population (Kaosol, 2021). Finding a reliable place to dump waste is a major challenge for most municipalities.

When waste is not properly managed, becomes a threat to health and a major social and environmental problem (E,K Nunoo,1019). Abul (2010, as cited by Yeboah, 2017) elucidated, the repercussions of inefficient waste collection and waste management are far-reaching. Diarrhoea is common in children under the age of five, and Boadi and Markku (2015) found that this is due to food contamination by flies that had dined on waste. Other health effects of poor solid waste management include respiratory issues, skin, nose,

and eye irritation, digestive troubles, mental conditions, and hypersensitivity. Malaria and cholera epidemics can also be traced back to improper solid waste management (Cointreau-Levine, 2019).

Since 1990, there has been a worldwide uptick in interest in issues of sustainable development and environmentally-friendly policymaking, and SWM plays a key role in achieving SDG 6, Ensuring Environmental Stewardship (Kohlscheen, 2003). Goal 12 of the Sustainable Development Goals (SDGs) aspires to significantly reduce solid waste production via minimization, recycling, and reuse by the year 2030, whereas goal 11 of the SDGs pushes for making cities and human settlements inclusive, safe, robust, and sustainable. As a result, proper garbage disposal is a key factor in progressing humanity. This is because improper waste management can have serious consequences for people's well-being, the environment, and the economy on a local, national, and global scale. The effects are particularly pronounced in places where waste isn't picked up or treated at all. The expenses of improper waste management are sometimes much larger than the initial price of good waste management (Hoornway & Bhada-Tata, 2018).

The government of Ghana has, over the years, enacted a number of policies and a legislative and institutional framework, including the Environmental Sanitation Policy, first drafted in 1999 (ECO Discipline, 2012) and scheduled for revision in 2020. More laws aimed at lowering waste have also been passed. Despite these efforts, waste management in Ghana continues to be an issue. In the realm of waste management, public input is regarded as crucial (Kohlscheen, 2016). For Sanoff (2018), true involvement occurs when citizens are given agency in solving problems and when officials encourage

citizen input during the decision-making procedure rather than imposing predetermined solutions (as cited in Kohlscheen, 2009). Sanoff (2016) elaborated on these goals, elaborating on how community involvement can lead to improved information sharing, higher levels of user satisfaction, a more well-kept physical space, and greater public awareness of the issue.

Various waste management operations in Cape Coast are overseen by the Cape Coast Metropolitan Assembly (CCMA), which reports to the Ministry of Local Government and Rural Development. In accordance with the requirements of the Local Government Act of 1993 (Act 462) , this encompasses all phases of waste management. One of the many problems the Metropolis has to deal with is the alarmingly high rate at which it produces garbage. The CCMA reports that garbage is often not collected on time and that waste bins often become overflowing. If nothing changes in CCMA for the next 25 years, the population and the quantity of SW that will be generated are shown in Table 1.

Table 2: Estimates of solid waste generation quantities in the Cape Coast Metropolis

Years estimated	population	Generation rate	Daily Tons	Annual in Tons
2014	220,000	0.75kg/day	165	60,255
2020	264,225	0.75kg/day	198	72,322
2030	358,560	0.75kg/day	269	98,156
2040	486,573	0.75kg/day	365	133,199

Source: GNWPTA, based on Census 2020 population data and daily generation rates derived from NESSAP, 2020.

In 2014, the Metropolitan Assembly produced roughly 60,225 metric tonnes of solid waste, based on its projected 220,000 residents' 165 metric tonnes of daily waste. If this situation continues, the population of the Metropolis would increase to 486,573 by the year 2040, and the volume of solid waste generated annually will increase to 133,199 metric tonnes.

Therefore, finding novel and efficient strategies for handling solid waste responsibly is of the utmost importance. Lowering the volume of waste that is thrown away helps landfills last longer, and recycling and reusing items are also important parts of an effective and sustainable integrated waste management strategy.

Some individuals in the Cape Coast Metropolis eke out a livelihood by collecting scrap metal, which is also one of the principal strategies to reduce the quantity of rubbish entering the main waste stream. Discarded materials of economic worth are known as "scrap." As such, it stands in for the shards and scraps that are produced as a by-product of a particular manufacturing process. Although the loss is significant, the product has little value unless it is refined (Lodha, 2017). In Ghana, those who travel around gathering and selling scraps are known as scrap collectors/dealers, but the government has not yet found a way to include them into the country's primary solid waste management stream (Oteng-Ababio, 2016).

Metals from obsolete items or demolished buildings, as well as scrap from factories, are collected and refined into usable forms as a raw material in production (Leblanc, 2018). Humans have always recycled in some way or another, thus the 20th century wasn't the first time the concept of recycling metals and plastics was considered. Early Bronze Age man, for instance,

would not have thrown away usable metal because it was broken or no longer needed. Large-scale scrap recycling is generally thought to have begun with the advent of modern metallurgical industries during the industrial revolution (often dated between 1730 and 1850). (Emery et al., 2000 cited in Javaid & Essadiqi, 2015).

The recovery, reusing, and recycling of solid waste are all helped by the activities that these scrap collectors participate in, which is primarily why the presence of these scrap collectors has helped to remove the barrier that prevents the functioning of solid waste collection and disposal services. The term informal waste sector is used to describe the broader waste collection and recycling operations of waste collectors and decomposers, of which scrap collection is a subset. Both of these names are commonly used to refer to the people whose job is to collect waste and separate recyclables and useable items. These types of endeavours are typical of the informal economy because they rely heavily on human labour but are unorganised, unreported, and uncontrolled (Wilson et al. 2006 cited by Oteng Ababio,2017). Because of the unsanitary conditions in which they labour in the dumpsites, most municipal authorities in Ghana, according to Badoe (2015), do not recognise their actions. Sustainable waste management will be greatly aided by formalising and regulating their operations and incorporating them into the existing waste management system (Osei, et al 2010). This study therefore sought to evaluate the role of scrap collectors in achieving sustainable solid waste management in the cape coast Metropolis.

Statement of the Problem

Waste management is a serious issue in Ghana, as it is in many other developing nations. There are 35 waste treatment facilities in Ghana, however only four are now functioning (Badoe, 2015). For instance, the collection rate of Cape Coast Metropolitan Assembly is 5.5%, which is a relatively low number when compared to other metropolitan assemblies' rates, such as Kumai Metropolitan Assembly's (17.2%) and Accra Metropolitan Assembly's (59.4%), amongst others (Badoe, 2015). Therefore, proper waste management remains an issue in the Cape Coast Metropolitan Area. Over the past few years, the Cape Coast Metropolis has seen a steady rise in the amount of trash produced by its residents and businesses. Authorities in charge of waste management in the Metropolis have not yet established a system for collecting and properly disposing of garbage that is both effective and sustainable. This leads to doubts regarding the efficacy of these efforts and necessitates an evaluation of existing urban solid waste management systems to inform planning and developments.

To what extent are scrap collectors and dealers in the Cape Coast Metropolis acknowledged and incorporated into the existing waste management system, given that scrap collection appears to be one of the key ways of lowering the quantity of waste that reaches the current waste system? Sustainable waste management has included the participation of scrap collectors or scavengers who gather recyclable debris from landfills, streets, and homes to resell to scrap merchants or dealers. Sometimes members of the public may even view them as thieves and accuse them of theft and espionage on behalf of arm robbers because their operations are not controlled, recorded, or incorporated into the larger waste management system. Additionally,

despite the fact that research on scrap collection has been carried out in other regions of Ghana (Oteng-Ababio, 2017; Oteng-Ababio, 2011), no research of this kind has been carried out in the Cape Coast Metropolitan area to document the activities, obstacles, and the number of scraps gathered by these scrap collectors out of the existing waste stream. To codify and control their actions, local councils need more information and evidence than they now have.

Therefore, since no empirical studies have been conducted in the metropolis, there is a need for this research to ascertain how the activities of scrap collectors could be integrated and formalized into the current waste management system.

Objectives of the Study

The study set out to evaluate scrap collectors' contributions to the Cape Coast Metropolis's long-term goal of sustainable solid waste management. More specifically, this research aims to:

1. Examine the sources and quantity of scraps collected in the Cape Coast Metropolis.
2. Analyse the operations of scrap collectors in the Cape Coast Metropolis.
3. Assess the challenges faced by scrap collectors in the Cape Coast Metropolis.
4. Explore for sustainably ways scrap collection could be integrated into the formal waste management system in the Cape Coast Metropolis.

Research Questions

1. What is the sources and quantity of scraps collected in the Cape Coast Metropolis?
2. How do scrap collectors operate in the Cape Coast Metropolis?
3. What are the challenges faced by scrap collectors in the Cape Coast Metropolis?
4. How could scrap collectors be integrated into formal waste management system in the Cape Coast Metropolis?

Significance of the Study

There are a lot of reasons why this study is important. The report offers helpful suggestions for the CCMA about the formalisation and regulation of scrap collection in order to incorporate it into the existing waste management system

through the implementation of sound administrative policy information.

Additionally, the Waste Management Department in Cape Coast Metropolis and other MMDAs in Ghana will find the study to be a helpful reference material for understanding how the incorporation of scrap collecting could contribute to sustainable management of waste.

The study would provide valuable information to the Cape Coast Metropolitan Assembly (CCMA) and other organisations like the Cape Coast Metropolitan Waste Management Department in order to promote SWM techniques that are good for the environment, accountable to the community, and cost-effective in the Cape Coast Metropolis. In conclusion, the results of the study will contribute to the body of prior information on methods of environmentally responsible waste management and provide a foundation for additional investigation.

Delimitations of Study

The study was conducted in the Cape Coast Metropolis, in the Central Region of Ghana. This research looks into how scrap collectors in the Cape Coast Metropolitan Area help get us closer to our aim of achieving sustainable waste management. Participants comprised scrap metal collectors, dealers, and the Cape Coast Metropolis Assembly's Waste Management Department (CCMA). The conceptual dimension leads to the conclusion that the engagement of scrap collectors and scrap traders, both of whom were chosen to be interviewed in the Metropolis, is necessary. As a direct consequence of this, the findings of the study are restricted to the study area, despite the fact that references might be made to other regions with features that are comparable to those of the study area. In spite of this, it serves as a solid foundation for additional research into the questions raised by the subject as well as the aims of the study. In addition to this, it investigates the research questions, the significance of the study, the delimitations, the restrictions, and the organisational structure of the study.

Organization of the Study

This research is organised into five sections. The first chapter is an introduction to the investigation; it provides some background information, offers a description of the problem, and explains the objectives of the study. In addition, it reveals the study's limitations, scope, and significance. The second chapter provides literature review to back up discussion on the role of scraps in achieving sustainable waste management in the cape coast Metropolis and its associated challenges. The study's methodology is laid out in chapter three, which discusses the study's rationale, scope, data sources, population of

interest, sample size, sampling strategy, instruments used in the study, analysis of results, any ethical concerns that arose during fieldwork, and difficulties encountered during the study's fieldwork. The data analysis, presentation, and discussion of the results are the topics that will be covered in the fourth chapter. The findings, interpretations, and suggestions derived from the research are presented in chapter five.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter discusses the previous research that has been done on the subject. As a result, it is organised into three major sections, specifically the theoretical review, the empirical review, and the conceptual framework. The theoretical evaluation centres its attention on the relationship between recycling efforts and environmentally responsible waste disposal practices. There is discussion of the Zero Waste theory, the Circular Economy Concept, and Institutional theory, all of which are fundamental to the subject. In addition to that, it provides definitions of several terms and ideas connected to scraps and environmentally responsible waste management.

Theoretical Concepts of Emerging Trends in Sustainable Waste Management

The theories of sustainable waste management that were employed in this study aimed to provide an explanation for the recent developments in the collection of scrap metal in order to accomplish sustainable waste management goals.

Emerging developments in environmentally responsible waste management have developed in accordance with laws and concepts of this kind. Some of the methods and techniques used by these decision support models are integrated waste management (IWM), cost-benefit analysis (CBA), and life cycle analysis (LCA) (Morissey & Browne, 2016). Cost-benefit analysis (CBA)-based waste management methods typically monetize the monetary, social, and environmental impacts of waste (Berkhout & Howes, 2020).

It is straightforward to assign monetary values here based on the capital expenditures and operational surpluses associated with building and operating waste management facilities. The cost of reducing pollution caused by a waste treatment plant or the amount that consumers are prepared to pay for an improvement in environmental quality can be used to get an approximation of the effects that will be felt by society and the environment. Those practises of waste management that are based on LCA of products involve the assessment of the environmental elements and possible effects that a product may have throughout its entire lifecycle, beginning with the acquisition of raw materials and continuing through production, use, and disposal.

This study builds upon previous work by using an Integrated Waste Management system (IWMS) for the greater Cape Coast area to implement a new strategy for solid waste management that places greater emphasis on the city's social, economic, and environmental sustainability. The sustainable waste management system should be run in conformity with Agenda 21

objectives, as established at the UNCED World Summit in Rio de Janeiro in 1992, and the particulars of its local implementation (Local Agenda 21).

Zero-Waste (ZW) theory

Waste management has recently shifted toward the Zero-Waste philosophy. According to the European Regional Development Fund (ERDF), the word Zero Waste first appeared in the 1970s and was subject to a variety of interpretations and points of view at the time. In 1973, Palmer, (2004) was the first person to use the word zero waste (ZW) as a term to refer to the process of recovering resources from chemical waste. According to the San Francisco Department of Environment (2011), zero waste refers to the practise of not depositing any waste in landfills or incinerators, as well as enacting regulations that cut down on waste and expand access to recycling and compost. Zero Waste is a straightforward method for summarising goals that aim to minimise the negative impact that waste has on the surrounding environment. This is a far-reaching objective that, among other things, eliminates waste, helps the environment, and increases the value of materials (Phillips et al., 2011). According to Tennant-research Wood's (2003), the Zero Waste system advocates for a circular economic material system, also known as a closed-loop materials economy, in which a product is designed to be reused, repaired, and recycled. This type of economic system reduces waste to an absolute minimum and, eventually, does away with it entirely.

The concept of "zero waste" (ZW) refers to a theory that explains how to derive the greatest amount of value from the use of waste as an asset, thereby reducing the amount of waste produced and maximising its potential for reuse in order to realize economic benefits, according to the ERDF (2010).

It posits that there is both a solution and a directive policy to the issue of waste, which is that waste is a problem. This not only gives novel methods by which everyday activities might aid in converting waste into assets, but it also prevents the problem of waste from getting worse. Since their inception, Zero Waste techniques have been implemented in a significant number of countries and regions across the globe. The European Regional Development Fund provides a list of cities that have adopted Zero Waste techniques. It is stated that Canberra, which is located in Australia, was the first city in the world to establish a vision of the Zero Waste by the year 2010, backed by the municipalities of Seattle, Del Notre County, and Santa Cruz County, all located in the United States.

Zero Waste strategies have been adopted by a large number of big firms worldwide, including Hewlett-Packard, Xerox, and Honda Motors, amongst others. ERDF describes a case study from Canberra, Australia, which implemented Zero Waste (ZW) regulations in an effort to create a trash-free society by 2010. These Zero Waste policies have created markets and jobs via the persistent repurposing of waste and community-based composting and recycling. Because of this, the community was able to achieve a local economy that functions effectively, maintains strong jobs, and offers better strategies. The Zero Waste (ZW) idea encourages environmentally responsible waste management by pointing toward more effective ways of utilising scrap metal as an asset for the reduction of poverty.

Waste is seen as a valuable resource, rather than an unnecessary nuisance, in the Zero Waste Plan developed by the Scotland Environmental Protection Agency (SEPA) for the Scottish Government. The Scottish

Government has set this initiative in motion. The amount of garbage hauled off to landfills has dropped dramatically as a result of this regulation, from 16 million metric tons in 1994 to 4.5 million metric tons in 2010, while at the same time, the treatment of organic matter has increased production and helped in the development of fertilisers (SEPA, 2014).

When Zero Waste is applied, it means that all forms of waste disposal will be eliminated, notably the disposal of scrap material in the land, water, or air that poses a risk to the environment, human health, or the health of animals or plants. The Zero Waste (ZW) idea is continuously expanding, and its application is not confined to recycling alone; rather, it also involves rethinking the product design in order to forestall the formation of waste in its early phases. In this regard, residents of the Cape Coast Metropolis are obligated to reuse, repair, and recycle any and all discarded materials that are considered to be an environmental hazard in the area. In addition to the reusing, recycling, and mending of these waste items, the larger issue at hand is the development of an economic structure inside the nation that encourages the growth of companies that are competent of reusing, recycling, and recycling scrap material. The lack of such businesses within the Cape Coast Metropolis makes it difficult for scrap collectors to do their jobs and presents a barrier to the implementation of Zero Waste in the city, despite the fact that this looks to be a wider problem that affects the nation as a whole.

The Zero Waste theory acknowledges the significance of the role that Ghana's scrap collectors serve in the country's efforts to achieve sustainable waste management. Since unofficial waste collection is not incorporated and institutionalised into the existing waste stream, the pursuit of holistic waste

management that is also sustainable is unquestionably a difficult undertaking. As a result, the theory advocates the participation of waste reduction, recovery, reuse, and recycling of scraps in order to manage waste and scraps in an environmentally responsible manner. It's possible that the search for self-sustaining or zero waste practises needs to also consider the gathering of scraps or recyclables from consumers, such as old newspapers, metals books, cardboards, plastics, and glass bottles. These wastes are then sold by small scrap dealers to a wholesaler, who then separates and sorts them so that it can be reprocessed or recycled.

The Circular Economy Concepts

The value that is placed on waste has substantially increased as a result of the rising costs associated with managing waste in a sustainable manner as well as the significance of reducing, reusing, recycling, and recovering items. The term "Circular Economy" refers to an economic model that sees waste as a resource that can be used to fight against poverty. It considers the existing take-make-dispose linear economy strategy to be the primary contributor to the current trash explosion that is taking place. Instead of throwing away items that are no longer useful, the notion of circular economy waste recognises that there are resources in unwanted products, primarily scraps, and that new items can be manufactured from them. This encourages people to avoid throwing away things that are no longer useful (Vision 2020). According to the findings of Peralla (2011), around eighty percent of products that are sold by production companies are abandoned during the first six months of their life cycle.

The European Commission has committed to a program titled "Towards a Circular Economy": A Zero Garbage Program for Europe in an effort to raise the rate of recycling and reuse of recyclable waste to around 70 percent by the year 2030 and to minimize the quantity of food waste by 30 percent (European Commission, 2015). They argued that implementing actions that take a circular economic perspective, such as recycling, reusing, repairing, and upgrading, will significantly reduce the quantity of waste that is added to the stream. They predict that this might provide a net significant savings to 600 billion euros for the EU, enhance productivity by 30 percent by the year 2030, which could boost the GDP of the EU by a percentage, and so on.

Further, it is hoped that this would result in the creation of around two million additional job possibilities (European Commission, 2015). Their Resource Efficiency Agenda, formed as part of the Europe 2020 Strategy for smart inclusive growth, places a premium on empowering individuals to reduce, reuse, and recycle waste in order to mitigate the waste industry's massive impact on development (European Commission, 2015).

According to Valavanidis (2018), the method known as the "circular economy" places an emphasis not only on the reuse of products, components, and materials but also on reprocessing, refurbishing, repair, cascading, and modernizing. Additionally, the circular economy places an emphasis on lowering the population's energy requirements by promoting the utilisation of alternative forms of energy all through the value chain of products. These alternative energy sources include solar, wind, biomass, and waste-derived energy (Mihelcic et al. 2003; Rashid, Asif Faqrazee, Krajnik, & Nicolescu,

2013). In a nutshell, the model of circular economy seeks to imitate processes that are analogous to those that take place in natural settings (European Parliament, 2015).

In the context of this study, the concept of the circular economy and its application to the recycling of waste (scraps) into assets for the alleviation of hunger is even more persuasive. According to research conducted by McKinsey and referenced by Perella (2014), transitioning toward a circular economy that seeks to eliminate waste by recycling or reprocessing it into resources might contribute one trillion United States dollars to the world's economy by the year 2025 and generate 100,000 new employments within the span of five years. Because developing nations such as Ghana face significant obstacles on the path to attaining sustainable waste management, there is an immediate and pressing need to tap into recyclable garbage as a resource agenda in order to foster growth.

Institutional theory

Some scholars of institutional theory argue that the human services sector's organisational structure is not governed by technological constraints but rather by norms arising from the broader institutional setting (Hasenfeld & Garrow, 2009). It contends that market exchanges are not the primary factor in determining the interactions that exist within a human service sector but rather laws and regulations. As Harvey (2005) argues, the state's responsibility in a public-private partnership is to establish and maintain an institutional system that allows for the efficient delivery of public services by the private sector.

These regulations will have an impact on how decisions are made within a sector regarding goals, means, and money, and how those decisions are

distributed among the component elements (Hasenfeld & Garrow, 2009). Therefore, various degrees of decentralisation, fragmentation, and federalization might be expected across the various sectors. That is to say, sectors might vary from one another in terms of how responsibilities and authorities are distributed from a central place or authority, as well as in terms of how large or tiny a sector is.

The manner in which the operations of the entities that make up a sector are managed also varies from sector to sector. Cheema (2003) makes the argument that even though the public sector endorses efforts to improve operational efficiencies, the private sector's drive for profit creates potential conflicts of interest with beneficiary governments. These governments are dedicated to fostering equity and ensuring that their citizens enjoy the highest possible standard of living.

On the other hand, authorities are frequently willing to allow their corporate partners to make a small profit in exchange for 22222enhanced service and efficiency, leveraging the financial capacity of the government, and speeding up the implementation of projects (Cheema, 2003). It was established by Da Zhu et al. (2008) that the legal structure is essential for sustainable waste management. This is because of the complexity of the Waste Management (WM) system as well as the participation of a large number of actors.

Meeting the rising demand for adequate sanitation service is notoriously challenging for a number of reasons, the most prominent of which are institutional, technical, and budgetary constraints at the various levels of government (national, regional, municipal, and private) (Amoah & Kosoe,

2014). It has been demonstrated once more that the state is gaining greater attention as a result of the statement that the participation of the private sector in the delivery of services without adequate state regulation makes the entire process more vulnerable. (Smith 2004).

Concerning this study, the institutional theory describes the implementation of organizational practices that promote reduction, reuse, and recycling of waste products, as well as co-processing, incineration, landfilling of waste products particularly scraps (Gunarathne, 2014). Gunarathne expands by saying that, according to institutional theory, coercive, mimetic, and normative pressure are the three most important factors in influencing a company to implement waste management methods.

Environmental standards and standard operating procedures have a significant role in persuading firms to adopt waste management techniques. These factors are complementary to coercive constraints. Mimetic pressures include the practises of other prominent organisations, consulting companies, business trade organizations, and disclosure criteria.

In conclusion, shifts in the expectations of stakeholders, the practise of recruiting candidates from the same industry, the practise of recruiting staff from a limited variety of education institutions, and the practise of common promotion practises are some examples of normative pressures that will put pressure on organisations to embrace waste management practises.

When we apply this logic to the context of waste management, we see that activities at the bottom of the hierarchy, like waste reduction, reuse, and recycling, are impacted by coercive forces, whereas behaviours at the top of

the hierarchy, such trash incineration and landfilling, are motivated more by normative and mimetic pressures.

It is necessary to shift from coercive demands to more normative and mimetic pressures in order to make waste management more effective. This shift in pressure needs to be the duty of many different social actors in order to raise the number of scraps that are recycled.

Integrated waste management (IWM)

Another strategy that can be implemented to properly manage waste in a sustainable manner is integrated waste management (IWM). As was stated before, this strategy, which is interchangeable with waste minimization and recycling, constitutes a practicable option (Puopiel, 2010). The amount of waste that needs to be thrown away might be drastically cut down if most waste could be recycled back into something useful, like materials and resources that could be put to financial use. Because of this, the concept of the "3 R's," which stands for reduce, reuse, and recycle, is the foundation for the integrated waste management system that is currently in place.

Households and relevant authorities in the locations where a pilot test of an integrated waste system was undertaken (Wuxi, People's Republic of China; Pune, India; and Maseru, Lesotho; respectively) stated their contentment with the system. These locations are Wuxi, People's Republic of China; Pune, India; and Maseru, Lesotho (Puopiel, 2010). It has been proved that a sizeable amount of waste can be saved from landfills and repurposed into a useful resource if the appropriate methods for sorting waste and recycling materials are carried out (UNEP, 2009).

In a similar vein, the United States Environmental Protection Agency (USEPA) stated in 1999 that in order for a state, local government, or household to organise for and use the Integrated Waste Management tool, a power structure of steps consisting of reduced waste, recycling, and landfill disposal needs to be abided. This hierarchy is depicted in a model for Integrated Waste Management (Figure 1).

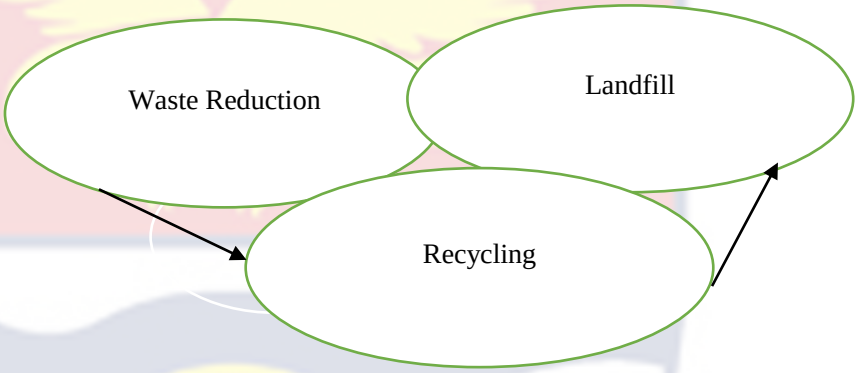

Figure 1: A Model for Integrated Solid Waste Management (Source: Poupiel, 2010)

Waste reduction

Waste reduction refers to the process of reducing the quantity of solid trash or the toxicity of that garbage prior to the waste's being processed and disposed of in incinerators or landfills (Kreith, 1994 cited by Agyem, 2013). The goal of source reduction is to lessen the quantity of waste produced while also cutting down on its hazardous nature. The use of returnable bottles is perhaps the most well-known example of source reduction, which refers to the practice of using items and packaging that can be reused.

An essential step in waste management is the separation of waste at its source and the subsequent recovery of resources. The person wishing to dispose of waste may discover that the wastes have significant value in another context, but that the wastes themselves have very little to no value to

the person wishing to dispose of them. According to Tsiboe and Marbel (2004), Austria, the Netherlands, and Denmark each put in place a waste management procedure in order to efficiently address the issue of garbage disposal. The most important part of the procedure was educating the general public about how to separate domestic solid waste into three categories: glass, paper, and plastic. This simplified the collecting process and made it possible to reuse the materials. However, scrap collection has reduced the obstacle to the operation of solid waste collection and disposal services mostly because their activities help to reduce the amount of waste that enters the main waste stream in the Cape Coast Metropolis.

Recycling

There has been a widespread acknowledgement that recycling is a vital tool in the fight to minimise the quantity of household solid waste transported to landfills, as stated by Momoh and Oladebeye (2010). In addition to this, it provides the raw materials that are essential for the manufacturing sector. They claim that it has been established beyond a reasonable doubt that this method represents the most effective approach to the management of solid waste inside the system. On the other hand, this may not be a financially viable alternative in emerging nations like Ghana.

According to a report published by the Environmental Protection Agency of the United States in 2014 (USEPA, 2014), recycling is one of the waste management strategies that is considered to be the most successful. According to the US Environmental Protection Agency (USEPA), recycling converts raw material that would otherwise have been thrown away into useful resources. This has a positive impact on the environment, as well as financial

and social benefits, including the preservation of natural resources and energy, the pollution control, and the growth of the economy and its ability to remain competitive. More importantly, a considerable amount of what is discarded contains valuable resources like metals, glass, paper, wood, and plastic that may be recycled and used once more as raw materials. This is a significant portion of what is discarded (USEPA, 1999). Scrap collectors collect recyclable waste which are recycled into valuable products.

In addition, Kreith (1994) stated that recycling is the waste management strategy that is seen as having the highest potential and is also the most feasible. Through the process of separating useful items from the rest of a municipality's waste, recycling brings previously used raw materials back onto the market. Recycling has a wide variety of positive effects. It reduces the demand for extraction of virgin minerals, which in turn reduces the environmental burden of processing and extraction.

This results in the saving of precious finite resources. According to the European Environmental Bureau (2017), Germany (with a recycling rate of 66.1%), Wales (with a recycling rate of 63.8%), Singapore (61%), South Korea (with a recycling rate of 59%), and Taiwan (58%), the top five countries in terms of recycling are Germany (with a recycling rate of 66.1%), Wales (with a recycling rate of 63.8%), Singapore (61%), South Korea (with a recycling rate of 59%), and Taiwan (58%)

Landfill

Capping, compacting, and finally enclosing the garbage are the three steps involved in sanitary landfilling (covering with soil). Not only does this protect the waste from being burned, but it also assists in the reclaiming of

land for more beneficial uses (Centre for Environment and Development, 2003). Landfills, as defined by the Environmental Protection Agency (2012), are defined as areas of land or excavations that are used for the placement of solid waste prior to its final disposal. The terms land application units, surface impoundments, injection wells, and trash piles are not synonymous with landfills. To safeguard human health and the environment from contaminants that may be contained in the solid-waste stream, modern landfills are specially sophisticated disposal plants that are situated, planned, controlled, and monitored in such a way as to minimise the risk of adverse effects.

During the operation of siting and designing new landfills, petitions for construction and operating permits must be filed to and authorised by state and local governing agencies. Most of the time, states mandate that the landfill be designed by a licenced professional architect (Guyer, 2009). According to O'Brien (2006), large, privately held businesses are better equipped to deal with the increasing costs associated with owning landfills. This is because the ownership of several sites, many of which have huge volumes, offers an economy of scale for the cost.

Since landfills serve as a depository for waste that should be disposed of in an appropriate manner, one could argue that they are also engaged in the service industry. Landfills are the only method of solid waste management that fulfils both a necessary and adequate function, making them one of the fundamental choices for managing waste. Some wastes are merely not recyclable, and the inherent value of many recyclable wastes finally hits a point where it can no further be collected and recycled once it has been used up to the fullest extent possible. It is essential to keep conditions within the

waste mass of the landfill anaerobic in order to prevent fires from being caused by an excessive amount of air infiltration.

Integrated Sustainable Waste Management

The concept of environmentally friendly waste management is another crucial component of the waste management field (SWM). Sustainable development is the approach that the Brandt Land Commission takes to economic growth. This approach, which seeks to fulfil the needs of the present without compromising the capacity of future generations to satisfy their own requirements, is known as sustainable development (WCED, 1987).

Integrated sustainable waste management is a waste management system that fully satisfies the society, economy, and environment in a given place, which is typically a metropolitan area. This definition comes from the International Community Waste Management which is an organisation that focuses on waste management (Klundert, & Anschiitz, 2000, p.3). ISWM is an approach that not just takes into account the technical or financial-economic sustainability of waste management, but also takes into account the socio-cultural, environmental, structural, and governmental elements that affect the long term sustainability of waste management.

This is a strategic and long-term way of thinking about waste management. It is crucial to lessen the extraction and consumption of natural resources, ideally via recycling waste materials and instituting efficient waste management, in order to lessen the negative impacts of garbage disposal on the surrounding environment and to maintain ecosystem processes for both the current and future generations (Millennium Assessment Report, 2005).

In accordance with the waste hierarchy, the most effective method for achieving sustainable management of waste is to cut down on the amount of garbage that we generate (Girling, 2014). When it is unavoidable to generate waste, the most environmentally responsible course of action is to promote the reusing and recycling of items in order to keep those products out of the waste stream.

In the final step, trash is treated so that its inherent values, such as energy, can be recovered in situations where it would be economically unfeasible to prevent or reduce waste, reuse it, or recycle it. The goal of sustainable waste management is also to improve coordination between the parties involved in the production of goods, including retailers, producers, the general public, and local councils, as well as anyone else who is concerned with the management of waste and recyclable materials and equipment (London Waste Action, 2007 cited by Oteng Ababio 2017).

The three key pillars of integrated sustainable waste management (ISWM)

Integrated Solid Waste Management (ISWM) is a notion that is built upon three essential components that not only support the concept but also work together in concert to bring about the concept's overarching strategic objective. These components are broken down into their own categories, which are stakeholders, system elements, and sustainability components. Regarding the Stakeholders, as suggested by Klundert and Anschiitz, (2000), this research considers local Government and Agencies (Municipal, Metropolitan, and District Assemblies), Central Government Agencies (National Government), households and service users, non-governmental

Organizations (NGOs), Private Sector entities, Informal private Sector, and donor agencies to be the stakeholders of ISWM. The components of the system are as follows: the reduction of waste, the reuse of waste, the recycling of waste, the collecting of waste, the transit of wastes, the treatment of waste, and the disposal of waste. The idea of sustainability can be approached from a variety of angles, including the scientific, the ecological, the social, the economic, the fiscal, the organizational, and the policy and political. Consequently, whenever a waste management system is being developed, evaluated, or supervised, it is recommended to take these issues into consideration. The significance of the 'time' component is essential due to the fact that development and planning are long-term concerns that require time to address. A conceptual structure for ISWM is shown in Figure 2.

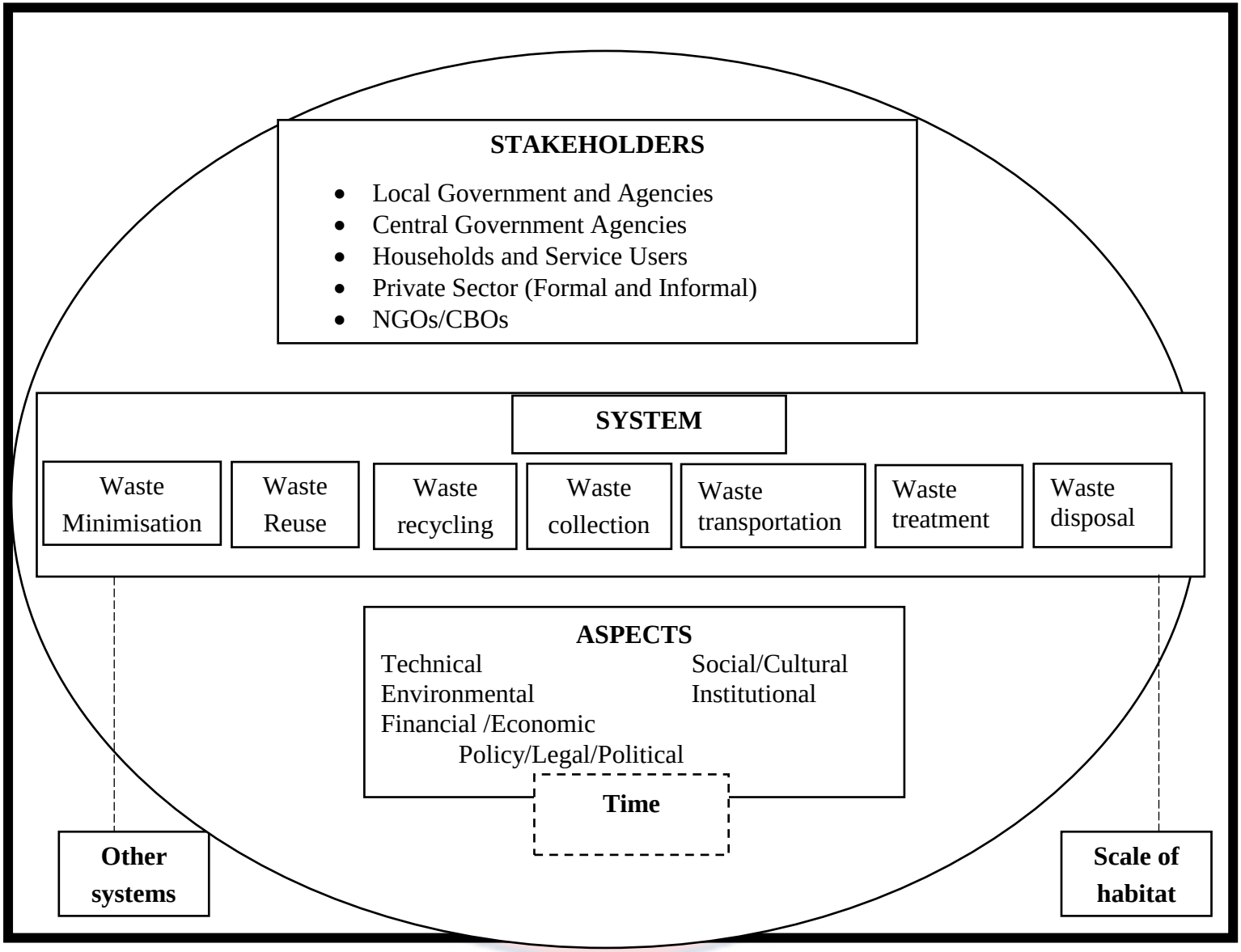

Figure 2: Integrated Sustainable Waste Management Framework: (Source: Klundert & Anschiitz, 2000)

Stakeholders in Integrated Solid Waste Management (ISWM)

The ISWM framework provides a collaborative approach, which encourages the participation of multiple stakeholders. The Integrated Solid Waste Management (ISWM) framework provided earlier demonstrates this point by identifying and enlisting a wide variety of stakeholders or actors, including officials, provincial and federal governments, formal private waste management firms (big corporations and recognized small-scale enterprises), business organizations, garbage-pickers, unofficial waste collectors and buyers, materials dealers, recycling facilities, service consumers (residents, commercial establishments, and so on), NG, and so on. The following is a synopsis of the roles that these stakeholders play, along with their primary concerns and priorities.

Central Government Agencies

Local governments are obliged to have the necessary powers, competence, and capability to properly deal with solid waste, and national or central government entities are obligated to ensure that they have these capabilities. In order to achieve this goal, the institutional and legal mechanisms need to be established by the various national governments. In many third world nations, national administrations abdicate their obligation to control garbage without providing appropriate support to local governments in their efforts to enhance their administrative capacities (Schubeler, 1996).

Local Government Agencies

In addition to the legal responsibility, they have to regulate waste, and local governments are typically driven to do so by political interests. According to Schubeler (1996), the implementation of solid waste

management from the standpoint of a local government could be contingent on the contentment of users with the services that are provided, the permission of higher state officials, and the financial practicability of the operation. Schubeler goes on to explain that higher levels of government delegate authority to manage solid waste and implement bylaws and legislation to local levels of government. This, according to Schubeler, is how the authority comes to be delegated. When local governments are not able to generate the necessary revenues in order to offer the essential services, many times this results in problems.

Households and Service Users

The ISWM framework recognizes families, communities, and service users as critical stakeholders due to their central roles in the generation of waste. Schubeler (2014) claims that while most homeowners want to ensure they have access to affordable and reputable garbage removal services, there are times when they don't give a second thought to where their trash goes once it's been collected. This will continue to be true so long as there is no deterioration in the standard of their living environment. People become more interested in disposal when dump facilities for the collected waste are located in close proximity to their homes. This curiosity heightens once the dumpsites have a negative impact on the standard of their living surroundings. According to Schubeler, Christen, and Wehrle (1996), the need for better solid waste collection develops as a result of the proliferation of other services and the growing knowledge of the negative effects that inadequate garbage collection services have on both the environment and human health.

Community-based organizations or CBOs, are frequently established in areas of a community that have inadequate waste collection services. CBOs are organisations that have their roots in communities and are typically directed by prominent members of those communities. These leaders have a more comprehensive knowledge of their local community, participate effectively and regularly with people of the community, and are therefore in a great spot to prioritise issues that arise within their respective contexts (Tukahirwa, 2011). They are frequently established with the goals of bettering existing services, enhancing environmental conditions, or petitioning the government for betterment in existing services.

Non-governmental organisations (NGOs) exist outside of the purview of either public nor private sector law. Many non-governmental organisations (NGOs) aim to improve the environment or the standard of living for economically poor and marginalized populations, even though their origins lie outside of those communities. To this end, NGOs may advocate for local, grassroots initiatives. There are numerous facets of solid waste management in which non-governmental organisations (NGOs) can participate. These include providing door-to-door collection services for residential, business, and hospital garbage; increasing public awareness; and broadening public and community participation. These activities are oriented toward boosting the ability of communities to handle the collection of waste, and hence they are described as such.

Schubeler, Christen, and Wehrle (1996) stated further that other service customers, such as large- and small-scale companies, institutions, and commercial organisations, are similarly interested in getting garbage

collection services that are both cost-effective and dependable. Businesses in the industrial sector may have a vested interest in minimising the waste they create in the course of their operations because efficiency in production is a higher priority for them. Industries have the potential to play a very proactive part in the management of trash collection, management, and disposal when working in conjunction with governmental authorities and/or specialized private businesses. These consumers of the service are interested in waste collection that is both efficient and effective, and in the majority of cases, waste reduction.

Private Sector Enterprises

Waste collection, street cleaning, waste recycling, and, progressively, the building and management of landfills, waste incineration, and composting plants are progressively outsourced to private sector businesses through concessions or contracts with the relevant government authority. Waste management service providers in the private industry are often motivated largely by the need to increase their rate of return on investment and may engage in a variety of kinds of partnership with the public sector. It is imperative that local authorities keep the obligation of collecting user fees in order to guarantee equitable service delivery from businesses operating in the private sector. In the event that this is not the case, the priority that they place on making a profit may lead them to focus entirely their services in high-income areas, where they have a greater chance of generating revenue; conversely, they may have less of an incentive to provide assistance in low-income areas, which have lower revenue prospects (Post & Obirih-Opareh, 2003).

It is advised that private engagement in the provision of waste management services be examined as a means of enhancing cost-effectiveness and of deploying the most suitable available resources in the management industry. This recommendation was made as a result of a recommendation made by the American Public Health Association (APHA). Since at least 2010, Zoomlion, a private company that manages waste throughout Ghana and even further afield, has been a participant in the process of managing solid waste in the Cape Coast Metropolis. This responsibility was given to Zoomlion because the company manages waste everywhere in Ghana and even further afield. The company has a number of goals in terms of waste management, including the following:

1. The mobilization of more equipment for improved service delivery which otherwise is a problem to the Municipality.
2. Improve service quality and reduce cost which will finally increase the revenue for the municipality.
3. To ensure a completely cleared environment for the people of the Cape Coast Metropolis

Informal Private Sector and Donor Agencies

Activities in waste management performed by individuals, families, groups, or small businesses that are uncontrolled and unlicensed are included in the informal private sector. These activities make up the informal private sector. These people are frequently driven to work as rubbish collectors by their need for financial support (Schubeler, Christen & Wehrle, 1996). According to Schubeler and colleagues, it is extremely challenging to include the contributions of informal trash workers into the ISWM system because of

the marginalisation of these employees and the instability of their social and economic conditions. The operations of informal waste workers, including collection, transfer, separation, recycling, and/or disposal of garbage, represent economically significant services. The majority of the time, people who engage in the informal garbage industry do so as self-employed individuals or as members of ad hoc groups; however, in some instances, households and/or neighbourhood groups may hire them directly.

External support agencies

Other parties, such as international support organisations (bilateral and multilateral donor agencies), are engaged in the process of giving assistance for the management of municipal solid waste in countries with low incomes. Integrated Solid Waste Management (ISWM) is frequently included as a component of a larger development programme that is being carried out by a number of the funding organisations with the interest of enhancing the capabilities of urban management and/or protecting the urban environment. In order to achieve the objective of establishing sustainability in waste management, it is vital to take into consideration the various roles, interests, and power structures that are typical in the industry. According to the experiences of a number of different countries, cooperation and coordination between various stakeholders, including community-based organisations (CBOs), Nongovernmental Organisations (NGOs), local authorities, service users, donor agencies, and the private industry (formal and informal), will inevitably lead to sustainable growth of waste management systems, including transitions in social behaviours and sharing of financial responsibilities. On the other hand, ignoring some actions or groups may result in a reduction in

the system's capacity to continue operating without interruption. This may take the form of a rise in the number of people who are unemployed or in the number of health hazards that are present (UNEP, 2009).

Aspects of Solid Waste Management

When developing a system, it is imperative to take into account all of the various components, also known as pillars, that make up Integrated Solid Waste Management. These elements include institutional, social, financial, economic, and technical characteristics or concerns that are associated with trash management. Environmental concerns are also included here. Each town faces the difficult task of determining, in light of these considerations, which mix of waste management operations will serve its requirements in the most effective and efficient manner.

The economic element should take into consideration measures that provide sufficient resources for the waste management system in order to prevent the system from collapsing as a result of a shortage of cash. It ought to implement the Polluter Pays Principle with regard to the waste generators and offer both financial and technical help to encourage private as well as community engagement.

By guaranteeing that the intricacies are met with suitable storage, transport, and disposal sites, the environmental impacts, such as short-term annoyance and aesthetic concerns and long-term air, water, and soil pollution from landfill gas emissions and leachate discharge, can be mitigated or eliminated.

The social aspects place an emphasis on creating awareness on activities such as reducing waste, the advantages of reuse and recycling, the environmental health advantages of cleanliness, and the health effects that arise from a lack of an ISWM system. It has been noted that an active involvement of both nongovernmental organisations (NGOs) and private organisations is highly helpful in ISWM.

The technical considerations include the design, construction, and upkeep of trash collection, transfer, recycling, disposal, and hazardous substance management systems.

For the program's execution to be successful, institutional preparations would need to be made to include an administrative and legal framework, as well as the equipment necessary for law enforcement. The vast majority of the time, the management of municipal solid waste falls under the jurisdiction of the local authorities a result, the obligation for waste, including its collection, sweeping, storage, transport, management, and ultimate disposal, lies with the towns (Zhu, Asnani, Zurbrugg, Anapolsky, & Mani, 2007). Another common issue is that the responsibility for solid waste management (SWM) falls on municipal departments that do not have the necessary skills to manage it, such as public health departments. SWM needs to be professionalised so that the service can be improved, and solid waste departments should be controlled by individuals who have been trained to handle these types of systems. The authorities at the local level need to gain an understanding of the ways in which solid waste impacts not just the environment and health but also the quality of life and then take the right steps to improve the system. With the help of education, training, and improved infrastructure, the government ought

to bolster the capabilities of the organisations that are in charge of the management of solid waste.

The Political Aspect, as defined by Visvanathan and Trankler (2003), is concerned with setting policy, establishing rules and regulations, and determining who has authority over what.

Review of Empirical Literature

Sources and quantity of scraps

It is anticipated that, by the year 2050, the overall quantity of waste generated in nations with low incomes will have increased by more than three times. It has been determined that East Asia and the Pacific create 23% of the world's waste, whereas the Middle East and North Africa are responsible for creating only 6% of the world's waste, based on data compiled by the World Bank in 2016.

It is expected that the overall total amount of waste accumulated in other regions, such as Sub-Saharan Africa and South Asia, amongst others, would rise from where it is presently at. This is due to the fact that more people are living in these areas. More than half of the waste that is produced in these regions is currently thrown away in open dumps, and the rate at which waste production is expected to continue rising will have an effect not only on the environment but also on public health and economic growth, making it imperative that immediate action be taken.

In developing countries, governments in both small and large cities faced a significant obstacle in the form of solid trash. However, in more recent years, the surge in technical innovation has rendered waste a more important resource than garbage for industrialized and developed nations (Abdel-Shafy

& Mansour, 2018). The gradual rise in consumer demand for products made from recycled materials can be attributed to the growing resource crunch (Rozenberg, 2013). According to UNEP (2013), the process of sensitizing local citizens should involve encouraging the sorting of garbage into recyclable and non-recyclable categories for the purpose of making the disposal and recycling of recyclables easier.

The method of collecting scraps can change depending on the kind of product as well as the nation in which it is done. In Ghana, large-sized scrap metals and plastics in great amounts, such as those from demolition and construction sites, as well as scraps from residents, are typically transferred directly to the local landfill or to scrap treatment plants. In addition, scraps from construction and demolition sites can be found in households (Badoe, 2015). According to Muchová and Eder (2010), scrap pickers in the municipalities gather items such as plastics and metals, which are then sorted and baled before being transported to treatment plants or refineries.

A great number of developing nations have, for an extremely extended period of time, permitted various levels of community and individual engagement in scrap gathering, particularly in the fields of collecting and recycling municipal waste. The act of scavenging exemplifies the collective and individual involvement that goes into the collection of scraps. Scroungers of recyclables from landfills are a part of the so-called informal sector of the solid waste management industry. Itinerant consumers of abandoned goods (from door to door), curbside dumpster divers, and dumpster divers at transfer facilities are all examples of additional informal stakeholders (Oteng-Ababio, 2012).

Scavenging is comprised of activities that require a significant amount of manual labor, pay little, are not recorded, utilize a low level of technology, and are uncontrolled. It has the potential to generate economic and environmental benefits, such as providing employment opportunities for the unemployed, supplying raw materials for industry, and lowering the need for collection, transportation, and disposal machinery and facilities (Medina, 1997). Waste pickers, also known as scavengers, have long been a part of Ghana's recycling industry by salvaging recyclables from landfills for resale or personal use, but their work has never been formally recognized or included into the country's larger waste management infrastructure (Oteng-Ababio, 2018).

Badoe (2015) is of the opinion that the majority of Ghana's municipal officials do not acknowledge their operations since the settings in which they labor at the dumpsites are unclean. The quantity of scrap metal is reliant on the reclamation of end-of-life (old) scrap, which is limited by two different factors:

When products are geographically dispersed across many locations and the world, gathering becomes a difficult and expensive task. It is possible for a single product to have numerous distinct types of metals, and for one particular form of metal to be dispersed or intertwined throughout that product, making it challenging to separate and clean. Improving scrap reclamation requires overcoming a significant barrier, which is the inability to salvage end-of-life products in a manner that is both cost-effective and efficient (Global e-Sustainability Initiative & Electronic Industry Citizenship Coalition, 2008). According to Emery et al. (2000) and Muchová and Eder

(2000), the metal business can be broken down into two basic categories: ferrous metals and non-ferrous metals.

Operation of scrap Collectors

In most cases, the collection of scrap metal can be accomplished with only the barest minimum of equipment, including wheelbarrows, pushcarts, and tricycles (Oberlin, 2012). With their rudimentary tools, they are able to reach and service the most marginalize segments of society, filling a hole created by government and formal private waste collectors who cannot enter these areas (urban poor). Their standing in society is typically low, and the vast majority of them are disadvantaged individuals who are impoverished and depend on scavenging or rubbish picking for their means of subsistence (Muhammad & Manu, 2013).

The first step in recycling metals is collecting scrap, which is typically done by young men in their teens and twenties. Scrap collection is an important part of the recycling process (Broni-Sefah, 2012). According to Broni-Sefah, the collection process often takes place between the wee hours of the morning and the late afternoon, for a total of approximately eight hours every day, and is typically carried out by individuals or groups. The act of collecting scrap metal can be done by hand or with the use of straightforward technological instruments, depending on the situation. Typically, scrap metal is collected by hand from the surface of the land, and after collection, it is kept in the houses so that it can be sold at a later time, based on the circumstances in the surrounding community (Moyes, 2005).

According to Rapten (1998), which was mentioned in Mazinyo (2009), people in impoverished nations refer to people who gather scrap metal as rats, ants," vultures, and walking garbage. Scrap collectors are often poorly educated and disorganised. In spite of these labels and the associated social stigma, the activity of waste collection employs around two percent of Asia's urban poor (Madina, 2000 in Muhammad & Manu, 2013).

In Nepal, members of the low caste known as Kachakbars (also known as cleaners) are now the minority group responsible for waste collection jobs, despite the fact that this was not the case in the past (Gotame, 2012). Prior to the creation of the "Safai Adda" (sanitary office) by a former Prime Minister named Chandra Shamsher, the management of waste was the responsibility of every Nepalese citizen. The low caste was given the responsibility of collecting waste (Gotame, 2012). People's perspectives on waste were fundamentally altered as a result of this move taken by the Prime Minister. Consequently, individuals whose social status is not seen as poor and do not experience any sense of obligation toward maintaining a clean environment since they believe that the task of waste management falls under the purview of others (Gotame, 2012).

Pokhrel and Viaraghavan (2014) have pointed out that appointing a certain group to be in charge of waste management has not only caused some people to change their habits, but it has also caused some people to quit cleaning their own wastes. A vast majority of India's urban poor who are employed in this industry are able to put food on their tables thanks to the informal rubbish pickup business that exists in some neighborhoods. This business is a reflection of distinct local needs and demands. However, workers

in this industry are subjected to deplorable working conditions (Sarkar, 2003). Because the majority of them are immigrants living in abject poverty who come from remote regions and have no formal education (75 percent of them are illiterate), they are taken advantage of because of their fragile background (Sakar, 2003)

According to Gan (2012, page 116), "the widespread supply of poor people ensures that society's nasty labor is done inexpensively." Regarding gender, over 76% of India's informal rubbish pickers are males, while just a small percentage of women and young girls are employed in this line of employment (Sakar, 2003). This is because Muslims make up the bulk of the workforce (52 percent), and according to Islamic tradition, Muslim households should not allow their daughters to hold jobs that take them away from the home (Sarkar, 2003). Also, rubbish picking accounts for 24 percent of youngsters working on the streets in India, making it the fourth most common activity for these children (Sarkar, 2003).

According to Muhammad and Manu (2013), the few women who participate in scavenging in Nigeria often collect goods that are not heavy, which requires less energy to do so. This is because lighter objects take less time and effort to retrieve than heavier ones. The commercial value that is generated from the sales of these items is, however, not particularly high. Aside from that, the materials that are recovered by junk collectors include plastics, metals, bottles, and rejected cooking utensils, the majority of which are utilized by the scrap collectors themselves. However, scrap collectors travel from residence to residence in order to acquire solid waste for the

purpose of selling it to men, who then sell it to recycling companies via further middlemen (Menhra et al, 1996 in Muller & Scheinberg, 2015).

In the Greater Accra Metropolitan Area of Ghana, a group of unorganized private individuals known as kaya bolas use specially designed carts to collect trash from residence to residence and charge residents a fee for their services (OtengAbabio, 2012). The majority of the time, the same businesses that are responsible for waste collection are also involved in the process of recovering waste. They go from house to house and collect rubbish for a charge, during which time they go through the garbage and remove any materials that can be reused or recycled. Only then do they get rid of the remaining debris. An average waste picker may expect to make GH50.00 (US$35.10) per day, which is a significant increase over the present minimum wage of GH3.11 (US$ 2.12) in the country (Ghana Statistical Service, 2010). However, the amount of their daily remuneration given is what they use to pay for things like cart rentals, paid by waste pickers and other necessities of everyday life.

This is despite the fact that a study conducted by Oteng-Ababio (2012) on the contribution of the informal economy in solid waste management in the GAMA in Ghana disclosed that a waste picker boldly commented during a Focused Group Discussion that, this suggests that in Ghana, despite the social stigma connected with rubbish collection, a significant number of young people make a decent living out of engaging in the activity.

Challenges of scrap collection

Sustainable waste management in Ghana is a long-term goal, and the informal sector plays a significant role in getting there. However, there are a

variety of unforeseen effects that develop at different points along the way. Heavy metals have the potential to be released into the environment as a consequence of industrial processes such as metal smelting and refining, the recycling of metal, and the burning of waste containing heavy metals. These processes include: (Kimani, 2007).

Many hazardous compounds are employed in the processing and extraction of metals, and workers in industries that recycle metal wastes are exposed to these compounds as well as the metals themselves (in the form of dust or fumes) during the course of their workday (Foulke, 2008). Workers are put in a position where they are vulnerable to a multitude of health hazards when loading and unloading leftovers which puts the workers in danger of getting sick.

However, these dangers can be avoided by wearing the appropriate type of personal protection equipment (PPE), which includes things like hard hats, robust boots, gloves, thick clothes, and ventilators among other things (if the operation generates hazardous dust). Employees and workers will be totally shielded from any potential risks to their health and safety as a result of this (Foulke, 2008). When recycling old scrap metal, one of the procedures that needs to take place is reducing the size of the scrap metal that is being recycled. Heavy manual labor is typically necessary in the initial phases of metal breaking processes. This may be the case when dismantling large or sophisticated components of scrap metal, or when cutting or breaking the pieces into sizes that are appropriate for feeding into a furnace.

In most cases, the processing of waste results in relatively modest quantities of dust and air pollutants. Nevertheless, emissions of dangerous air

pollutants such as dioxins and furans as well as metals and metal oxides such as lead and zinc may be formed by the secondary metal synthesis in a furnace (Muchova & Eder, 2010). An increase in the cost of scraps, particularly non-ferrous metals, has the possibility of provoking an increase in the theft of metal from the built environment. For instance, as a result of increased demand, there has been a discernible increase in the destruction of the built environment all over the world (Bennett, 2008). In the majority of developing countries, there is also the problem of employing children to work in the scrap metal trade (Moyes, 2005).

According to Asase (2011) and Preprah (2013), some homeowners are reluctant to sort their trash because they either don't have the time to do so or don't have enough room for more bins. Other reasons cited include concerns about health risks, the complexity of sorting trash (not understanding its various components), the perceived high expense of separating trash at the source, and late collection.

This presents a problem for collectors of scrap metal since they would have to segregate the scrap materials from the other solid wastes, which may take a significant amount of time. Significant obstacles to the adoption of source separation were identified by Oduro-Appiah and Aggrey (2013) as follows: uncertainty concerning cooperation in the short and long term by households, businesses, and other garbage generators; uncertainty surrounding markets for recycled material; and reluctance on the part of consumers of recyclable materials to establish long-term purchase agreements (in view of uncertain community participation and the problems associated with recycled materials meeting market specifications).

Some of these factors include the widespread belief that low-income and urban households won't participate in source separation programs, the high cost of transporting recycled materials from rural locations to the fabrication factories of potential purchasers, and a lack of attention from the local government to the creative design of programs, incentives, and contamination control studies. A similar study by Oduro-Appiah and Aggrey found that 37.20 percent of respondents, especially those living in low- and middle-income areas, worried about the availability of storage space and the length of time required for waste separation, while 15.20 percent assumed that the federal government would be the only source of bins for future waste segregation initiatives.

The lack of a waste recycling facility and homeowners' inability to afford waste segregation bins are the two main issues with trash segregation across all three income zones (low, middle, and high) in the Cape Coast metropolitan area of Ghana (Gyimah, Mariwah, Antwi, & Ansah-Mensah, 2019). These issues accounted for 37.9 percent and 27.1 percent of the total percentages, respectively. In addition, a sizeable percentage of respondents (12.6%) ascribed the difficulties to a lack of time to sort the waste and 8.6% of respondents pointed the finger at a lack of space to fit the bins as the source of the problems. Other challenges that have been cited by Gyimah include the perception that there will be negative effects on health, inconsistent waste collection by waste management companies, a lack of sufficient incentives and low financial advantages to inspire individuals to separate their waste, and the absence of bylaws governing the practices.

Integration of scrap collectors into the main waste stream

Oteng-Ababio (2018) postulates that city officials appear fascinated with unrestricted replication of practices used in more advanced countries in their pursuit of sustainable waste management. At the same time, however, the possibility of hiring indigenous private waste collectors undoubtedly slips their minds Gyimah (2018) cites Medina (1997), who claims that authorities in many developing nations fail to properly appreciate the social, economic, and environmental benefits of scavengers' recycling efforts. People that rummage through trash in search of recyclable items and scrap metal are known as scavengers. Scrap pickers or scavengers have been collecting recyclable debris from dumping sites for sale to recycling facilities or for their own private use for a long time, but their efforts have not been documented or integrated into Ghana's larger waste management system. This is despite the fact that these individuals have been collecting recyclable waste from dumpsites for a number of years (Oteng-Ababio, 2018).

ISWM, or integrated solid waste management, is a potential solution to this problem proposed by Zia and Devadas (2008) and cited by Oteng-Ababio (2018). According to Tchobanoglous et al. (1993), cited in Oteng-Ababio (2017), ISWM is the process of choosing and implementing the most suitable strategies, technologies, and management programmes to achieve predetermined goals and objectives, such as ensuring environmental and health standards are met, maintaining economic stability, and gaining widespread public support. According to UNEP (2000), the management and implementation of a well-structured waste management system is difficult due to the existence of a considerable informal sector that persists un-integrated into the formal waste management system and inadequate mechanization as a

result of the low financial condition of the local bodies. Both of these factors contribute to the difficulty of the management and implementation process.

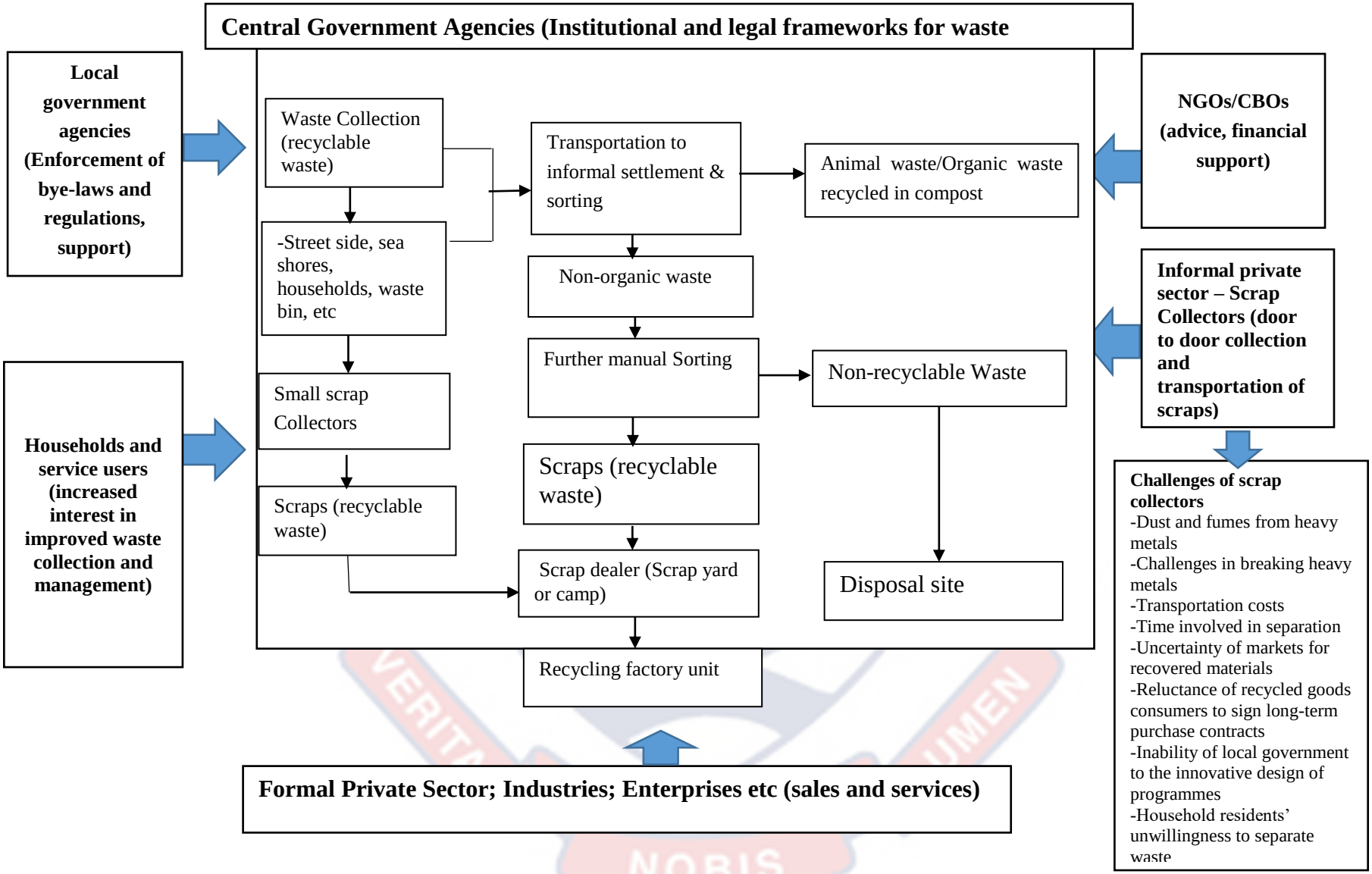

Figure 3: Conceptual framework for sustainable waste management (Source: Adapted from Ababio, 2015)

The step that marks the beginning of one's involvement in the waste economy is the collection process. Young people make up the vast bulk of the employed in the scrap industry, and the collectors are among the youngest workers. They are the people who are responsible for collecting rubbish and scrap from private houses, public institutions, landfills, and transfer stations using a door-to-door collection method. It is therefore possible to draw the conclusion that garbage collectors make a living by starting their own businesses, as opposed to making a living by working in conventional, full-time jobs (Oteng-Ababio, 2017).

However, they do not function in a separate economic sphere because their operations are dependent not only on the formal economy in their home country but also on that of other countries. In addition, there is the potential for several feedback loops to exist between informal activities and formal industries in terms of the supply of recycled inputs. The issue, on the other hand, is that just like the majority of other informal enterprises, they occupy a secondary position within both the global and local economies. In the beginning, garbage collectors did not have to pay anything for objects that were dumped in neighborhoods, on street corners, or at dumpsites. However, as a result of increased competition caused by an increase in youth unemployment and the entrance of more potential scavengers, the price of scraps has begun to reach a price that is competitive with other similar items (Oteng-Ababio, 2012).

Some collectors are also directly involved in the breakdown and collection of waste, particularly plastics and metals; However, the majority of collectors sell their refuse to scrap dealers, who also act as intermediaries

between the collectors and recyclers. The informal sector is responsible for the collecting of recyclable waste as well as its recycling. According to Oteng Ababio (2017), the practice displays a highly layered system, which includes actions such as collecting, recycling, refurbishing, reusing, and ultimately the disposal of the residuals. In a number of different refining and conditioning procedures, valuable components that are simple to extract are converted into components that can be directly reused or into secondary raw materials.

Waste collectors often participate in resource recovery activities both on and off the collection site. These people typically collect dry recyclables (such paper, plastic, glass, bottles, electronic items, and metal cans) from homeowners or housekeepers as they make their rounds. Paper, plastic, glass, bottles, electronic items, and metal cans are among the many types of materials that these individuals will either purchase or barter in order to transport to scrap vendors in order to sell for a profit. Scrap vendors will then buy these materials. In addition to the labour they contribute, these collectors, particularly those who deal in scraps, sometimes devote financial resources to purchasing and operating the means of transportation. These wandering hoboes are the people that collect scrap metal.

The debris is sorted by the scrap merchants after they have received it from various vendors, including the kaya bolas nomadic. The benefits of source separation of organic and inorganic wastes are numerous, as noted by Yeboah (2017), citing research by Lardinois and Van De Klundert (1994). These benefits include a decrease in damages and an enhancement in the health condition of waste workers (scavengers, collecting crew, etc.), an increase in the cost of recyclable waste and the value of waste produced from

segmentation of organic waste, and a decreased in the quantity of waste collected and subsequently disposed of.

The organic waste is recycled into compost, which is the biological process of breaking down of compostable solid waste that takes place in controlled environments that are predominately aerobic. This process continues until the compost reaches a state that is sufficiently robust for hassle-free storage and handling and is adequately developed for safe application in agricultural settings. The United Nations Environment Programme (2009) claims that composting is the most ideal method due to its adaptability to a wide range of circumstances and the limited resources that exist in the global south, with a few exclusions. Composting is cited as an example of a waste reduction strategy that utilizes low technology by Zerbock (2003). Over fifty percent of the material that makes up household and other solid waste in developing nations is organic material, which has the potential to be composted and used for the development of resources (Zerbock 2003 Cited by Obesebia 2015).

Inorganic or inert materials (including clothing and accessories, utensils and appliances, containers, books, and periodicals), as well as those typically perceived as waste by the primary consumer (including newspapers, scrap paper, cardboard, and damaged or irreparable plastic products like buckets and bins), are commonly separated from domestic waste streams. According to Bennagen, Nepomuceno, and Ramil's (2002) findings, additional manual sorting is carried out. According to Obesebia (2015), it is preferable to select recyclable materials at the point of production as opposed to recovering them from mixed garbage because the sorting process results in materials that

are of a cleaner and higher grade. No matter how effective a recycling system may be, Al-Salem, Lettieri, and Baeyens (2009) underlined that sorting is the most crucial phase in the recycling loop. This is true despite the fact that efficiency may be a factor. According to Ketibuah et al. (2009), the goal of differentiating recyclable materials such as metals, plastic thins, and cans at the household level is to prevent the most beneficial and reusable materials from being thrown away. This can be accomplished by minimizing the amount of space that these materials take up in landfills.

They then put the recovered waste through some sort of processing before either selling it to scrap dealers or resource merchants or taking it straight to the recycling industry. The resource merchants are usually tiny businesses that acquire recyclable resources such as waste glass, metal cans, and plastics. Examples of these types of resources include: glass and metal cans. They put these commodities to use as raw materials in the manufacturing of goods that can be offered for sale to consumers afterward. According to Boadi and Kuitunen (2003), which was cited by Obesebia, (2015), the first phase in the development of waste recycling at families in low-income communities is the reuse of plastics, bottles, paper, cardboard, and cans for domestic purposes. This is the step that is considered to be the most important. Paper, plastic, metals, and glassware are examples of the recyclables that are used in the manufacturing of new items as well as recycling at the industrial unit. Other examples of recyclable materials are cardboard and aluminum cans (Korner, 2006). Boadi and Kuitunen argue that recycling procedures can transform many types of waste into useful items, such as toilet paper, organic fertilizer, plastic toys and domestic products (bowls, plates), and textile bags

and accessories, with the resulting residue being sent to a landfill. However, scrap collectors recover and extract recyclable and reusable materials from mixed waste. if their activities are regulated and formalized, and effectively incorporated into the current waste management system, it will significantly promote sustainable waste management in the Cape Coast Metropolis.

CHAPTER THREE

METHODOLOGY

Introduction

This chapter outlines the research approach that was taken for this particular study. The research framework and principles that are provided by a research methodology are either directly tied to a certain paradigm or are determined by a specific paradigm that has been translated clearly and precisely. This section profiles the study's setting, discusses the study's guiding principles, methodology, research design, approach, data source, study population, sample size, sampling techniques, data collection tools, fieldwork, difficulties encountered, lessons learned, ethical considerations, and data analysis.

Profile of Study Area

Location

The study area is the Cape Coast Metropolitan Area in the Central Region of Ghana. The Metropolis is located about 145 kilometers west of Accra and 84 kilometers east of Takoradi. The geographical coordinates of the Metropolis are 050º 06'00" N and 01º15'00" W. The study occupies an approximate area of 122 km², and it is bordered to the south by the Gulf of Guinea; to the north by Twifo Heman Lower Denkyira District; to the west by Komenda-Edina-Eguafo-Abrem Municipality and to the east by Abura-Asebu-Kwamankese District as illustrated in figure 4.

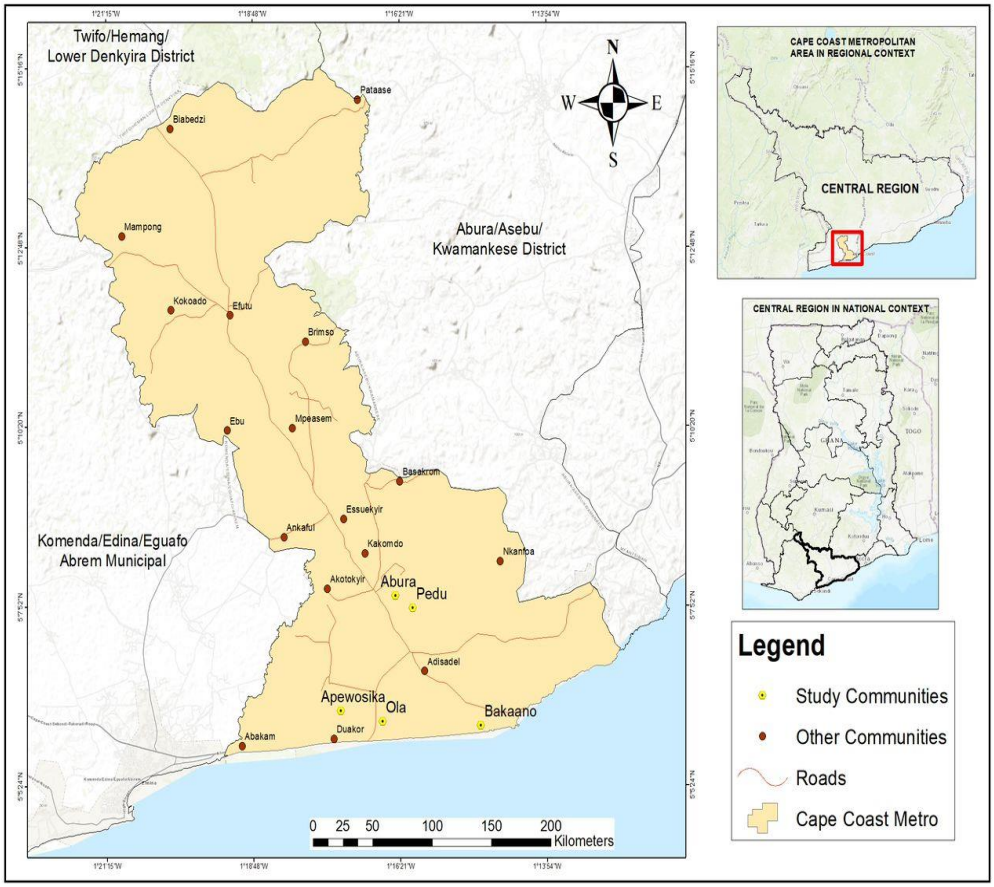

Figure 4: Study Area in the Regional and National Context
Source: Cartography & G.I.S. Unit, Dept. of GRP, UCC (2021)

Physical Characteristics

The study region is located within the coastal lowland belt of Ghana which is dominated by batholith; it is typically undulating with steep slopes; and it was selected because of these characteristics (Dickson & Benneh, 1998). The Kakum River is the most significant of the many rivers and streams in the region, which are all contained within valleys. There are a few minor streams that empty into the Fosu Lagoon at "Bakaen", while others flow into marshes as their final destination. In general, soils of the metropolitan area are lateritic, and they are produced from the granite and schist that have

been weathered (Dickson & Benneh). There are significant amounts of fine sand deposits in valleys and swamps.

According to Kendie, Ghartey, and Akantapulsi (1997), the mean monthly relative humidity in Cape Coast Metropolis ranges between 75% and 85%. The sea wind has a moderating impact on the climate in this area, which contributes to the region's humid climate. The primary rainy season in the Metropolis is between May and July, while the minor rainy season is around September and October (Boadi, 2013). The Metropolis receives double maximum rainfall between 750 and 1000 millimetres (Boadi, 2013). The area's flora is primarily comprised of grasses and shrubs, with a smattering of trees here and there (Addo, 2009). Because of its location, the Metropolis looks to have year-round temperatures that are relatively high and high relative humidity, both of which are indicators of an enhanced rate of the decomposition of solid waste (Kendie et al, 2014). Under these circumstances, the impact that solid wastes with a high carbon content have on the environment, particularly on humans, plants, and animals, can be catastrophic.

Socio-Economic Characteristics

To the south of the Metropolitan region, fishing is the industry that makes the single most significant contribution to the local economy (Bannerman, Koranteng & Yeboah, 2001). Businesses at Siwdu's car shops, Adisadel's palm kernel oil extraction facilities, Abura and Kotokuraba's commercial districts, sections of key thoroughfares, etc., are just a few more illustrations. The effects of these wastes on water supply, as well as on plants,

animals, and humans, are a direct outcome of all of the human activities that have led to their production.

The Metropolitan region is one of Ghana's urban centers, and it draws a sizable student body because to its numerous of post-secondary institutions (Boadi, 2013). In particular, there is a seasonal influx of tourists in the region as a result of the historical development of Cape Coast Castle as well as other tourist destinations such as Kakum National Park, Hans Cottage Crocodile Pond, and other similar locations. The actions that are carried out by these visitors and students are a key contributor to the alarmingly high volume of waste that is created in the metropolitan area. This waste is generated as a result of the metropolitan area's rapid population growth.

There are currently about 169,894 people living in the Cape Coast Metropolis, with 82,810 males (48.7%) and 87,084 females (511.3%) making up the population (GSS, 2010). According to the General Social Survey from 2012, there is a high dependency ratio as a result of the limited prospects for employment, which had resulted in monetary difficulties and poverty. There is little doubt that difficult economic conditions and poverty have serious repercussions for aspects of environmental control, such as the separation of solid waste.

The researcher came to the following conclusions based on their findings, which led them to the inference that the Cape Coast Metropolis would be the ideal location in which to carry out the research. To begin, there is a growing amount of solid trash in the metropolitan area, which has created an increase in the cost to the public. In addition, there is a growing number of people who live in the area (Addo, 2010). As a result of this, the national

government and, in particular, the Cape Coast Metropolitan Assembly are compelled to bear enormous costs in order to effectively manage the solid wastes produced by private homes, public institutions, industrial facilities, and other kinds of establishments. This is necessary in order to ensure that these wastes are disposed of in an environmentally responsible manner. For the purpose of Solid Waste Management (SWM), for instance, the Metropolitan Assembly allotted Gh1,500.00 each week and approximately Gh710,400 per year in 2014. (CCMA, 2015). This amount constitutes a major chunk of the Assembly's annual budgets, and it does so in addition to the ongoing financial support it receives from other partners (MLGRD, 2010a).

And secondly, negligent practices regarding the disposal of solid waste pose a threat to the expansion of the environment and other environmental resources such as air, water, and land. An offensive smell and a nuisance created by flies are the results of illegal dumping of solid waste at bus stations, landfills, the sea, gutters, along the streets or roadsides, the Fosu Lagoon, and the wetlands that surround it. All of these locations are considered to be wetlands. This, coupled with the fact that flooding in the metropolitan region is a recurring occurrence on an annual basis, makes the situation particularly unpleasant (CCMA, 2009). As a consequence of this, health centers in the city receive numerous reports of cases of sanitation-related diseases on a regular basis. These diseases include malaria, cholera, typhoid fever, diarrhoea, intestinal worms, and severe upper respiratory infections. In addition, diarrhoea is a common symptom of these illnesses (MLGRD, 2010b, Ghana Health Service, 2012).

In addition, the practices of the Assembly's Solid Waste Management in the study area have consisted only of waste collection, transportation, and disposal without any significant waste recovery, reuse, recycling, composting, or treatment. These practices have been in place since the beginning of the project (CCMA, 2009). As a direct consequence of these practices, the environment in its whole, including the air, the water, and the land, has been subjected to detrimental effects. This study will contribute significantly to determining which alternative waste management systems are the most effective and sustainable in the Metropolis

Research Philosophy

For the purpose of this study, the interpretivism philosophical approach was utilized. According to Myers (2000), this philosophical viewpoint accepts the premise that reality is a product of social construction and that there is not a single reality that can be observed. This philosophical perspective was suitable for the investigation because it permits the systematic analysis of socially significant actions by means of direct and detailed observation of phenomena under investigation in their natural surroundings in order to arrive at a comprehension and interpretation of how individuals construct and sustain their social worlds (Myers, 2008). The intepretivist philosophy is appropriate for the research because it provides for extensive one-on-one time with the junk collectors, who can provide in-depth information on the logistics of scrap collection and the economic and social benefits of recycling. In addition to that, it enables the utilization of participant observation as well as field observation of waste management procedures. Last but not least, the researcher has the ability to examine videotapes of junk collectors in

remarkable detail as well as read transcripts of conversations between scrap collectors.

Research Design

A descriptive research design was used for this study because the primary emphasis was placed on recycling and environmentally responsible waste management. The design makes use of an inductive methodology that investigates, describes, and attempts to provide verbal explanations for the actions and behaviors of individuals (Silverman, 2010). The descriptive design was selected because it provides a better and more thorough description of people's attitudes, beliefs, behaviors, or activities. The reason for this is that descriptive design delivers a better and more comprehensive description. The researcher has the opportunity to obtain specific information regarding the behaviors of people who collect scrap metal thanks to this study.

Research Approach

In this particular study, a qualitative research methodology was utilized. In general, qualitative research tends to follow in the footsteps of the interpretive philosophical tradition, employing methods of data collection that are adaptable and attentive to the social environment in which the data are being created (Grix, 2004). The strategy typically entails doing a in-depth analysis of the phenomenon in question, using techniques that do not rely on numerical measurements but can make use of such measurements. In order to provide a more in-depth perspective on the issue at hand, qualitative research investigates aspects of people's mindsets, actions, and experiences using

techniques such as interviews, observation, and focus groups (Dawson, 2002).

The qualitative research approach has a number of advantages as well as some drawbacks. The qualitative approach has a number of advantages, including the following: the ability to acquire a more in-depth comprehension of the world in which the respondent lives; the provision of a greater degree of adaptability; the humanization of the research process through the elevation of the role of the researched; the research of people in their natural settings; and the provision of a more accurate picture of the world (Chadwick, Bahr, & Albrecht, 1984). The following are some of the drawbacks that are inherent to qualitative research: a limited sample size and the inability to generalize the findings; challenges with objectivity; the need for extensive amounts of time; the possibility of obtaining meaningless and pointless material (Chadwick, Bahr, & Albrecht, 1984).

This study used qualitative research approach for a number of reasons, the most important of which are as follows: First, the presumption that the individual experiences of people who gather scrap metal and those who collect waste in a more official capacity are distinct. Second, the adaptability of qualitative research allows for the possibility of redefining waste as a resource, rather than waste as any material that is abandoned and thrown away because it is no useful to the owner. Thirdly, the purpose of the research is to acquire a more in-depth understanding of what goes on in the study communities located inside the Cape Coast Metropolis. The goal here is not generalization but rather transferability to other situations that are analogous to the original one. The conclusions of the study depend on the context in which they are

interpreted. The research was carried out in the context in which all of this complexity operates across time, and it was carried out in the context in which data on numerous realities was acquired.

Data Sources

The study relied on primary data, which was collected through in-depth interviews from a variety of scrap collectors and scrap dealers, in addition to the Waste Management Department of the Cape Coast Metropolitan Assembly (CCMA). In addition, articles that were published and unpublished in periodicals such as journals and magazines, as well as internet searches and other connected literature, were used as sources for the linked literature.

Target Population

In the context of this investigation, the population of interest consists of people who gather scrap metal, those who deal in scrap metal, and authorities from the Waste Management Department of the Cape Coast Metropolis (CCMA). Because of their extensive experience and familiarity with the scrap industry, the populations that were targeted for this research were selected, and they were deemed to be in an ideal position to supply sufficient data for the investigation.

Sample size

According to Hair (2000), taking a representative sample involves picking a specific number of members or items to investigate for a fair representation. The sample size provides answers to fundamental concerns such as how big or how small the sample size needs to be for an investigation

to be representative (Sarantakos, 1998). With regard to this research project, the sampling size was decided upon through the process of data saturation.

According to Morse (2004), data saturation occurs when the researcher has maintained sampling and analyzing data until no new data arrive and all ideas of the theory are well established and their links to other ideas are clearly outlined and the researcher can thus stop collecting data. For the purpose of the study, the sample group consisted of twenty-two scrap collectors, two scrap merchants, and one official from the CCMA.

Sampling Procedure

This study utilized the snowball and purposive sampling methods of data collection. The snowballing technique was utilized in the first step to locate scrap collectors and their corresponding scrap yards through the original scrap collector. This accomplished the snowballing method. After that, the approach of purposive sampling was utilized to pick a few scrap collectors and scrap dealers in order to conduct interviews with them at their different places of business. Again, purposive sampling was utilized in order to select one key informant from the CCMA for the purpose of conducting an interview regarding the ways in which scrap collection could be formalized and included into the existing method of waste management.

Data Collection Instruments

Field observations and participant interviews were the methods that were utilized for the research. The primary data were gathered through preliminary observations made in the field and interviews conducted face to face. The following sections will go into greater detail regarding these topics:

Feld Observation

Some scrap yards throughout the Metropolis were visited for research purposes, and familiarization time was also spent out in the field to get a feel for how scrap collectors and dealers do their work in well-established scrap camps in the Cape Coast Metropolis. It was required to do this in order to gather information about the constraints of their actions as well as the sources of scraps in a direct and personal manner. The information that was obtained included the bargaining strength of scrap dealers, the processing methods of scraps used by scrap dealers, the number of scraps that were collected each day, and the best way to transport them so that they could be further processed. In this context, observation was the most important method for gathering data since it provided first-hand information on the processes involved in the collection of scrap metal at each of the different locations. The information that was acquired from the field observation was helpful in comprehending concerns pertaining to the collection of scrap metal and the management of garbage in a sustainable manner in the Cape Coast Metropolis. Pictures were obtained as a result of such observations made in the field.

Interview Guide

In-depth interviews with scrap collectors and dealers were performed to gain insight into the scrap collection process, its obstacles, and the ways in which it could be incorporated into the existing waste management infrastructure. The in-depth interview did not include any set questions. This was done since it assisted both the researcher and the participants in gaining clarity on matters when they were unsure about anything with each other. Additionally, it gave the participants the opportunity to freely express their thoughts and feelings using their own words. Again, this strategy enabled the

researcher to have greater control over the interview, as well as clear up any gaps or misunderstandings regarding any concerns that were the subject of the study.

Pre-Testing of Instruments

In the Mfantseman Municipality, the preliminary examinations were carried out. For the purpose of the research, a total number of respondents was chosen, including ten respondents each from the communities of Edumadze (a low-income community), Anafo (a middle-income neighbourhood), and Habitat, were chosen (high-income community). Another person who was interviewed was a representative from the Waste Management Department of the Mfantseman Municipal Assembly.

A preliminary reconnaissance trip to the aforementioned towns was carried out by the researcher, who was accompanied by two qualified research assistants. This first visit afforded the researchers the chance to observe the operations of scrap collectors and to obtain permission from the leaders of various scrap yards located inside the villages that were chosen to participate in the study. During the preliminary testing of the instruments, a few of the people who collect scrap metal expressed an initial reluctance to take part in the study. This was due to the fact that they mistook the people conducting the research for officials from the Waste Management Department of the Mfantseman Municipal Assembly who were trying to call them in. A few other people were under the impression that the researcher worked for the Mfantsman Tax Revenue Service as a tax collector. Following the preliminary

testing of the instruments, a number of adjustments were made in order to make the instruments more reliable and suitable for the research.

Reliability and Validity

Whether or not a measuring device reliably measures the characteristic for which it was built is referred to as its reliability (Wallen & Fraenkel, 2001). The criteria for determining whether or not an instrument is legitimate are laid forth by Patten (2004) and Wallen and Fraenkel (2001), respectively. Therefore, validity refers to the appropriateness, meaningfulness, and practicality of the inferences drawn by the researcher on the basis of the facts obtained.

In order to look for any signs of discrepancy, the instruments underwent a thorough inspection. Before administering the test, the researcher also provided the supervisors with the instruments so that they could check them for reliability and inconsistency. In order to guarantee that high-quality data collection tools were utilized throughout the primary phase of the fieldwork, a preliminary test of the research instruments was carried out. Confirming the emerging conclusions from the study required the researcher to use a variety of methods and sources of data, including the replies from key informants (qualitative data), as well as the observation of selected testing equipment.

Ethical Concerns

Conformity to established norms and adherence to generally acknowledged guidelines for proper behaviour are essential components of ethical behaviour (Strydom, De Vos, Fouche & Del Port, 2005). The research did not violate any of the ethical guidelines or standards that were in place.

First things first, the researcher approached his department to get an introductory letter, and then he approached the Institutional Review Board at the University of Cape Coast to receive ethical clearance for his research. The researcher then proceeded to present himself in a way that did not give any misleading impressions. In addition to that, informed consent from the respondents was sought. This was accomplished by providing the participants with material that was pertinent to the study, as well as explaining or informing them about the nature of the research and the goals of the project, in which they voluntarily agreed to take part. When a respondent indicated that they did not wish to answer a particular question, their right to privacy was protected by the fact that their opinions were taken into consideration. In addition to that, the study respected the respondents' rights to remain anonymous. It was also clarified that participants' names had been concealed and would not be included in any report resulting from the research. Finally, the respondents' right to privacy was respected and honored. As a result, the study used information provided by respondents only for the purpose of academic work and not for any other objectives.

Data Processing and Analysis

According to the postulations made by Amedahe (2002), the act of analysing data requires the ordering and dissection of data into its component pieces, using the raw data to produce answers to the questions that prompted the research. Both the processing of the data and the analysis of the data were carried out in a qualitative manner by using thematic and content analysis. The audio recordings of the interview sessions were done so with the express agreement of the respondents and at their earliest convenience. After some

time had passed, the audio recordings were eventually transcribed manually by repeatedly listening to the audiotapes. The transcripts were then subjected to a manual analysis, and the findings were presented according to the themes that had become apparent.

In order to develop conclusions that are both well informed and trustworthy, observations of the activities of the collectors and selected artifacts from the field that were captured on photographic film were given as supporting evidence for the findings.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents study's findings. The goal of the study was to examine the role of scrap collectors in achieving sustainable solid waste management in Cape Coast Metropolis. The findings are divided into five sections. The backgrounds of the participants are discussed in the first section. The remaining sections of the study discuss responses to questions based on the four objectives of the study, which are: the amount and sources of scraps collected, operations of scrap collectors, challenges faced by scrap collectors, and how scrap collection could be integrated into the formal waste management system in the Cape Coast Metropolis.

Background Information of Participants

The demographic information of the participants is described in this section. Participants' sex, age, educational level, and religious background are among the demographic data collected. This part looks into why they got into the scrap metal business, how long they've been in the waste collection business, how they got started, and when their company was registered. All of the participants (scrap dealers and collectors) were men, with the exception of

a key informant (one CCMA official) who was a woman. From the interview, it was also discovered that all the scrap collectors were males between the ages of 19 and 24. This supports the claim by Broni-Sefah (2012) that scrap collection is the first step in metal recycling and is primarily carried out by young men in their teens and twenties. The scrap traders, on the other hand, were substantially older; 38 and 45-year-old.

From the responses gathered from the participants, all the scrap dealers and collectors did not have any formal education. This was evident in the fact that the scrap collectors were mostly immigrants and could speak only their local dialect i.e., "Kotokoli", "Kusasi" and "Gawo" but not the English Language or Asante Twi and/or Fante dialect which is the language spoken by the majority of people in the study area. The language barrier was therefore a problem because I could not carry out a number of interviews with some scrap collectors because they could only speak and understand their local dialect, which I could not understand. This made data collection very difficult, as I had to spend about one week in search of scrap collectors who could at least speak and understand the common dialects spoken in Cape Coast (Twi or Fante).

Illiteracy level can be used to describe this limitation, and this was found in the work of Mazinyo (2009), as he explained that scrap collectors and dealers are poorly educated, disorganized. In addition, the working conditions of those employed in this industry are deplorable (Sarkar, 2003). Because the majority of them are immigrants living in abject poverty who come from remote regions and have no formal education (75 percent of them are illiterate), they are taken advantage of because of the vulnerable circumstances in which they come from (Sakar, 2003).

On the question of how long they have been involved in scrap collection activity, one of the scrap dealers indicated that he had been in the business for twenty years whiles the other had been in the business four months. The scrap collectors on the other hand said they have been in the business for ten years.

With respect to how they joined the business and when they registered their business, the participants indicated that their businesses have not been registered.

Oteng-Ababio (2018) makes a similar point, stating that waste collectors have been engaged in the collection of recyclables from dumpsites for sale to shredding firms or for their own private use for a long length of time, but that their actions have not been registered and, consequently, have not been incorporated into the whole waste management system in Ghana. It was also found that capital is needed to start a scrap business because they would have to pay the scrap collectors they work with.

One participant had this to say:

> *"And you have to get a capital. If you have your capital and have some amount of money for the boys. You need capital for this job. Because if you don't have a capital, you cannot do it. This job deals with physical cash. I buy car tyres too." (Scrap Dealer 1)*

This is to say that, like most businesses, for a scrap dealer to start a business he should have some start-up capital to buy some scraps as well as pay the scrap collectors who would be collecting the scraps for them. A question was asked in relation to this to find out whether they buy the scraps or get them for free and one participant echoed that:

"Yes, we buy them, anybody whom we go to or who comes to us sells the scraps to us. Unless we find it on the floor ourselves which is not common nowadays" (Scrap Collector 2).

Another participant had this to say

"I have young boys who move to houses and markets with wheel to collect them. Sometimes people call them home to sell scraps to them, so, they negotiate and buy" "They buy the scraps people give them" (Scrap dealer 1).

This lends credence to the idea that, on a regular basis, individuals visit one another's homes in order to collect recyclables prior to these waste components being included in the organized waste management system (Tartiu, 2011). It has also been suggested by Katusiimeh, Burger, and Mol (2013) that informal collectors play a significant role in the first step, which entails the collection of solid trash from houses, particularly from more economically disadvantaged sections of the population. First-line services are provided by informal collectors, who solely remove rubbish from residential properties. According to findings from a case study conducted by Gugssa (2012) on the informal plastic and metal recovery system in Accra, members of the network travel from neighbourhood to neighbourhood offering waste collection services, primarily to residential customers but also occasionally to commercial establishments. Members of the network collect waste not just from their own clients but also from anyone else in low- to high-income neighbourhoods who requires the service.

Figures 4 and 6 confirm how scrap collectors go around within their neighbourhood to collect scraps for the scrap dealers.

Figure 5: A young scrap collector with the cart in Abura
Source: Field data (2021).

Figure 6: A tricycle with scrap in Abura.
Source: Field data (2021)

The amount and sources of scraps collected in the Cape Coast Metropolis.

The study's first goal was to look into the quantity and sources of scraps collected in the Cape Coast Metropolis. Questions were therefore asked on where scrap collectors buy scraps from, how much scraps they are able to collect daily or weekly, and what type of scrap materials they collect. On the other hand, the scrap dealers were asked same questions but they were a bit longer than that of the collectors. They were asked where they buy the scraps from, whether from the house, market or dumpsites, whether they pick them

for free or not, the types of scrap materials collected and the amounts they pay for them.

According to the study's interviews, scrap collectors gather scraps around the neighbourhood or households where the shops of the dealers are located and they sometimes travel a long distance depending on the 'weather and how slow or fast the market is. Some dealers had this to say:

> *"Some people even bring it here to sell. There is a refuse dump just a stone's throw from my shop but the caretaker sells scraps from the dumpsite to me. So, I bought the tin tomato containers you see here from the caretaker of the dumpsite" (Scrap Dealer 2)*

> *"Some people in my household call me to go and buy, especially those who repair fridges but most of them come and give to me rather. Some people bring the cars here to sell to me" (Scrap Dealer 1)*

In addition to this, the interview with the scrap dealers revealed that they do not go around for scraps as the collectors do but their customers or people mostly come to their shops to sell the scraps to them. It was also brought to light that they take all kinds of "condemn" (as they locally put it) or scraps but do not take the ones that are not attracted by magnets.

The following excerpts are illustrative:

> *"For metals we buy all. Any 'condemn' thing too they buy. They buy iron, zinc, aluminium, everything 'condemn' they buy. Even rubber sandals we buy. I have a friend here who wants to open a PVC company here in Cape Coast. Let me say that he has opened the company, because, he owns three machines and waiting for one he ordered so he opens the company. I used to take PVC from here and*

Takoradi and pack at his house. If he gets help, it would be a very good business. And very soon you will hear that Cape Coast has a PVC recycling company." (Scrap Dealer 1)

According to the interviews, both scrap dealers and collectors buy copper, aluminium, and other metals

"We take copper, aluminium and all types of metals. We take rubbers like gallons too. The copper is the most expensive. We weigh the scraps before we charge. We charge according to the weight of the scrap." (Scrap Dealer 2)

The findings show that scrap collectors and dealers have an interest in taking copper, aluminium and all types of metals. As a result, scrap dealers and collectors do not have interest in all wastes from households or at dumpsites, but they have specific interest in some metals such as copper, aluminium iron, steel etc. The prices at which such items are sold may influence the values they place on such materials. The findings support the views of Andrews et al.'s (2015) who assert that aluminium, copper, iron, lead and steel are some types of scraps that are collected by scrap dealers.

Concerning the number and prices of scraps they buy daily or weekly, the scrap collectors indicated that it would be difficult to know because they do not keep records and some of the scraps are bought at a cheaper price compared to others which are bought at a higher price depending on the purchasing power between the collector and the seller. One scrap collector has this to say:

"As for the prices we buy the scraps I cannot tell, because, it all depends on negotiation power and the person selling the scrap to us" (Scrap Collector 2).

The amounts they pay for the scraps were also asked and according to the interviews, these were their responses.

"Ok. Sometimes, I get and sometimes too I don't get. In a day I can get more than one ton. Sometimes too you will not get one kilo. But roughly you can get at least 150 or 200 kilos. because, it is not every day you will get. But for now, the business is good. The prices are good. We buy one kilo for 10peswas and when we go, we sell it for 30peswas. But now we buy it 1cedi, and if it is the correct one, we buy it 1,50peswas. So, something being bought for 10peswas is now sold for 1.20peswas." (Scrap Dealer 1)

"One kilo is 1 cedi for rubbers and 1kilo of copper is 20cedis, and 1kilo for a metal is 1-cedi 20peswas. For the amount of money, I get daily or weekly, I can't tell because we don't write or keep records of the scraps we buy. People bring some here for me to buy whiles my workers also go round and buy some but we don't keep records of them." (Scrap Dealer 2). Figure 7 and 8 below depicts weighing of scraps by scrap dealers in the scrap yard.

Figure 7: Scrap dealers weighing scraps in the scrap yard in Abura
Source:Field data (2021).

Figure 8: Scrap dealers weighing scraps in the scrap yard at Ola
Source: Field data (2021).

It could be seen from Figures 6,7 and 8 above and the responses alluded to the fact that scrap dealers weigh materials such as copper, and aluminium before they state the price of them. The scraps are therefore weighed in kilograms (Murugaiah et al., 2010) before value or price is placed on them.

The scrap dealers and collectors mostly use “we” and “they” because they work as a team especially with the collectors. According to them they

sometimes move in pairs or disperse individually when they get to certain point. Their responses demonstrate the informal nature of their work, with each day brings its own market or sales, supporting Oteng-Ababio (2012) assertion. These responses also go in line with a study by Andrews et al. (2015) on the topic: Scrap metals' role in circular economy in Sunyani - Ghana. This study found that the highest producers of scraps for scrap dealers are refuse dumps, fitting shops, and households. That means that scrap dealers mostly get scraps from their neighbouring households who find the scraps unusable and ready to sell them.

In addition, Gugssa (2012) discovered that, during door-to-door waste collection, janitors (who are responsible for collecting and pouring waste into the truck) search primarily for metals in trash cans before transferring the waste to waste collection trucks. They sell the obtained materials to scrap metal collectors known as "boys" who scavenge neighbourhoods in search of metals to gather. The crews working on waste collection trucks do not have the resources or the interest to stockpile the metals or to bargain for a higher price; as a result, they sell the metals to any of the scrap dealers who are roaming around. Therefore, most of the time, people that collect scrap metal either gather the scrap themselves or have other people gather it for them and then sell it to them.

Operations of scrap dealers and collectors

This section sought to find out the operations of scrap collectors and scrap dealers in the Cape Coast Metropolis. The interview questions were focused on how they operate at work, from the gathering of scraps to processing them daily up to the time they transport their scraps to sell, how

they sort the scraps and assess the quality of the scraps. Their weekly income and how negotiation is done were also discussed.

It was found from the interviews that the daily activities of the scrap dealers are all about luck.

> *"This business is all about luck. My workers sometimes come early with a lot of scraps which might not be the same the following day. When they bring the scraps, we hit them with a metal to mould them into a smaller shape to get more space to arrange the scraps when transporting to the scrap companies and we sort them according to the type of scrap. An example is the refrigerator, when we buy it, we take the metal out and throw the foam around it away." (Scrap Dealer 2)*

practices on small scale. Figure 10 and 11 corroborate the respondents' views on sorted scraps before transporting to the factories for recycling.

Figure10: Sorted Canned and Perfume containers

Figure 11: Metals

Moreover, it was found that sorting of scraps was done according to the type of scraps, be it aluminium, copper, rubber or metal and they are reshaped with hammer to make packaging and transportation easier. However,

it was said that they use "steam" (a magnet) to check the quality of the metal, such that if the magnet does not attract it, it is not quality, therefore, they will not buy. According to the dealers, the quantity of scraps gotten determines the type of vehicle to use for transporting the scraps be it Tricycle "Aboboyaa" or Kia truck and the amounts vary depending on the type of vehicle taken. One dealer had this to say:

> *"If they bring them to us we have to weigh them together before we separate them. Even with iron, we have different types which you have to be separated later. We have cars and we have the normal iron we normally call "faalafaala", and then we have bronze, zinc, and copper. So, we look at it and we know the kind of metal it is. But some copper does not look like copper, so you have to get steam (a magnet) to test it." (Scrap Dealer 1)*

Aside from using the magnet to detect the quality of some metals, some scrap dealers and collectors can detect the quality of the scraps depending on their level of experience in the business or the number of years spent in the scrap business. This was gotten from a response from one dealer:

> *"As you deal in scrap collection for some time, you gain experience to detect which scrap is of high quality and which is not. In addition, we use magnet to check. If the magnet is able to attract metal, then it means it is quality. We buy scraps that magnet can attract because the companies do not buy metals that, magnet cannot attract. So, we don't buy metals that are not attracted to magnets." (Scrap Dealer 2)*

The findings show that scrap dealers and collectors have varied ways of sorting the scraps and most of them indicated that it depends on the material in question be it metal or non-metals. A study by Javaid & Essadiqi (2003) revealed similar approaches for sorting scraps such as baling, shredding, briquetting, and shearing. Magnetic separation and separation by physical and chemical characteristics were also mentioned as approaches that are used when a large quantity of ferrous scrap is to be separated from other materials.

In addition to this, the scrap dealers and collectors were asked how their operations have affected the waste management of their community. It was found that the dealers and collectors did not actually know how their operations had affected waste management of the nearby communities. The scrap dealers therefore found it difficult to give exact figures when it comes to monetary issues like the income they earn and the amount they buy and sell the scraps because they do not take records of any transaction that takes place in their operations**.** However, one scrap collector was able to give quite a clear benefit the community gets from their operations. That was when he said that:

> *"Yes, it has helped the environment. Everybody knows about it, that it has made the environment clean. You will not see iron waste in the environment" (Scrap Collector 1).*

Similarly, the CCMA official said in the course of the interview that the operations of the scrap collectors are also instrumental in achieving sustainable solid waste management.

> "They *are helping. If they don't collect the scrap, the wastes will be at our responsibility to manage. That will also be a burden in a way. You know waste management; we do a lot of sorting. When we sort, it is*

easy in managing it. So, I will say that the scrap collectors are instrumental. They are helping in a way, in one aspect of the sorting. Just that they sort out only what they want." (CCMA Official)

Furthermore, the officer revealed some benefits of the waste management activities of their organization in the quest of achieving sustainable waste management in Cape Coast Metropolis. According to her, introducing a Clean Up Exercise has been one major significant activity that was integrated to improve the environmental sanitation on Cape Coast metropolis, although, the zeal to continue had reduced overtime. She had this to say:

"What is being done is that most at times the Assemblymen, organize clean up exercise in their communities and then we go in to support them. Because, it's possible that when they desilt the gutters, they will just leave them by the roadside. As a result, we go collect and dump them in the containers." (CCMA Official)

"Sometimes it depends, when we are in the rainy season, we quickly organize, we desilt all our major drains and the chocked gutters so that it will allow free flow of water. So now it depends on the season and the time but it is not every first Saturday of the month, no. But other districts do it once a quarter, so it depends. But we are looking at the season and then the time." (CCMA Official)

The Zero Waste (ZW) theory could be used to explain the importance of scrap collection as well as the activities of the formal waste management. It could be noted from the responses that scrap collection, with its operations seems to be one of the major ways of reducing the amount of waste that enters

the current waste stream in the Cape Coast Metropolis. The quest of attaining a comprehensive sustainable waste management is undoubtedly an arduous task, since the informal waste collection is not integrated and formalized into the current waste stream.

Informal collectors are distinguished from their more official counterparts by the fact that they offer only first-line services. These collectors remove garbage from residential areas, but they do not transport it all the way to the final disposal site (Katusiimeh, Burger, & Mol, 2016). According to Manhart and Spitzbart (2020), in Ghana, the management of electronic waste has, up until this point, been virtually entirely organised by the informal sector. The current system ensures that many people have a means of subsistence. The current system has many advantages, the most notable of which are its high collection rates (which are greater than 90 percent) and its extremely labour-intensive procedures. It is estimated that over 5,000 people in Accra alone are operating as informal scavengers, using their pushcarts to collect e-waste gadgets from private residences and companies (Manhart & Spitzbart, 2020).

Challenges faced by scrap dealers and collectors

The study also sought to examine the challenges that scrap dealers and collectors face in their operations. It was found from the interviews that the major challenge they face is theft. According to them, some of the scraps they have bought are being stolen right on the storage site and it amazes them how thieves are able to steal them even when some scrap collectors sleep at the scrap site.

"I work from 8am to 6pm (10 hours) but some of my workers also sleep here to protect the scraps from being stolen. If they don't sleep here, the scraps will be stolen. Even as they sleep here people have been stealing the scraps. There is no light here and no wall or container to cover the scraps." (Scrap Dealer 2)

"Yes, someone sold some scraps to us, not knowing he stole it from his boss. His boss reported to us and we had to return the scraps to him. Some of them will not tell you the truth when they come here." (Scrap Dealer 1)

Similarly, another scrap dealer said something that confirmed this:

"The only challenge is about the collection. If you don't take care you can go to the Prisons. I had that issue one day. A man brought a door which had no glass, nothing and another person came that it is for him so I asked of his phone number and he said I have to pay him, and I asked how much and he said 2000cedis. We bargained and I gave him 1500. He took the money and sent the material as well. The person came back and called him for more than 20minutes and he was not coming. I think he went to steal the thing and came to sell to me." (Scrap Dealer 1)

"Another case too is that a boy brought a head pan. Three days afterwards the boy came to show some people that he brought it to me and I brought the head pan but they insisted that it is not that particular head pan they are looking for. And I told them that is what the boy came to sell to me but they said that was not the one. The boy himself insisted that it is that particular head pan but the owner said

he wouldn't take it but wants money. So, we went to ask of the price of a new head pan and it was 20cedis so I took my 200 cedis and bought a new head pan for him, so those are the main challenges." (Scrap Dealer 1).

According to Bennett (2008), an increase in the pricing of scraps, particularly the non-ferrous metals, has the ability to provoke an upswing in the theft of metal from the physical environment. Specifically, the non-ferrous metals have the highest potential for this to occur. For example, there has been a discernible increase in the plundering of the built environment all over the world as a direct result of the need for copper. This could be a reason for some of the theft cases as one of the scavengers echoed that copper is more expensive than other metals. An observation I made on the scrap site was that the scraps were stored in an open place where anybody can just steal them since they are not locked in a container or room. The only way they use to safeguard the scraps is by sleeping there but that seems not to solve the theft cases.

Theft issue was also mentioned in the interview with the CCMA Official and it was revealed that dustbins that have been provided by the Municipal Assembly are sometimes stolen which leads to inadequate supply of dustbins and increases the attitude of poor waste disposal. Another challenge that was added was the negative attitude of some community members. This was what she said:

"…, and then most of the dustbins too have been stolen, because they are plastics. Some will also steal and sell it to the scrap dealer who

buy the plastics. Some also take them away when they are empty but we still have some. So that is our major challenge" (CCMA Official.)

"The challenges are huge. Financial constraint, and then the attitude of people. You know sometimes when you go to our container side, the containers are empty but people are still dumping refuse on the floor. People want the containers to be maybe just one meter away from their house so when you demarcate places that the communal container is supposed to be, they don't want to go there. So, you will see people dumping indiscriminately. Throwing refuse, rubbish, garbage everywhere, in the drains everywhere. So, as for challenges, we do have a lot of challenges." (CCMA Official)

Transporting recovered materials from faraway communities to the fabrication factories of potential buyers can be expensive, and local governments may not be paying enough attention to the creative design of programmes, incentives, and contamination control studies to ensure that source separated commodities match market standards, as noted by Oduro-Appiah and Aggrey (2013). Just as indicated by Oduro- Appiah and Aggrey, issues about transportation were also raised and the scrap dealers said that they sometimes have to take two cargoes to transport the scraps, or which they are charged huge sums of money which sometimes led to losses especially when they are not able to bargain well when they get to the potential purchasers.

"It depends on the cargo. If you take single axel, they can take at least 1500 cedis but if you take the double axel, they take at least 2000cedis and some people also take triple axel or which the price would be

higher, like 2500cedis. You would have to buy food for them on the day of loading. (Scrap Dealer 1).

Notwithstanding, another challenge found during the interview was stigma because of the nature of their job. One participant had this to say:

"Some people show some attitude because of the work I do to the extent that when I greet them, they don't wait to respond. Notwithstanding, some people don't care about that so they can come around and have a conversation with me." (Scrap Collector 2)

This is made clear by the argument made by Muhammad and Manu (2013), which states that their status in society is often low, the majority of them are poor and marginalised people, and their only means of subsistence is sifting through rubbish or scavenging for food and other supplies. This, to some extent, causes people to treat them in any manner, and one of their comments proved that this is the case. In addition, Gugssa (2012) explains that according to the Local Government Act of 1993, (Act 462) in Ghana, it is against the law for waste generators to obtain service from waste collectors who are not registered. The formal companies have the authority to confiscate their vehicles and issue fines once it is discovered that the individuals in question are operating in the aforementioned regions. There may also be instances of a violent altercation taking place. Oguntoyinbo (2012) also states that scavengers and other groups of informal recyclers see waste as a source of revenue and a way to make a living, while the general public sees waste as an aesthetic issue and people who are involved in resource recovery as a socioeconomic nuisance. The lack of social acceptability of the activities of informal waste collectors and scavengers as a legitimate source of income, as

well as of themselves as environmental actors in the sustainability of waste management, is one of the most significant barriers to the integration of these groups.

Another challenge that came out of the interview was the health risk associated with this informal waste management and its precariousness. The most common health risk they mentioned was body pain and this was a result of the carrying of heavy metals in their day-to-day activities. One Scrap dealer had this to say:

"We sometimes have body pains because of our daily routines but aside that we don't have any health issues as a result of our work."

The findings reveal that scrap collectors face some challenges such as theft cases and body pains. These results could be linked to the findings of a study by Gyimah et al. (2021).who found that people collect the scrap metals without any protective clothing. They gather the metals from various places such as the dump sites, fitting shops, ports and harbours, industries, homes and many more. Broken down wheelbarrows, copper cables, broken down cars, gas cookers, tins, fan parts, roofing sheets, metallic doors, metallic trunks, desktops computers and monitors are just a few of some of the items they collect as scrap metal. The gadgets containing metals are later pulled to pieces to retrieve the metallic parts. As recyclers hammer and chisel away parts of gadgets, they sometimes get cuts and bruises which may result in infections if not properly treated. Based on an observation by Gugssa, (2012), they are also challenged as they have no appropriate waste collection equipment and protective tools. Gugssa also adds that informal waste collectors are challenged by road congestion as they have to push truck for long hours on

main roads. Thus, pushing the truck for long hours may affect their health. Asim, Batool and Chaudhry, (2012) adds that the scrap collectors are poor, suffer harassment from officials and face health and safety problems during the work.

Integration of scrap collection into formal waste management system

The purpose of this section is to evaluate the relationship between scrap collectors and formal waste management. Some of the questions asked were to know if they get any support from the formal waste management system, how they think the scrap collection is beneficial to the formal waste management system, the measures that can be taken to integrate the informal waste collectors into the formal waste management system and the expected challenges if informal waste collectors were to be integrated to the formal waste management system.

It was found from the responses from the interviews that scavengers do not have any relationship with the various formal waste management system in Ghana but they indicated that they had unions. One Scrap Dealer echoed that:

"No, they do not support us in any way. We have a union though" (Scrap Dealer 1)

This confirms the response of the head of CCMA who said that they have partnership with a Private formal waste management only and did not mention scrap dealers in their operation. She had this to say:

"Because, for now, per the 2010 sanitation policy, 80% of waste is supposed to be given out to private management, whiles the rest, 20% is to be dealt with by Metropolitan, Municipal and District Assemblies

(MMDAs). So, for now, we are working with Zoom Lion, waste management company to manage waste in the metropolis, because they are handling 80% of our solid waste." (CCMA Official)

To know the commonalities between the formal and informal waste collectors, one participant said this:

"Ok, not just at partnership with Zoomlion. We are like Zoom Lion because they clear waste and we do the same thing. We give them sorted waste which they recycle which then helps the community or Ghana. We are more like the private companies. We don't get any support from anybody." (Scrap Dealer 2)

To find out whether they would like to get public support, all the participants responded that they would be very glad to get any kind of support from formal waste management institutions. A question was asked to know how they want the support to be and this is one of the responses:

"If it is training or money, we would like both. They have been talking about it long time ago that they will come and help us. But recently we heard that they will give us some credit, 'these three tyres' (tricycles), so that we can pay little by little every month but it has never come." (Scrap Dealer 2)

However, it was revealed from the interview with the CCMA Official that issues about they reaching out to support the scavengers can only be addressed when their grievances and needs are written and documented formally to them. Below is the response;

"No, we can't be going out and help. The Assembly in collaboration with UCC is having a programme that will help the scrap dealers. But

before you can help them, they need to be organized in a group. You are into business, what you want, put it into writing and then come and see us. If you are sitting in your corner, how do we know you need our support? They should organize themselves formally with a letter and come. We don't deal with individual just like that. They should come in a group with the leader who is recognized. Even if banks are giving loans, they don't give it to individuals unless you are into a kind of recognized group. So, they have not brought their grievances so for now we will say we are not aware they need any support." (CCMA Official)

On the other hand, it was revealed from the responses of the scavengers that they would like to join the formal waste system at any time provided there would be no challenge. A probing question was further asked to know the problem they think can arise as a result of they having a contract or relationship with a formal waste management system and one participant indicated that:

"I don't want any misunderstanding. I haven't worked with them so I wouldn't know the challenge that may arise in the course of our activities." (Scrap Dealer 1)

The last question for the scrap collectors and dealers was to know what measures they think can be taken to integrate the informal waste collectors into the formal waste management system and it was found that this this would be possible if the formal waste management invited them and work together with them. For instance, one participant opined:

"If they invite me for us to work together, I would be glad. I know one gentleman at Zoomlion who used to give me scraps from Zoomlion."

. They believe the CCMA is not doing enough to integrate their activities in the formal sector. But according to the CCMA, this is so because the informal waste sector is poorly organized and does not present a united front to make it easier to have a relationship with them as a collective group. Operators in the informal waste sector suggested the need to be trained and resourced by the CCMA.

According to Asim, Batool, and Chaudhry (2012), informal waste collectors not only reduce the amount of waste produced, but they also supply the recycling industry with secondary materials. This enables more conventional garbage collectors to reduce the costs associated with sweeping, transportation, and disposal of waste. As a general rule, the activities of dumpster divers are associated with positive outcomes for both the economy and the surrounding natural environment. A study that Manhart and Spitzbart carried out in the year 2020, they outlined the preparation steps that could be taken in order to fully integrate the work sheds on the Old Fadama Scrap Yard into a formalised chain for the management of e-waste. This was done as part of the research that they had conducted. These strategies involved the presenting of potential operator concepts, followed by a selection from those concepts, the creation of standard operational procedures, and ongoing capacity growth. According to Oguntoyinbo (2012), one potential option to assist these people is to include their informal services into the formal waste management system. This is the argument made in the study. They may be able to develop expertise and experience in resource recovery as a result of

this, which may ultimately lead to improved working and living conditions. It's vital to keep in mind that inclusive waste management is an ongoing procedure, and that measurable progress is being made in several developing nations thanks to the efforts of waste pickers and informal waste collectors who have become environmental activists (Gugssa, 2012) and this will help in achieving sustainable waste management.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The findings of the study are summarized in this chapter. The major findings are derived from the specific objectives of the study. The chapter ends by drawing conclusions from the findings and making recommendations.

Summary of the Study

The purpose of the study was to assess the role of scrap collectors in achieving sustainable solid waste management in Cape Coast Metropolis. The specific objectives were to determine the sources of scraps collected in the Cape Coast Metropolis, examine the operations of scrap collectors in the Cape Coast Metropolis, assess the challenges of scrap collectors in the Cape Coast Metropolis, and investigate how scrap collection could be integrated into the formal waste management system Cape Coast Metropolis. To achieve these objectives, twenty-five (25) people were interviewed: twenty-two scrap collectors, two scrap merchants, and one CCMA official. Due to the qualitative nature of the study, participants were carefully selected. Because each type of participants has a distinct role to play in waste management operations, three separate interview guides were used to meet the research's objectives. Using the narrative approach of data analysis, the data was manually processed, and the results were discussed based on the themes from the interviews and the study's specified objectives.

Key Findings

The study involved twenty-four male scrap dealers and collectors as well as one female CCMA official. The fact that all scrap dealers and collectors were males confirm the fact that the scrap collection business is dominated by men. Scrap collectors in the Cape Coast Metropolis were also discovered to wander throughout the neighbourhood buying scraps from market places and households, but scrap dealers remained in their stores while individuals came to sell scraps to them.

The study also found that scrap collectors in the Cape Coast Metropolis walk from house to house to purchase scraps and find it difficult to quote the amount of money they pay to purchase scraps in a day, week, or month since they do not keep records of their dealings.

Scrap collectors work for at least 8 hours per day (from 8 a.m. to 4 p.m.) and their daily scrap gathering activities are entirely dependent on the luck of the day. Sorting of the scrap is done based on the type of scrap material that has been collected. Scraps are also reshaped with a hammer to make the packaging and transporting easier. More importantly, a magnet has been discovered to be a quality detector for metal and as such when it attracts, it signifies the metal is of good quality; however, if the magnet does not attract the metal, scrap collectors will not buy it since it is assumed to be of poor quality. Finally, depending on the quantity of scraps, the scraps are delivered to possible customers on tricycles, Kia trucks, or a large truck.

Theft issues were discovered to be a major threat to both scrap collectors and the formal waste management system in terms of the challenges scrap dealers and collectors face. The second issue was associated with

tiredness and body pains they frequently experienced as a result of lifting heavy scraps and hammering large scraps into small shapes. Scrap collectors have also been reported to endure stigma as a result of the nature of their work, as people regard and talk to them in an unfavourable manner.

In terms of the integration of scrap collection into the formal waste management system, it was discovered that while the formal waste management system of Cape Coast metropolis recognizes the activities of scrap collectors as a significant way of contributing to sustainable waste management in the Cape Coast Metropolis, they have no relationship with them, share no commonalities, and are not integrated into their formal system. In light of this, scrap collectors receive no assistance from the Metropolitan Assembly, and that the Metropolitan Assembly is of the view that if they want to receive an assistance, scrap collectors must form groups and present their request to the Assembly in writing.

Conclusions

The goal of the research was to find out how scrap collectors can help the Cape Coast Metropolis achieve sustainable waste management. Based on the findings of the study, it can be concluded that scrap collection is a male-dominated occupation. Scrap collection was also discovered to be an active, energy-sapping job that employs a large number of illiterates and immigrants who face theft, stigma, and health risks as a result of their economic activity. Furthermore, it was discovered that both the formal and informal waste management systems contribute to proper sanitation; however, scrap collectors, with their precarious operations, are not included in the formal

waste management system, posing a challenge in the quest for sustainable waste management in Cape Coast Metropolis and Ghana as a whole.

Recommendations

Based on the conclusions, I therefore recommend that:

1. This study purpose stakeholders consultation and involvement to device means to make scrap collectors officially recognised as the first response team in sustainable waste management and support them with automobiles to increase their coverage.
2. There should be a link between recycling agencies and scrap collectors to increase the prices of scraps to release some transportation burdens from the scrap collectors.
3. Stakeholders should design innovative programmes, incentives, and contaminant control research on how to store components securely and how to safeguard themselves while undertaking potentially harmful disassembling techniques.
4. A holistic approach by authorities of waste management in Ghana to help various scrap collectors and dealers to have a formally registered union that brings together the activities of all scrap dealers and collectors to streamline their activities. This will help to mobilise and regulate the activities of scrap collectors so as to properly integrate them into the formal waste system,

Recommendations for Further Studies

It is recommended that further studies be conducted involving recycling agencies to get their views on some of the challenges encountered in dealing with informal waste collectors.

REFERENCES

Abul, S. (2014). Environmental and health impact of solid waste disposal a Mangwaneni Dumpsite in Manzini: Swaziland. *Journal of Sustain. Dev. Africa, 12(7): 64-78*.

Amedahe, F.K (2018). *Fundamentals of educational research methods*, Mimeograph. Cape Coast: University of Cape Coast pp 78-120.

Amoah S.T. &Kosoe, E.A. (2014). Solid Waste Management in Urban Areas of Ghana: Issues and Experiences from *Wa. Journal of Environmental Health and Human Health.Vol. 2 No. 5, 110-11.7.*

Bennett, L. (2008). Assets under attack: metal theft, the built environment and the dark side of the global recycling market. Environmental law and management, 20, pp.176-183.

Boadi, K.O. &Markku, K. (2017). Environment and health impacts of household solid waste handling and disposal practices in the third world cities: The case of Accra Metropolitan Area, Ghana. *Journal of Environmental Health, 68(4): 34-36.*

Chadwick, B. A., Bahr, H. M., & Albrecht, S. L. (1984). *Social Science Research Methods.* Englewood Cliffs: Prentice-Hall

Chandrappa, R. (2016). *Solid Waste Management. Principles and Practice*.

Cheema, G. S., (2003). The challenge of urban management: Some issues. In *Urban management: Policies and innovations in developing countries*, ed. G. S. Cheema and E. Wards. London: Praeger.

Coad A. (2005). Private Sector Involvement in Solid Waste Management. Avoiding Problems and Building on Successes. *Collaborative Working Group on Solid Waste Management in Low- and Middle-income Countries.*

Cointreau-Levine, S. &Coad, A. (2000). *Private sector participation in municipal solid waste management, executive overview (part 1)*. SKAT (Swiss Centre for Development Cooperation in Technology and Management), Swiss.

Cointreau-Levine, S. (2016). Sanitary landfill siting and criteria. Washington DC: World Bank infrastructure notes, *Urban* (UE-12).

Da Zhu et al. (2015). *Improving Municipal Solid Waste Management in India: A sourcebook for policy makers and practitioners*. The international bank for reconstruction and development / The World Bank.

Emery, A., Gibbs, A., Griffiths, A., Myrddin, S., Williams, K. (2000) Analysis of Waste Entering a Typical Small Landfill Site in the South Wales Valleys – Phase 2, Cardiff University, Report no. 2683.

Environmental Protection Agency (1996). *Environmental Assessment Regulations in Ghana, A guide*. Republic of Ghana.

Environmental Protection Agency (2016) *Ghana's state of the environment report*. EPA, MES, MLGRD,

European Commission (2017). Directorate general: Environment, nuclear safety and civil protection. *EU. Focus* on *waste management.* Luxembourg: Official publication of European communities.

European Commission Joint Research Centre Institute for Prospective Technological Studies, (2008). End of waste criteria, Final Report. Seville, Spain, Luxembourg: Office for Official Publications of the European communities.

Foulke, E.G. (2008). Guidance for the identification and control of safety and health hazards in metal scrap recycling. Occupational Safety and Health Administration, US Department of Labour. OSHA 3348-05.

Furedy, C. (2014). Garbage: Exploring non-conventional options in Asian cities. *Environment and Urbanisation*, 4(2) 42-61. Geography, 82 (1), 17-26.

Ghana Statistical Service (2002). *2000 population and housing census report.* Accra: Ghana Statistical Service.

Ghana Statistical Service (2012). 2010 Population and Housing Census: Summary report of final results. Ghana. Retrieved from http://www.statsghana.gov.gh/docfiles/2010phc/2010_POPULATION_AND_HOUSING_CENSUS_FINAL_RESULTS.pdf.

Ghana Statistical Service, 2012. 2020 Population and housing census. Summary report of final results, http://www.statsghana.gov.gh/2020phc/ Census2020

Global e-Sustainability Initiative & Electronic Industry Citizenship Coalition, (2015). Social and environmental responsibility, http://www.eicc.info/ PDF/Report on Metal Extraction.pdf.

Government of Ghana, Ministry of Local Government and Rural Development (2003). *Local government project preparation of sample development*

plans and infrastructure programme in selected towns. (1) Summary report on findings and recommendations applicable to all settlement.

Gugssa, B. T. (2012). The cycle of solid waste: a case study on the informal plastic and metal recovery system in Accra Metropolitan Area, Ghana; The Environmentalist; 28,211-218.

Hartman, R. (2016). *Solid waste management*: Options for private sector

Harvey, D. (2014). *A Brief History of Neoliberalism*. Oxford: Oxford University Press.

Hasenfeld, Y. &Garrow, E. (2015). Theoretical Approaches to Human Service Organizations. Environmental law and management, 20, pp.176-183.

Hoornway, D., &Bhada-Tata, P. (2012). What a Waste: *A Global Review of Solid Waste Management*. Washington DC, USA: World Bank. Retrieved from www.worldbank.org/urban.

ISWA & UNEP. (2002). *Industry as a partner for sustainable development: Waste management*. International solid waste association and the United Nations Environment Program. London: The Beacon Press, UK.

Javaid, A., and Essadiqi, E. (2003). Final Report on Scrap Management, Sorting and Classification of Steel. Report No. 2003-23(CF) The Government of Canada Action Plan 2000 on Climate Change Minerals and Metals Program

Kaosol, T. (2009). Sustainable Solutions for Municipal Solid Waste Management in Thailand. *World Academy of Science, Engineeering and Technology 36*

Kaseva, M.E. &Mbuligwe, S.E. (2005). Appraisal of solid waste collection following private sector involvement in Dar es Salaam city, Tanzania.*Habitat International* 29, 353–366.

Katusiimeh, M. W., Burger, K., & Mol, A. P. (2013). Informal waste collection and its co-existence with the formal waste sector: The case of Kampala, Uganda. *Habitat International*, *38*, 1-9.

Kendie, S.B, Akanpatulsi, J. Ghartey, F. (1997). *Cape Coast District Development Plan 1995-2000.* prepared for the Ministry of Local Government and the District Assembly, Accra and Cape Coast

Kendie, S.B. (2004). Willingness to pay more for rural drinking water service in Ghana and Togo. Discussion paper series No. 3 Cape Coast: Institute for Development Studies, UCC.

Kimani, N. G. (2007). Environmental pollution and impact to public health; Implication of the Dandora Municipal Dumping site in Nairobi, Kenya. A pilot study report in cooperation with the United Nations Environment Programme (UNEP), Nairobi, Kenya.

Kitbuah, E., Asase M., Yusif S., Mensah, M.Y. &Fischer, K. (2015). *Comparative Analysis of Household Waste in the Cities of Stuttgart and Kumasi*-Option for Waste Recycling and Treatment in Kumasi.

Klundert, A.V. D & Lardinois, I. (1995). *Community andprivate (formal and informal) sector involvement in municipal solid waste management in developingcountries*.(http://www.gdrc.org/uem/waste/swm-finge1.htm)

Leblanc, R., and (2018) About Metal Recycling an Introduction to Scrap Metal Recycling retrieved from https://www.thebalancesmb.com/about-metal-recycling-2877921

Manhart, A. & Spitzbart, M. (2018). Strategies for the formalization of scrap businesses on the Old Fadama Scrap Yard. Retrieved from https://www.giz.de/en/downloads/giz2021-en-strategies-formalization-scrap-business.pdf

Mariwah, S. (2012). Institutional arrangements for managing solid waste in the Shama-Ahanta-East Metropolis, Ghana.*Journal of Sustainable Development in Africa*.Vol. 14, No. 6.

Material Losses: Waste, Scrap, Defectives and Spoilage Article shared by Lodha Ashish (n. d) retrieved from https://www.yourarticlelibrary.com/cost-accounting/material-control/material-losses-waste-scrap-defectives-and-spoilage/55398

Ministry of Local Government and Rural Development (2016) *Environmental sanitation policy.* Accra: MLGRD, Republic of Ghana.

Ministry of Local Government and Rural Development (1999). *Environmental Sanitation Policy*, Accra: MLGRD. 59

Ministry of Local Government and Rural Development (MLGRD, 2006).*MoU between Government of Ghana and Zoomlion Ghana Limited.* Government of Ghana.

Momoh, J. J. & Oladebeye, D. H. (2010). Assessment of awareness of attitude and willingness of people to participate in household solid waste recycling programme in Ado-Eketi, Nigeria, in the *Journal of Applied Sciences in Environmental Sanitation*. Jakarta, Indonesia. Volume 2(10), pp. 212-217.

Moyes, R. (2005). Report on A study of scrap metal collection in Lao PDR. Geneva International Centre for Humanitarian Demining, Geneva.

Muchová L., and Eder P., (2010). End of waste criteria for iron and steel scrap: Technical Proposals. Joint Research Centre – Institute for Prospective Technological Studies. Luxembourg: Publications Office of the European Union.

Myers, G.A. (2005). Disposable cities: *Garbage, governance and sustainable development in Urban Africa*, Aldershot: Ashgate. Ministry of Local Government and Rural Development (MLGRD, 2010). *Environmental Sanitation Policy of Ghana.* Government of Ghana.

Nuzhat, A., Fouad, M., & Khan, O.Y. (2004). *Industrial and Environmental Biotechnology*. India: Replica Press Pvt. Limited.

Oduro-Kwarteng, S. (2007). Managing urban solid waste services, Assessment of performance of private companies in 5 cities in Ghana. Delft: UNESCOIHE Institute for water education.

Oguntoyinbo, O. O. (2012). Informal waste management system in Nigeria and barriers to an inclusive modern waste management system: a review. *Public health*, *126*(5), 441-447.

Onibokun, A. G & Kumuyi, A.J. (2004). *Governance and waste management in Africa*. Chapter 1. The International Development Research Centre: Science for humanity. http://web.idrc.ca/en/ev-42974-201-1-DO_TOPIC.html.

Onyanta, A. (2012). Urban governance and spatial in service delivery. A case study of solid waste management in Abuja, Nigeria. *Journal of Waste Management and Research Vol. 30(9), 991-998.*

Oteng-Ababio, M. (2009). Private sector involvement in solid waste management. *Journal of Management & Research*, 322-329.

Oteng-Ababio, M. (2012). The role of the informal sector in solid waste management in the GAMA, Ghana: Challenges and opportunities. Tijdschrift voor economische en sociale geografie, 103(4), 412-425.

Post, J. & Obirih-Opareh, N. (2003). Partnership and the public interest: Assessing the performance of public private collaboration in solid waste collection in Accra. *Space and Polity, 7*(1), 45-63.

Puopiel, F. (2010). *Solid Waste Management in Ghana*: The case of Tamale Metropolitan Area. Read A. D. (1999). "A weekly doorstep recycling collection, I had no idea we could". Overcoming the local barriers to participation. *Journal of Resources, Conservation and Recycling 26, 217 – 249.*

Republic of Ghana (1999). *Environmental Assessment Regulation*, LI1652 Accra, Ghana: ROG.

Târţiu, v. (2011). Selective collection of municipal waste in Romania: Characteristics and challenges. *Management Research & Practice*, *3*(3). pp.8-15

Taylor, D.C. (2000): Policy incentives to minimize municipal solid waste. *Waste management and research*, 18, 406-419.

Tchobanoglous G., Theisen H., Vigil S., (2016). *Integrated solid waste management. Engineering principles and management issues.* McGraw-Hill International Editions.

Tchobanoglous, G., & Theiser, H., & Vigil. S. (2001). *Integrated Solid Waste Management*. New York: Lewis Publisher.

Tsiboe, I. A., &Marbell, E. (2004). *A look at urban waste disposal problems in Accra, Ghana.* (Master's dissertation). Roskilde University.

Retrieved from http://rudar.ruc.dk/bitstream/1800/322/1/A_Look_at.pdf.

UNEP (2000). Urban areas.GEO-2000, *Global Environment Outlook*. http://www.eicc.info/PDF/Report on Metal Extraction.pdf. [Accessed on 26 July 2011]

UNEP (2014). Policy coherence of the sustainable development goals. A natural resource perspective. *An International Resource Panel Global Report on Human Settlements 1996. New York, United Nations Centre for Human Settlements (HABITAT)*

UNEP, (2015). Developing integrated solid waste management plan mraining Manual, Volume 2: *Assessment of current waste management systems and gaps therein"*. Osaka/Shiga, Japan.

UN-HABITAT. (2010). *Solid waste management in the world's cities.*London and Washington D.C: UN-HABITAT.

United Nations Environment Program -International Environment Technology Centre (UNEP-IETC). (2003): *Urban waste management strategy*. Available:http://www.unep.or.jp/ietc/focus_on_ietc/index.asp. [Accessed 17th September 2007.]

United States Environmental Protection Agency (2014). *Resource recovery and waste reduction*. Washington D.C., E.P.A. US Office of Research and Development.

World Bank (2008). Successes and failures of PPP projects, Europe and Central Asia Region. Volume 2: Assessment of Current Waste Management Systems and Gaps Therein.

Zerbock, O. (2003). Urban solid waste management, waste reduction in developing countries. (www.cee.mtu.edu). Accessed on 18th July, 2009

.Zerbock, O. (2003). *Urban solid waste management, waste reduction in developing countries* .Available http://www.cee.mtu.educ/peacecorps/ documents-july03.waste reduction.

Zero waste project (2007). *Solid waste management in Sunyani Minucipality.* Retrieved on July 7, 2009 from www.zerowasteproject.org.

Zurbrugg, C. (2003). *Solid waste management in developing countries.* SANDEC/EAWAG: Dubendorf, Switzerland

APPENDICES

APPENDIX A

UNIVERSITY OF CAPE COAST

COLLEGE OF HUMANITIES AND LEGAL STUDIES

FACULTY OF SOCIAL SCIENCES

DEPARTMENT OF GEOGRAPHY AND REGIONAL PLANNING

INTERVIEW GUIDE FOR OFFICIALS OF WASTE MANAGEMENT DEPARTMENT OF CCMA

The researcher aims to investigate the role of scrap collectors in achieving sustainable waste management in the cape coast metropolis. Interviewees' participation is important for the success of this study. Information provided is solely for academic purposes and would be kept as ***confidential*** as possible. Responses provided would be anonymous during the interview. Participation is voluntary and thus, you have the right to withdraw any time without any given reason (s). Kindly spend some few minutes to grant an honest interview as much as possible.

Section A- Demographic Data

1. Sex of respondent Male/Female
2. Age of Respondent ……
3. Education level of Respondent .....
4. Religion of Respondent.....

Section B- Integration of Scrap Collection into formal waste management system

5. What is the amount of waste generated in the CCMA yearly?
6. Apart from the waste management department who are the other stakeholders of solid waste management in this municipality?
7. What is the level of coordination between the assembly and private stakeholders in the management of solid waste?
8. What kind of coordination exists between the CCMA and other stakeholders?
9. Are there local groups responsible for solid waste management?
10. Who provides funding for their activities? How often do you consult these groups in solid waste management issues in their respective areas?
11. Do you encourage citizens to participate in waste management?
12. How much does the Assembly devote for the management of solid waste (in term of the percentage) of assembly's revenue?
13. Which aspects of the waste management chain does the assembly want to involve the private sector?
14. What is the main means of storing solid waste in CCMA? What methods of waste disposal does the assembly use in CCMA?
15. What role does your department play in ensuring effective management of solid waste in CCMA?
16. What challenges do you face in the exercise of this role?
17. What are the efforts being made by your department to ensure effective waste management?

18. What are the efforts being made by your department to ensure effective enforcement of environmental and sanitation regulations?
19. How would you describe the level of coordination between your department and the private waste collectors?
20. What are the factors that inhibit effective cooperation between your department and the various stakeholders (mainly private waste collectors)?
21. How would you rate your performance in waste management issues and enforcement of environmental and sanitation regulation?
22. What are the factors responsible for your current state of performance?
23. How do you think scrap collection is beneficial in formal waste management?
24. What measures do you think can be taken to include the informal waste collectors into the formal waste management?
25. What are the expected challenges if informal waste collectors were to be integrated to the formal waste management system?

APPENDIX B

UNIVERSITY OF CAPE COAST

COLLEGE OF HUMANITIES AND LEGAL STUDIES

FACULTY OF SOCIAL SCIENCES

DEPARTMENT OF GEOGRAPHY AND REGIONAL PLANNING

INTERVIEW GUIDE FOR SCRAP COLLECTORS

The researcher aims to investigate the role of scrap collectors in achieving sustainable waste management in the cape coast metropolis. This interview guide seeks to gather information on five thematic areas. First, data will be collected on the personal details of scrap collectors. Secondly, data will be collected on the amount and sources of scrap collected by scrap collectors. Moreover, data will be collected on the operations of scrap collectors in their work. Furthermore, data will be collected on the challenges faced by scrap collectors in their line of work. Lastly, data will be collected on how scrap collection could be integrated into the formal waste management system.

Interviewees' participation is important for the success of this study. Information provided is solely for academic purposes and would be kept as ***confidential*** as possible. Responses provided would be anonymous during the interview. Participation is voluntary and thus, you have the right to withdraw any time without any given reason (s). Kindly spend some few minutes to grant an honest interview as much as possible.

Please provide responses to the following questions.

Interview questions

Section A- Demographic Data

1. Sex of respondent? Male/Female
2. Age of Respondent? ……
3. Education level of Respondent...
4. Religion of Respondent……
5. Why are you involved the scrap metal trade? Ans:
6. How long have you been involved in waste collection activity? Ans:
7. How did you join the scrap collection business? Ans:
8. When was your scrap collection business registered?

Section B– Amount and Sources of scrap collection

9. Where do you gather or buy scraps from? Ans:
10. How much scraps are you able to collect daily/weekly? Ans:
11. What types of scrap materials do you collect/purchase? Ans:

Section C- Operations of scrap collectors

12. What is the means of transport of collected scraps to point of sale? Ans:
13. What is your weekly/daily income from sale of scraps? Ans:
14. How much do you sell your scraps per kilogramme/pound? Ans:
15. How is the pricing done? Ans:
16. How do you sort your scraps before selling them? Ans:
17. How do you assess the quality of scraps at the collection/purchase stage? Ans:
18. What scrap collection methods do you use? Ans:

19. How many hours do you work in a day? Ans:
20. Who are your clients? Ans?
21. How has your operations affected sanitation in your community?

Section D – Challenges faced by Scrap collectors

22. What challenges do you face during scrap collection? Ans:
23. How can your livelihood from scrap collection be improved? Ans:
24. What do you think the government can do to help you? Ans:
25. What risks are associated with your business? Ans:
26. How does income made from sale of scrap enable you to cater for your dependents? Ans:
27. How does the nature of your work affect your health? Ans:

Section E- Integration of Scrap Collection into formal waste management system

28. What kind of relations do you have with the formal waste management system? Ans:
29. What support do you receive from the formal sector of waste management? Ans:
30. How do you think scrap collection is beneficial in formal waste management? Ans:

31. How do you think the informal waste collectors can be integrated into the formal waste management system?

APPENDIX C

UNIVERSITY OF CAPE COAST

COLLEGE OF HUMANITIES AND LEGAL STUDIES

FACULTY OF SOCIAL SCIENCES

DEPARTMENT OF GEOGRAPHY AND REGIONAL PLANNING

INTERVIEW GUIDE FOR SCRAP DEALERS

The researcher aims to investigate the role of scrap collectors in achieving sustainable waste management in the cape coast metropolis. This interview guide seeks to gather information on five thematic areas. First, data will be collected on the personal details of scrap collectors. Secondly, data will be collected on the amount and sources of scrap collected by scrap collectors. Moreover, data will be collected on the operations of scrap collectors in their work. Furthermore, data will be collected on the challenges faced by scrap collectors in their line of work. Lastly, data will be collected on how scrap collection could be integrated into the formal waste management system.

Interviewees participation is important for the success of this study. Information provided is solely for academic purposes and would be kept as ***confidential*** as possible. Responses provided would be anonymous during the interview. Participation is voluntary and thus, you have the right to withdraw any time without any given reason (s). Kindly spend some few minutes to grant an honest interview as much as possible.

Please provide responses to the following questions.

Interview questions

Section A- Demographic Data

1. Sex of respondent Male/Female
2. Age of Respondent ……
3. Education level of Respondent.....
4. Religion of Respondent.....
5. Why are you involved the scrap metal trade? Ans:
6. How long have you been involved in waste collection activity? Ans:
7. How did you join the scrap collection business? Ans:
8. When was your scrap collection business registered?

Section B– Amount and Sources of scrap collection

9. Where do you gather or buy scrap from? From the house, market, dumpsite, or street?
10. Do you pick the scraps for free or it is bought?
11. Where do you pay for the scraps you obtain and where do you pick scraps for free?
12. What types of scrap materials do you collect/purchase?
13. How much do you pay for the different types of scraps?
14. How much scraps are you able to buy/collect daily/weekly in kilogrammes from houses, markets, dumpsites, and streets?
15. What types of scrap materials do you collect/purchase? Do you collect metals, different kinds of plastics bottles?

Section C- Operations of scrap collectors

16. Please, describe how you operate as a scrap dealer, from gathering of scraps to processing and selling them. Tell me about it.
17. How does your normal day look like, as scrap collector? If you get up in the morning, what do you do? What scrap collection methods do you use? How many hours do you work in a day? Who are your clients?
18. Describe how you transport of the scraps you collected to point of sale? What is the means of transport collected scrap metals to point of sale?
19. What is your weekly/daily income from sale of scrap metals? Ans:
20. How much do you sell your scrap metal per kilogramme/pound? How much do you sell the metals, plastic and bottles for?
21. How is the pricing or negotiation done?
22. How do you sort your scraps before selling them?
23. How do you assess the quality of scraps at the collection/purchase stage? Ans:
24. Apart from the income to you, how does your activities benefit the environment? How has your operations affected general sanitation in your community?

Section D – Challenges faced by Scrap collectors

25. What challenges do you face during the collection of scrap collection? What challenges do you face when transporting the scrap? What other challenges are associated with storing the scraps and selling them?

26. What are some of the poor attitudes you face? Tell me about the stigma from neighbours, scrap owners, waste management companies, and local government authorities.
27. What risks are associated with your business? What health related risks do you face in relation to your work? What risks do your family face in relation to your work? What risk do your neighbours face in relation to your work?
28. How can your livelihood from scrap collection be improved?

Section E- Integration of Scrap Collection into formal waste management system

29. What kind of relations do you have with the formal waste management system?
30. What support do you receive from the formal sector of waste management?
31. How do you think scrap collection is beneficial to the formal waste management system?
32. What measures do you think can be taken to integrate the informal waste collectors into the formal waste management?
33. What are the expected challenges if informal waste collectors were to be integrated to the formal waste management system?