

# **GHANA INSTITUTE OF JOURNALISM**



**SCHOOL OF GRADUATE STUDIES AND RESEARCH**

**DEVELOPING AN OPTION FOR SUSTAINABLE PLASTIC WASTE PROGRAMME  
IN GHANA.**

**BY**

**AMANDA DEBORAH GODDARD**

**MADC19071**

**AUGUST, 2020.**

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A RESEARCH WORK SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES and RESEARCH, GHANA  
INSTITUTE OF JOURNALISM IN FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF  
MASTERS DEGREE IN DEVELOPMENT COMMUNICATION.

AUGUST, 2020

**DECLARATION**

**CANDIDATE'S DECLARATION**

I hereby declare that, except for references to other people's work, which have been fully acknowledged, this project work is the outcome of my own original efforts and that no part has been presented for another degree in this Institute or elsewhere.

.....

Amanda Deborah Goddard

.....

Date

**SUPERVISOR'S DECLARATION**

I hereby declare that the preparation and presentation of this project work has been supervised by me in accordance with the guidelines on supervision of project works as laid down by the Ghana Institute of Journalism.

.....

Dr. Kofi Amponsah - Bediako

.....

Date

(Supervisor)

## **DEDICATION**

This work is dedicated to my parents, for their support and encouragement throughout my journey in academia.

## **ACKNOWLEDGEMENT**

The success of this project would not be possible without the guidance and correction from my supervisor, Dr. Kofi Amponsah-Bediako.

Also, I wish acknowledge my peers and colleagues for their constructive input in making this project a reality.

## **ABSTRACT**

Urbanization and continuous economic growth of Accra municipality have resulted in rapid increase in volume and types of solid waste. This thesis provided a consolidated data on municipal solid waste (MSW) generation, as well as data on plastic waste component of the MSW which is quite problematic. The total amount of waste collected during the study period of one month was 6857.1 kg and an average of 685.68 kg per day. The study results show that the total amount of 2,516,823.3 kg of solid waste is generated in the municipality for the period of one month which translate to an average of 83,894.11 kg of MSW generated daily. Accra, the capital city of Ghana is one of the fastest growing cities in Africa. This has led to the daily generation of about 2,000 tons of municipal waste. Accra faces a situation in which plastics, the second largest component of waste produced is disposed of primarily through dumping and landfills although plastics do not decompose. However, recycling which is a preferable alternative for disposing of plastics and a profitable industry accounts for about 5% of the waste disposal methods used in Accra. The findings show that the plastic recycling industry in Accra is largely unstructured. In addition, the results also revealed socio-economic status of residents in the metropolis reflected in the way they handle waste and dispose waste; many of them are not able to pay for the services of waste disposal. The study recommended a more robust policy should be formulated to encourage investors in the area of recycling.

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# CHAPTER ONE

## INTRODUCTION

### 1.1 Background

Urbanization, industrialization and continuous economic growth have resulted in rapid increase in volume and types of solid and hazardous waste. The amount of municipal solid waste (MSW), one of the most important by-products of an urban lifestyle, is growing even faster than the rate of urbanization. In 2003, there were 2.9 billion urban residents who generated about 0.64 kg of MSW per person per day (0.68 billion tonnes per year) worldwide. Ten years on, these amounts have increased to about 3 billion residents generating 1.2 kg per person per day (1.3 billion tonnes per year). It is estimated that by 2025, this will increase to 4.3 billion urban residents generating about 1.42 kg/capita/day of municipal solid waste (2.2 billion tonnes per year) (World Bank, 2013)

The World Bank Group, in 2013, provided a consolidated data on MSW generation, collection, composition, and disposal by country and by region. Despite the importance of this report, reliable global MSW information is not typically available. Even where it is available, data is often inconsistent, incomparable and incomplete. The report however made projections on MSW generation and composition for 2025 in order for decision makers to prepare plans and budgets for solid waste management in the coming years (Global Waste Management Market Report 2007).

Solid Waste Management (SWM) in most nations is being handled by national and local governments. Although considerable efforts are being made by many Governments and other entities in tackling waste-related problems, there are still more room for improvement. In developing countries where open dumping with open burning is the norm, it is common for

municipalities to spend 20-50 percent of their available budget on solid waste management even though 30-60 percent of all the urban solid wastes remain uncollected and less than 50 percent of the population is served. In low-income countries, collection alone drains up 80-90 percent of municipal solid waste management budget. In mid-income countries, collection costs 50-80 percent of total budget. In high-income countries, collection only accounts for less than 10 percent of the budget, which allows large funds to be allocated to waste treatment facilities. (World Bank, 2013).

In advanced countries, upfront community participation reduces the collection cost and facilitates waste recycling and recovery. Hence, developing countries face uphill challenges to properly manage their waste with most efforts being made to reduce the final volumes and to generate sufficient funds for waste management. If most of the waste could be diverted for material and resource recovery, then a substantial reduction in final volumes of waste could be achieved and the recovered material and resources could be utilized to generate revenue to fund waste management through a system based on the 3Rs (reduce, reuse and recycle). It has been shown that with appropriate segregation and recycling system significant quantity of waste can be diverted from landfills and converted into resource (UNEP, 2009).

Accra, the capital city of Ghana, is said to be generating over 2,200 metric tons of waste daily (Daily Graphic, February 6, 2014: page 40). This has put pressure on city authorities responsible for managing waste and ensuring that the capital city is clean at all times. At all the places demarcated as landfill site or dumpsite, residents have met them with fierce resistance due to the environmental and health implications associated with the sites. Such sites are noted for unbearable stench, flies and rodents as well as heavy smoke which engulfs the nearby communities. Examples abound in Accra of residents picking up arms against the siting of

landfill sites or dumps near their communities. Mallam, Oblogo, Achimota and most recently Pantang, near Abokobi, are typical examples of residents picking up arms against the siting of these landfill sites. At all these locations, authorities were forced to close down the landfill sites as they succumbed to the pressure from their constituents. These pressure and threats from residents near the landfill site have resulted in the Environmental Protection Agency (EPA) giving the assembly an ultimatum to close down some of these dumpsite because of the environmental and health hazards the site was posing to residents (Daily Graphic, February 6, 2014: page 40).

Currently, most Metropolitan, Municipal and District Assemblies (MMDAs) have engaged the services of Zoomlion Ghana Limited, a waste management company, to collect their waste and manage their landfill site by constantly using its machines to compact the waste and ensure that trucks bringing in waste dispose it properly. Zoomlion also from time to time spray some of the landfill sites and their surroundings to reduce the infestation of flies and rodents. As part of steps to mitigate the excessive smoke that engulfed the nearby communities, some of the MMDAs also engaged the scavengers at the sites to find solutions to the burning of the refuse.

Although the organic solid waste takes a bulk of the MSW, the problem of organic solid wastes management is not a big issue as compared to plastic wastes. This is because the organic solid waste is biodegradable. However, the non-biodegradable nature of plastic waste poses a big problem since the plastic waste can stay in the environment for quite a period of time causing all sorts of problems.

The management of these Plastic Waste through combustion (incineration) is not environmentally friendly and sustainable since this may release carbon dioxide, a major

contributor to global warming (greenhouse effect). Landfilling with Plastic Waste is not also desirable since plastic is non-degradable and no economic value would have been derived from the waste in that case. According to a study conducted in Accra, Ghana by GOPA Consultants in 1983, Plastic Waste accounts for 1-5% (of net weight) of the total amount of waste generated (Lardinois and Van de Klundert, 1995). Since then, there has been a tremendous increase in plastic waste particularly sachet water bags due to increase urbanization and consumption pattern.

The best option for Sustainable Plastic Waste Management is through recycling. This is because the benefits of recycling of Plastic Waste are numerous and also environmentally friendly compared to the other methods of waste disposal. Through recycling of Plastic Waste, we can have material and energy recovery and therefore value will be derived from the waste instead of regarding it as garbage or trash.

This topic was deemed necessary after series of media reportage on plastic waste menace in the Accra Metropolitan Area (AMA). Upon viewing and listening to various discussions, a quick survey was done to assess the situation in Accra Metropolitan Assembly (A.M.A). This thesis work will also serve as a working document for policy makers and serve as a way of turning garbage into wealth as well as providing jobs to the urban poor. It is hoped that this document shall be useful to other countries where plastic waste is engulfing all the major cities and causing all sorts of environmental problems.

## 1.2 Problem Statement

Waste management is one of the major challenges confronting most Metropolitan, Municipal and District Assemblies (MMDAs) in Ghana. Very limited research work has been done on waste generation and disposal in some urban areas in Ghana. It is envisaged that for proper integrated solid waste management to be put in place, the characteristics of the solid waste generated must be known (Sakai *et al.* 1996). Accra is rated as one of the, if not the most, vibrant and commercial metropolis in Ghana due to urbanization and continuous economic growth. In 2000 the population of the Accra metropolis was estimated at 1000000 with a growth rate of 3.8% . Nearly two decades later, the population of Accra is estimated as 2.4 million people. The growth rate of Accra compared with the national growth rate of 2.7 percent indicates a high growth rate (GSS, 2010).The accompanying increase in economic activities in the municipality coupled with historic and cultural heritage of the people make sanitation an important issue to consider in keeping the municipality clean.

Effective and adequate solid waste management in the municipality is therefore necessary to ensure clean environment in order to promote public health and sustainable development. The problem of domestic waste disposal especially iced water sachets and other plastics has been of a major concern in the municipality (Accra Metropolitan Assembly annual report, 2011). These solid wastes are scattered all over the municipality especially some days after market day. The worry is the fact that our gutters get choked with plastic waste leading to flooding in most parts of the city after the rains. Some other concerns have been that our streets have been engulfed with sachet water plastic waste destroying their aesthetic beauty thereby driving away tourists (Wienaah, 2007). Our livestock may also feed on plastic waste and get choked and die. Choked

gutters with plastic waste also become fertile breeding grounds for mosquitoes infesting the general populace with malaria (Wienaah, 2007).

The Organic component of Municipal Solid Waste may not be too much of a problem since that is biodegradable. However, the Plastic Waste component of the Municipal Solid Waste is quite problematic because this can stay in the environment for a considerable length of time causing all sorts of problems. The two existing waste management practices in the municipality namely: combustion and land filling are not commercially and environmentally friendly since the former may release carbon dioxide, a major contribution to global warming and the latter is not desirable since plastics takes a longer time to biodegrade. There is therefore the need for a better and sustainable option for waste management through recycling.

### **1.3 Research Objectives**

- To determine the amount of waste generated in the Accra metropolitan area.
- To determine the alternative means of managing waste generated in the metropolitan area.
- To gauge the perception and attitudes towards waste management practices in the metropolis
- To gauge the perceptions and attitudes towards the assembly's efforts in effective waste management.
- To measure the strategies and measures put in place to improve waste management practices in the metropolis.

#### **1.4 Research Questions.**

- How much waste is generated in the Accra metropolitan area?
- What are the alternative means of managing waste by the Accra metropolitan assembly?
- What is the perception of the people living within the metropolitan assembly towards waste management?
- What are the perceptions of the metropolitan assembly's efforts in managing waste effectively?
- What are strategies put in place to ensure that all hands are on deck to improve waste management practices in the Accra metropolitan assembly

#### **1.5 Significance of study**

The study was designed to explore sustainable options and approaches to plastic waste management in the Accra metropolis. This study among other things is expected create awareness on plastic waste management, as well as contribute to existing body of knowledge on a sustainable plastic waste management option.

#### **1.6 Scope of the study**

The Greater Accra region as it stands now, is divided into various metropolitan and municipal areas. Hitherto this segmentation, it was largely the Accra metropolitan assembly. Although most

of the municipalities and sub-metros have similarities in waste management problems, the study will be focused on the Accra Metropolitan area, since it houses the central business district which is highly concentrated with human population during peak hours.

### **1.7 Organization of study**

The study will be organized in five chapters, with each chapter dedicated to a specific aspect of the study. The first chapter deals with the introduction, statement of the problem, research objectives and research question, and scope of study. The second chapter will deal extensively with literature review and relevant concepts to put the study in perspective. The third chapter of the project will deal with the methodology and research design of the project, as well as the sample and sampling technique of the population. The fourth chapter of the study will deal with presentation of the data analysed using relevant statistical tools. The fifth and final chapter will deal with summary, analyses and conclusion of the project including recommendations for further studies.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.0 Introduction

This chapter will cover extensively on relevant literature, as well as concepts that will put the study in context. In this section relevant theories will be discussed in relation to the topic; developing a sustainable plastic waste programme in Ghana. This chapter is heavily reliant on literature from other scholars. Also in this chapter, there will be a discussion on waste generation and management in the country.

#### 2.1 Waste in the Environment

During manufacturing process, products are produced from raw materials and delivered to the consumers. Thus, converting raw materials into a form that can be used to fabricate a finished product. The process generates three main categories of waste in each stage of product's life cycle: atmospheric emissions, waterborne waste and solid wastes.

Solid waste is material, which is not in liquid form, and has no value to the person who is responsible for it. Synonyms to solid waste are terms such as “garbage”, “trash”, “refuse” and “rubbish (Zurbrugg, 2003).

Non-municipal solid waste is the discarded solid material from industry, agriculture, mining, and oil and gas production. These include: construction materials such as roofing sheets, electrical fixtures, bricks; wastewater sludge; incinerator residues; ash; scrubber sludge; oil/gas/mining waste; railroad ties, and pesticide containers (UCCP & California University, 2009).

## **2.2 What are Plastics?**

Plastics are man-made organic materials that are produced from oil and natural gas as raw materials. Plastics consist of large molecules (macromolecules), the building blocks of all materials (Hans-Georg, 2003). The molecular weights of plastics may vary from about 20,000 to 100,000 mg/L (Wienaah, 2007). Plastics can be regarded as long chains of beads in which the so-called monomers such as ethylene, propylene, styrene and vinyl chloride are linked together to form a chain called a polymer. Polymers such as polyethylene (PE), polystyrene (PS) and polyvinyl chloride (PVC) are the end products of the process of polymerization, in which the monomers are joined together (Hans-Georg, 2003). In many cases only one type of monomer is used to make the material, sometimes two or more. A wide range of products can be made by melting the basic plastic material in the form of pellets or powder (Warmer Bulletin, 1992). Such materials cannot be reprocessed into new products unlike thermoplastics (Wienaah, 2007). Thermosets are widely used in electronics and automotive products.

### **2.2.1 Sources of plastic waste**

Due to its characteristic properties such as light in weight, flexibility and durability, plastics has become one of the most commonly used material for many purposes. Thus, waste plastics are generated from a wide variety of sources. The main sources of plastic waste in Ghana can be classified as follows: industrial, commercial and municipal waste (MLGRD, 1999). Sources of plastic waste are categorized in in different forms; industrial, commercial and domestic plastic waste. Industrial plastic waste are generated by plastic processing industries. Domestic plastic

waste are types of waste that are generated from homes and these will include polythene bags, sachet water, and other plastic carrier bags.

### **2.3 Socio-Economic Effects of plastic waste**

The sight and smell of improperly managed wastes constitute a major discomfort to residents and visitors. Pollution of water resources increases the technical difficulty and cost of providing water supplies and the environmental health situation also has serious health impact, with attendant social and economic costs. Flooding with its associated damage to public infrastructure and private property increases with improper solid waste management. The plastic wastes affect the environment in various ways.

The waste plastic water sachets are discarded randomly after usage. These then scatter around the city, choking drains, threatening small animals, damaging the soil and polluting beaches. The environmental effects of plastics differ according to the type and quantity of additives that have been used. Some flame retardants may pollute the environment (e.g. bromine emissions) (Wienaah, 2007)..Pigments or colorants may contain heavy metals that are highly toxic to humans, such as chromium (Cr), copper (Cu), cobalt (Co), selenium (Se), lead (Pb) and cadmium (Cd) are often used to produce brightly coloured plastics. Cadmium is used in red, yellow and orange pigments. In most industrialized countries these pigments have been banned by law. The additives used as heat stabilizers (i.e. chemical compounds that raise the temperature at which decomposition occurs), frequently contain heavy metals such as barium (Ba), tin (Sn), lead and cadmium, sometimes in combination (Wienaah, 2007). Plastic wastes find their way into the water bodies thus polluting the water. The plastics then float on the surface of the water bodies,

thus preventing direct sunlight for the water organisms. Water animals are killed by plastic waste that finds their way in water bodies as they mistakenly eat plastics as food. Since plastics are indigestive material and stay inside them, then cause pains and this leads to death. After the decay of the animal, the ingested plastic is freed back to the environment again to continue causing problems (Abota, 2012).

The most important environmental problem caused by plastic waste is air pollution. Plastic wastes takes a longer time to biodegrade and made of toxic chemicals that pollute the air. During the production of plastics several substances such as additives and plasticizers may be added. It is very common to see plastic waste being burnt in Ghana (Wienaah, 2007). However, unless the combustion is complete, burning plastics release considerable quantities of polluting substances which causes respiratory problems and cancer as they are inhaled. The incomplete combustion of PE, PP, PS and PVC can cause further problems, as CO and smoke may be produced. As a result of incomplete combustion of PVC also dioxins and other hazardous substances may be formed. The burning of plastics releases CO<sub>2</sub> which is a major contributor to the global warming and affect the environment in general (Wienaah, 2007). Plastic waste affects is a menace and threat to humans in every environment. EPA (2002), attributes infectious diseases like cholera, and malaria to the indiscriminate handling and disposal of plastic.

## **2.4 Types of plastic recycling**

Mechanical recycling is the recycling of conventional waste plastics by physical means into plastics products. The mechanical recycling involves sorting plastics, washing, crushing and processed into flakes of consistent quality acceptable to manufacturers (Abota, 2012). The flakes

are then fed into the extruder machine, which is incorporated with rotating single or double screw in heating barrel, through the hopper. The dry plastic flakes are melted down and then extruding into thin strands that are cooled and chopped into small, uniform pieces called pellets, which are then bagged for sale or shipment (Abota, 2012).

Mechanical recycling is regarded as the best technology for recycling homogeneous and relatively clean plastics waste streams, provided end markets exist for the resultant pellets. It is the second largest recovery technique after energy recovery in Europe representing 13.6% and 14.8% in 2002 and 2003 respectively of total plastic waste recovered (APME, 2002-2003). This technique is also well suited for developing countries since it is less cost-intensive compared to the others. It is mechanical recycling that is currently being employed in Accra, Ghana to recycle about 50% of the plastic waste that is generated in the city daily.

#### **2.4.1 Feedstock or Chemical Recycling**

Chemical recycling or feedstock recycling involves breaking down the plastic waste materials into smaller chemical form by chemical process and reuse to produce raw material for manufacturing plastic products or different kinds of products. This may include breaking down polymeric product into its individual monomeric components or hydrocarbon feedstock and these components could then be fed back as raw material to reproduce the original plastic product. Feedstock recycling include chemical depolymerisation (glycolysis, methanolysis, hydrolysis, ammonolysis etc.), gasification and partial oxidation, thermal degradation (thermal cracking, pyrolysis, steam cracking, etc.), catalytic cracking and reforming, and hydrogenation. Besides conventional treatments (pyrolysis, gasification), new technological approaches for the

degradation of plastics, such as conversion under supercritical conditions and co processing with coal are being tested (Aguado and Serrano, 1999). In feedstock recycling, only specific plastic waste materials are used in this process such as PET, nylon etc.

This technique of recycling is however not suitable for developing countries since it requires a lot of expertise, capital intensive and is quite cumbersome. Even in the developed countries, it is still under development and is being practiced by only a few companies. It has limitation of not recycling mixed plastic waste material but only separate plastic waste. Few companies have successfully developed and demonstrated technologies many of which can process mixed plastics streams. There has been some renewed interest in other areas of feedstock recycling, such as the depolymerisation of PET or treatment of PVC to make chemicals which can then be used in the production of new plastics (APME, 2002-2003). There are several separation methods that is need to be carried out in order to completely recycle the plastic waste materials by feedstock recycling.

## **2.5 Socio-Economic Benefits of Plastic Recycling**

Benefits of recycling plastics to the country can be categorized into social, economic and environmental benefits. These are discussed below. Plastic wastes litter the streets and choke gutters. This causes breeding grounds for mosquitoes and flies, which then causes diseases such as malaria and cholera to the people. Recycling of plastic wastes will contribute to reducing littering the streets with plastic waste. This leads to preventing the diseases associated with filth and littering of plastic wastes and this will save foreign exchange in the importation of drugs to treat such diseases. Recycling will also create a healthy environment for tourist attraction.

Recycling creates job for the people. Through recycling, many people will get employment particularly at the collection stage and hence be able to earn their living. This will help raise social standards and to eliminate social vices such as armed robbery drug trading and so on.

The use of recycled pellets for product manufacture will save recycling companies from folding up as a result of high cost of importing virgin pellets. The cost of recycled plastic pellets is far cheaper than the virgin plastic, and therefore using the recycled plastic pellets will help reduced the cost purchasing the raw materials. Blowplast Ltd, a plastic manufacturing company in Ghana has established recycling plant and therefore buys plastic wastes from the people and recycle them for reuse. This create employment for the people to earn an income. As the people earn a living, the funds that accrue as a result can be channeled into other areas that could lead to higher profits (Wienaah, 2007).

Plastic is manufactured from crude oil and as the demand for plastic increases, considerable amount of energy resources is put on drilling and refining the crude oil. Recycling of plastic waste conserves natural resources, particularly raw materials such as oil and energy. The more that is recycled, the longer will natural resources be available for future generations. It means that there is less environmental impact due to mining, quarrying, oil and gas drilling, deforestation and so on. If there are fewer of these operations, the environment will be safe from continuous destruction and degradation. Furthermore, in an attempt of getting virgin plastics from the crude oil, gases such as carbon dioxide (CO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>) are emitted into the atmosphere thus causing global warming. Research have shown that the emissions of CO<sub>2</sub>, SO<sub>2</sub>, NOX (NO and NO<sub>2</sub>) are much less for recycled plastics compared to that for virgin materials (Lardinois and Van de Klundert, 1995). The environment will therefore be better safe from air pollution and global warming if recycling is adopted on large scales (Wienaah, 2007).

## 2.6 Challenges of Recycling Plastic Wastes

Recycling of plastic wastes seems to be the way forward for sustainable management of plastic wastes as well as providing raw materials for the manufacturing companies. Nevertheless, much more effort need be done in order to reach the waste management requirements the society needs in order to ensuring sustainable development. .The complex nature of the plastic waste streams in terms of plastic composition and the presence of impurities raises a very big question as to the development of automatic and effective separation methods for mixed plastic waste. An extensive cleaning, separation and pre-treatments prior to reprocessing is required to add value to waste plastics as raw materials for new products (Wienaah, 2007).

There is also still no known technology for the recycling of mixed plastic wastes. The plastic waste may contain a large number of hazardous compounds that makes difficult the recycling processes, such as degradation products of additives, brominated flame retardants, etc. It is therefore necessary to develop techniques to identify, quantify and extract these products from plastic prior to recycling them. Some efforts have been done in this direction (Gaiker-IVL and KTH, 2005). The optimal solution to the plastic waste management problems will be provided by the conjunction of the different treatment alternatives available (i.e. mechanical recycling, feedstock recycling and energy recovery). Therefore, it is necessary to achieve a good integration between all the aspects of the recycling activity (collection and separation of the waste streams, characterization methods for recycled plastics, identification of the optimal treatment technique, etc.)

## **2.7 Review of Related Literature**

There have been numerous studies conducted on the effects of plastic waste management, and how to possibly turn it into a wealth creation enterprise. Batchison-Ofei (2003) investigated the role of the stakeholder in sustainable plastic waste management in Accra. The study examined the effectiveness of the approaches used in the past towards solving the solid waste, especially plastic waste problem in the Accra metropolis. The study examined the capacity of the local government agency, in this case the Accra Metropolitan Assembly in handling plastic waste.

There have several attempts at solving the plastic conundrum in the metropolis. The study identified inadequate legislation, environmental and sanitation policies, as well as lack of institutional capacity and competence. In a bid to identify the stakeholders in the waste management ecosystem, the study identified manufacturers of plastic materials as stakeholders. The study identified community participation as an essential component in ensuring effective and efficient plastic waste management delivery.

After rigorous methods the study concluded and advanced the following recommendations: a sustainable plastic waste management system should include economic and social goals. This will bridge the gap between the poor deprived neighborhoods and affluent ones. Also, the study recommended massive education on plastic use, reuse and disposal.

## **CHAPTER 3**

### **METHODOLOGY**

#### **3.0 INTRODUCTION**

Kaplan (1973) cited in Cohen (2006) suggests that the aim of methodology is to help us to understand, in the broadest possible terms, not the products of scientific inquiry but the process itself. This chapter discusses the research method to be utilized to collect data related to the topic discussed in the project. This chapter will cover the research design, the sampling technique and the sample, the sources of data that will be consulted for the project.

#### **3.1 Research Design**

In research, studies are done using different paradigms. The main paradigms are quantitative and qualitative (Leedy & Ormrod, 2005). According to Given (2008), qualitative methods are best for addressing many of the why questions that researchers have in mind when they develop their projects. Whereas quantitative approaches are appropriate for examining who has engaged in behavior or what has happened and while experiments can test particular interventions, these techniques are not designed to explain why certain behaviors occur. Qualitative approaches are typically used to explore new phenomena and to capture individuals' thoughts, feelings, or interpretations of meaning and process. It is the search for qualities, the very characteristics of our experience in a particular study (Stokrocki, 1997). Thus qualitative inquiry looks at the quality of a particular activity whereas quantitative inquiry looks at how often it occurs. The approach adopted for this study was the qualitative approach. According to Kvale (1996) the

qualitative research interview attempts to understand the world from the subjects' points of view, to unfold the meaning of their experiences.

The qualitative method of data collection is preferred over the quantitative method, not for the fact that one method is superior to the other. In terms of suitability, the qualitative method is favored because it gives the researcher the opportunity to probe themes that will arise.

### **3.2 Sample and Sampling Technique**

As it is with any research enquiry, a sample must be determined from a larger population from which the subjects can be studied and a generalization made based on the characteristics of the sample. In choosing the sample an appropriate technique must be used to determine the sample, although there are a number of techniques available to the researcher. The purposive sampling method will be used to determine the sample size, which falls under the broader category of non-probability sampling. Purposive sampling is used in instances when the researcher needs, as Ball (1990) puts it, knowledgeable people in the subject area. The sample purposively selected for the study will be officials from waste collection companies and sanitation officers at the Metropolitan office.

The purposive sampling method was chosen over other techniques of its specific approach to reaching the sample. It gives the researcher the opportunity to reach specific people with technical expertise on the subject matter. Sanitation and waste management has become a critical part of the social discourse; the general populace have their views on what the solution should be. However, there is the need to tap into the knowledge of experts in the field of waste management, since they have been at the fore front of waste management.

### **3.3 Sources of Data**

The research will rely on both primary and secondary sources of data for the study. Secondary sources of will include publications on waste management, as well as data on types and volume of waste generated in the Accra Metropolis. The primary data will come from interviews with officials from waste management companies, and officials in charge of sanitation at the metropolitan office. The data collection instrument favoured for the primary data collection will be structured interview guide, for a face-to-face interview. Interviews with the experts in the sanitation and waste management sector will be recorded and later transcribed for analyses.

## CHAPTER FOUR

### Summary and Conclusion

#### 4.0 Introduction

In big municipalities such as Accra, waste generation a significant amount of waste, and these wastes must be managed appropriately. Solid waste management depends on accurate data collection and resource-appropriate methods. The study shows that municipalities in Ghana including Accra are generating a significant amount waste especially plastic waste, and these wastes must be managed appropriately.

#### 4.1 Summary and Discussion

The study was set out assess other options for developing plastic waste manage program in Ghana. In light of the study, research questions, as well as, research objectives were advanced to guide the study. The total amount of waste collected during the study period, is 6857.1 kg the average amount of waste generated is per day is 685.68 kg. The solid waste generation rate is 0.57 kg/person/day. The percentage composition of plastic in the solid waste is 22.93%. Plastic waste generation rate in the municipality is 0.14 kg/person/day. The sachet water plastic (HDPE/LDPE composite) is the highest among the plastic waste recording a percentage of 34.61%. Among the engineered plastic, low density polyethylene (LDPE) recorded highest percentage of 17.26% followed by polypropylene with the percentage of 14.59%, PET (12.94%), PS (11.24%), others (5.14%) and HDPE (4.95%). of the total plastic waste. PVC constituted the lowest fraction contributing representing 0.01%.Substantial amount of sachet water plastic waste

which was the highest component of the plastic was shredded and pelletized into granules. The above statistic attests to the fact that plastic waste generation in the municipality is on the increase. Waste management authorities over the years have developed various strategies in dealing with the menace. Although, their strategies have yielded some positive results, it appears there is more work to be done in changing the perception and attitudes towards waste management in the municipality. Interviews conducted in some households within the municipality, point to the fact that most household are of the view waste management is the sole responsibility of the service providers; therefore they do not see the reason why they should be actively involved in the waste management, especially when they pay for the service rendered them.

Other factors affecting the perception and subsequent attitudes towards waste management in the municipality can be traced to socio-economic factors of the household in the municipality. This is consistent with Longe et al (2009) work which stated that socio-economic factors have a significant impact on the people's perception towards solid waste management practice in the study area. They found that gender difference (being male or female) have a significance impact on perception. In addition, educational levels of the respondents have a significance positive relationship. Monthly earning is one of the major influencing factors contributing to a respondent perception towards household solid waste management in the study area.

Similarly, Kamara (2006) work which shown that the wealthier people in the study area participates in domestic good solid waste management than the poor one. The study further revealed type of residential unit and number of people living in the house as another major influencing factors contributing to a respondent perception towards household solid waste management in the study area. This is as a result of people living in a compound house are more

likely to influence each other's attitude and perception towards the management of waste, people living in the flat house are likely to have appropriate perception and engages in good hygienic practice while that of detached and semi-detached house are not. Houses which are densely populated set more paces for the generation of more waste in the house than houses with few occupants.

The waste management companies, together with the sanitation at the Accra Metropolitan office will better served if they developed an inclusive strategy to ensure that waste management starts at the door stop of households.

## **4.2 Conclusion**

The study was structured in such a way that it interrogates the subject of developing an option for sustainable plastic waste management in Ghana. Also in the study was systematic contextualization of all the chapter, dealing in the process, with what the study entails.

A strong literature review which linked scholarly works from related studies has been undertaken. Suitable theories, within the context of the study, were articulated to enhance the debate inherent in the study.

A suitable methodology with leanings to the qualitative method of data collection was deployed. It proved to be a valuable method in the sense that it provided opportunities for the researcher to further explore the matters arising in the data collection and analytical stage. The method may not be perfect in its entirety but the advantages far outweigh the disadvantages.

### **4.3 Recommendations**

The recommendations made after the study are as follows:

- There should be strengthening and enforcement of Solid Waste Management Regulation and Policy in Ghana.
- Waste management companies should be supported in their efforts develop a more robust mechanisms to deal effectively with plastic waste management.
- There should be collaboration among the Environmental Protection Agency, private sector players and research institutions to ensure proper waste management.
- Low income households should be identified and supported in terms of waste disposal. Waste bins should be supplied to these identified households at little or no cost.

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## APPENDIX

Dear respondent, this is a questionnaire for a research project for an academic exercise. Thus all responses provided will be treated as confidential

1) Age

a) 19 – 24 years b) 25 – 29 years c) 30 – 34 years d) 35 years and above

2) Sex

a) Male [ ] b) Female [ ]

3) Marital status

a) Single [ ] b) Married [ ] c) Divorced [ ] d) Separated [ ] e) Widowed [ ]

4) Level of education

a) JHS [ ] b) SHS [ ] c) Tertiary [ ] d) Nom – formal education [ ]

5) Number of people in your household?

a) 1 - 3 [ ] b) 4 – 6 [ ] c) 7 – 9 [ ] d) 10 and above [ ]

6) Which type of waste dominates waste generated by your household?

a) Organic waste [ ] b) Plastic waste [ ] c) Metallic waste [ ]

7) Are you able to sort the waste generated by your household?

a) Yes [ ] b) No [ ]

8) Has the municipal authority provided enough designated areas to dispose your waste?

a) Yes [ ] b) No [ ]

9) Do you get regular services from waste management companies?

a) Yes [ ] b) Not regular [ ] c) No [ ]

10) How would you rate the efforts of waste management companies in their service delivery?

a) Very effective [ ] b) Effective [ ] c) Not Sure [ ] d) Less effective [ ]

## **QUESTION GUIDE FOR WASTE MANAGEMENT COMPANIES**

- 1) How long has your company been operating in the waste management space?
- 2) What are the challenges with dealing with waste collected from household?
- 3) Have you developed enough capacity to venture into plastic waste recycling?
- 4) What is the future of waste recycling in Ghana?
- 5) What is the level of collaboration between your company and the Accra metropolitan assembly in the area of waste management?
- 6) How would you describe the attitude of residents in the metropolis towards waste management and disposal?
- 7) What, would you describe as the major challenge in dealing with plastic waste in the metropolis?
- 8) What are the targets of your company regarding plastic waste management?
- 9) Are you aware of any policies from stakeholders in the waste management ecosystem?
- 10) How would you describe the Ghanaians perception of recycling?