Deconstructing the Use and Disposal of Plastic Bags in Tema Community One Township in the Tema Metropolis

By

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DECLARATION

I hereby declare that this submission is my own work towards the Masters of Arts(MA) Development Studies Programme and that, to the best of my knowledge, it contains no materials previously published by another person nor materials which have been accepted for the award of any other degree of the university, except where due acknowledgement has been made in the text.

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ABSTRACT

This study set out to explore and ascertain the increasing use of plastic bags and the environmental effects they have on people. It was also to recommend possible approaches that can be adopted to reduce the environmental impact of the plastic bag waste**.** The aim of the research was to investigate consumers' attitudes towards the use of plastic bags, their level of awareness of the environmental hazards posed by the indiscriminate disposal and lack of management of the plastic bag waste**.** The research was also to assess the role institutions (TMA, waste collecting companies, EPA) play in plastic bag waste management.

A combination of the quantitative and qualitative approaches, were used to enable the researcher make objective comparisons. The total sample size for the study was one hundred (100) which was made up of ninety-four (94) consumers and six (6) respondents from institutions. The findings show that there is no clear policy on the management of plastic bags, which worsen sanitation problems in the metropolis. The traditional method of disposing of solid waste is the same means through which plastic bag waste is also being disposed of. Technologies on recycling, reuse, reduction and recovery still remain at exploratory stages. These have implications on the environment especially, with the increasing population, urbanisation and slum development. The study recommends for the design and implementation of a clear policy on plastic waste management, a revision of the old bye-laws to reflect the current ways of managing plastics and constant education of the public on sanitation.

DEDICATION

This work is dedicated to my loving family for their support and encouragement on the successful completion of my course.

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LIST OF ABBREVIATIONS

AMA	Accra Metropolitan Assembly
CDM	Clean Development Mechanism
EI	Economic Instruments
EPA	Environmental Protection Agency
EPHC	Environment Protection and Heritage Council
ESP	Environmental Sanitation Policy
GSS	Ghana Statistical Service
HDPE	High Density Polyethylene
LDPE	Low-Density Polyethylene
MDG	Millennium Development Goal
MLGRD	Ministry of Local Government and Rural Development
MTDP	Medium Term Development Plan
NHIS	National Health Insurance Scheme
NEAP	National Environmental Action Plan
OPD	Out Patients Departments
TDC	Tema Development Corporation
TMA	Tema Metropolitan Assembly
UNFCC	United Nations Fund for Climate Change
UNEP	United Nations Economic Programme

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The plastic[1] bag since its introduction has become very popular with consumers and retailers. It has been in use by consumers worldwide since the 1960's when it was invented by a Swedish engineer Sten Gustaf Thulin and patented in 1965 by Celloplast[2] (European Plastics News 2008). The bags rapidly became popular among retailers and consumers worldwide in recent decades due to their functionality, strength, and low cost (Clapp and Swanston (2009) citing UNEP, 2004). Plastic bags are widely used to transport small consumer goods, particularly food (Rayne, 2008). They are highly useful material and their purpose is by and large increasing as more new products are continually developed for the market to meet demands of retailers and consumers. The production and continuous use of plastic bags in developing countries like Ghana is a particular concern, as waste management infrastructure may not be able to deal appropriately with the increasing levels of plastic bags in the system. Particularly, the thin plastic bags are designed to be used once and then disposed of. According to the Environment Protection and Heritage Council (EPHC) (2007), after the plastic bag has served its original purpose [transportation] consumers usually view the bags as undesirable items. When plastic bags are

[1]The 'Plastic Bag' in the study means a plastic carrier bag with handles which is designed for the general purpose of carrying goods purchased by consumers or a plastic flat bag constructed with no gussets or handles which is designed for the general purpose of carrying goods purchased by consumers.

[2] A long-standing producer of cellulose film based in Norrkoping, in Sweden, and a pioneer in plastics processing

sent to the landfill they become incorporated into the waste mass within the landfill, contributing to the increasing size of waste at the landfill.

Scientists have found out that plastic bags do not readily erode and there are numerous estimates for degradation times, ranging from 50 years up to 1000 years (Science for Environment Policy, 2011). The rate of degradation, however, depends on both the composition of the bag and the attributes of the receiving environment; land or water. The generic plastic bags when tested by scientists did not decompose because it is made of polyethylene, a man-made polymer that microorganisms do not recognize as food. Although standard polyethylene bags do not biodegrade[3], they do photodegrade[4]. When exposed to ultraviolet radiation from sunlight, polyethylene's polymer chains become brittle and start to crack. This suggests that plastic bags will eventually fragment into microscopic granules. Currently, however, scientists are not sure how many centuries it takes for the sun to work its magic (Narayan and Moore, 2007). The fact, however, remains that it takes a very long time for plastics to degrade when left in any of the natural environmental media and an accumulation of plastic bags waste can cause serious environmental pollution and human health impacts that can be manifested in a number of ways.

[3]A "biodegradable" product has the ability to break down, safely and relatively quickly, by biological means, into the raw materials of nature and disappear into the environment.

[4]Chemical changes resulting from the absorption of light that reduce the useful properties of materials, particularly polymers. The chemical changes can include bond scission (especially of the molecular backbone), color formation, cross linking, and chemical rearrangements.

1.2 Problem Statement

The plastic bags since its introduction in Africa in the 1990's have been seen to create disproportionate environmental challenges because of their physical and chemical characteristics. They are made from petroleum products, and thus have implications for fossil fuel supplies as well as climate change. In the United States of America (USA) alone, according to some estimates, 12 million barrels of oil are required to produce the 100 billion plastic bags used annually (Clapp & Swanston (2009) citing San Francisco Department of Environment, 2004). Although single-use plastic bags have some advantages in embedded energy lifecycle analysis, when compared to paper bags, research is clear that they are not the best option (Environment Australia, 2002).

The use of the bags has increased with the rapid population expansion in the Tema Metropolis and has brought with it numerous environmental and sanitation problems. The population of Tema has increased from 141,479 in 2000 to 402,637 in 2010 and that of Tema Community One has also increased from 31,465 in 2000 to 160,213 in 2010 respectively (GSS, 2013). Conservative estimates suggest that, today, people use between 500 billion to 1 trillion plastic bags worldwide and about a million every minute (Clapp &Swanston, 2009). Plastic bags are widely used in shopping malls, on the streets and at market centres due to their convenience and cheapness. Hitherto, people carried baskets to the market centre but currently, people go to market centres with only purses. As every item bought in the market centre is packed in a plastic bag. Instances where the goods are heavy, extra bags are given in order to hold firmly, the weight of the goods due to its lightness.

The bags can persist up to 1000 years without being decomposed by sun light and/or microorganisms (Clapp and Swanston, 2009 citing UNEP, 2005). Very often therefore, the only means of disposal for plastic bags waste is largely through the landfill. It is estimated that about 96 per cent of all plastic bags are thrown into landfills (Williamson, 2003). Until 2013 when TMA began operations at the sanitary landfill site, all solid waste collected in the city was dumped at an abandoned gravel pit near Kpone in Tema.

In a study by Adane and Muleta (2011) on the usage of plastic bags, their disposal and adverse impacts on environment in Jimma City, Southwestern Ethiopia, they found out that burning, open dumping and burying were the main means of disposal of plastic bags waste in the city. Research has adequately established the negative implications of plastic bag usage. Anthony, (2003) reports that accumulation of plastic bag wastes causes environmental pollution that can be manifested in a number of ways. One of the problems is deterioration of natural beauty of the environment. They are environmentally unfriendly in the extreme, take hundreds of years to degrade, and fill up landfills. Plastic litter can also lead to clogged drains resulting in sanitation and sewage problems, and to clogged soil, which hampers trees growth. In addition, animals have been known to often ingest plastic bags while its indiscriminate disposal by incineration pollutes the air and releases toxic substances (Dikang et al 2010). Most floods are also caused by choked drains by plastic bag waste, which endanger the lives of people.

The several communal natural resources like the Chemu and Sakumono Lagoons, the Bremi River and Ozogu stream in Tema have over the years lost their beauty due to the dumping of plastic bag waste in these rivers. By clogging sewer pipes, plastic bags waste also create stagnant water; stagnant water produces the ideal habitat for mosquitoes and other parasites which have the potential to spread a large number of diseases. According to TMA Medium Term

Development Plan 2010-2013, malaria continues to top the chart as the most reported disease at Out Patients Departments (OPD) in hospitals. In 2007 and 2008, malaria cases at OPD in hospitals were 110,319 and 70,147 respectively, accounting for 5 percent and 9.7 percent deaths. These have economic and social implications: the nation loses manpower and also spends huge sums of money and other resources that could otherwise be used for the provision of social amenities. These resources are channeled through the National Health Insurance Scheme (NHIS) to ensure that malaria infected people recover fully.

Within the plastic bag waste management debate, much attention has been given to the minimization of plastic bag through legislations and the use of economic instruments. These have not been effective because alternatives to the use of plastic bags have not been properly introduced. Moreover with majority of the population of Africa living below the poverty level, outright bans in African countries are likely to face challenges due to the relative importance plastics have over other products such as paper.

1.3 Aim and Objectives

The aim of the research is to investigate consumers' attitudes towards the use of plastic bags, their level of awareness of the environmental hazards posed by the indiscriminate disposal and lack of management of the plastic bag waste**.** The following are the objectives of the study:

- To examine consumer attitudes towards the use and improper disposal of plastic bags in Tema Community One;
- To assess the role institutions (TMA, waste collecting companies, plastic producing companies) play in plastic bag waste management within the Metropolis;
- To examine the reasons for the increasing use of plastic bags by consumers;
- To examine alternatives to the use of plastic bags.

1.4 Research Questions

The research questions to be examined in the study are:

1. Are consumers aware of the harm caused by the indiscriminate littering of plastic bags
2. Why and what led to the increasing use of plastic bags by consumers?
3. What role does TMA, waste collection companies and Environmental Protection Agency (EPA) play in plastic bag waste management in the Metropolis?
4. Under what circumstances will consumers opt for an alternative to plastic?

1.5 Significance of the Study

This study is purely for academic purposes, it will serve as a point of reference for other students who might want to undertake a research related to the topic. It is hoped that state institutions such as the Environmental Protection Agency (EPA) and TMA will use the recommendations from the study to design sustainable innovations to reduce the menace the bags cause the environment. In like manner the recommendations can be used to address plastic bag pollution in Tema and Ghana generally. It could provide answers to policy directives on the use of plastic bags. This is because the study seeks to investigate whether consumers are aware of the dangers and the increasing use and indiscriminate disposal of the use of the bags have on the environment.

1.6 Organisation of Chapters

This research is divided into (5) five chapters. The first Chapter contains the introduction and background to the study, the statement of the problem, objectives and research questions of the study and the significance of the study.

Literature on plastic bags is reviewed in Chapter Two (2). The chapter discusses appropriate literature on studies on plastic bags in order to add relevance and strengthen the framework of the study. Other people's works and case studies on the use of plastic bags as well as policy interventions are appraised reviewed. The chapter also looks at the theoretical framework which sets the confines for the study.

Chapter three (3) discusses the methodology and research design of the study and how the tools for collecting the data were chosen. It therefore discusses the questionnaire design, units of analysis and sampling. The chapter also includes a description of the study area; Tema.

The fourth Chapter deals with the presentation, analysis, and discussion of findings. Lastly, the Chapter (5) five deals with summary of key findings, conclusion and recommendations of the entire research work.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter reviews relevant literature on the research topic. It is divided into the following sections: Plastic bag composition, use and disposal; plastic bags waste and effects on environment, humans and animals; selected work on countries that have imposed taxes/levies to reduce plastic bag waste and the environmental frameworks of Ghana. The last section of the chapter is devoted to the theoretical framework that sets the boundary for the research and a conclusion.

2.2 Plastic bag Composition, Use and Disposal

The word plastic, suggests one material but there are several hundred different plastic polymers[5]. Polymers have many inherent properties that can be enhanced by a wide range of additives to broaden their use and application. The ability to design or engineer the polymer for each specific application makes plastics unique among basic material types. The American Chemistry Society (2005) identifies the distinct characteristics of most polymers as being very resistant to chemical, can be both thermal and electrical insulators, are very light in mass with varying degrees of strength and can be processed in various ways to produce thin fibers or very intricate parts. There are many types of plastics but for this study the focus will be on the High Density Polyethylene (HDPE) and Low-Density Polyethylene (LDPE).The HDPE and LDPE are the ones used to

[5]A polymer is something made of many units (American Chemistry Council, 2013)

manufacture plastic shopping bags. Plastic bags are made from petroleum products, and thus have implications for fossil fuel supplies as well as climate change (San Francisco Department of Environment, 2004). In the US alone, according to some estimates, 12 million barrels of oil are required to produce the 100 billion plastic bags used annually (Clapp & Swanston (2009) citing San Francisco Department of Environment, 2004).

The material characteristics of plastic bags, and the way they are used, amplify concerns about their consumption. Plastic bags have been a part of daily life in developed countries since their introduction in 1977 (Williamson, 2003). In more recent years, plastic bag use has spread to many developing countries as well (Bøhne & Thomsen (2011) citing Environmental Literacy Council, 2005). The plastic bag rapidly became popular among retailers and consumers worldwide in recent decades due to their functionality, strength, and low cost (Clapp & Swanston (2009) citing UNEP, 2004). It is widely used by retailers to package goods at the shopping malls, on the streets and at market centres. This is because plastic bags have proven to be durable, lightweight, and versatile (American Chemistry Society, 2005).

Ellis et al (2005) citing Chauhan, (2003) stated that the most common final resting place for plastic bags is the garbage bin, resulting in countless number of them filling landfills and spilling over onto essentially every other surface of the planet. Waste disposal in Ghana is mainly by land filling. Currently the country can boast of sanitary landfill facilities located in Kumasi, Tamale and Tema with one under construction in Sekondi-Takoradi. This means that a lot of cities and towns depend on dumpsites for their waste disposal. Other systems such as incineration, waste to energy, anaerobic digestion, etc have so far remained at exploratory stages.

However, Zoomlion Ghana[6], is implementing a waste-to-compost plant in Accra which is Ghana's first registered Clean Development Mechanism (CDM) project to reduce greenhouse gas emissions in the country.

2.3 Plastic Bags Waste and Effects on Environment, Humans and Animals

Most plastic bags become waste after they have served the purpose of carrying goods from the shop, market centres and streets. Very often, the individual has practically no use for the plastic bag especially the thin plastic bags after first use. Ellis et al, (2005) revealed that in all stages of a plastic bag's life, from manufacturing to disposal, negative social and environmental impacts are associated with it. The environment, including its soil, water and air, is affected directly in numerous ways, beginning with the extraction and use of fossil fuels during the manufacturing process of plastic bags. Most plastics deteriorate in full sunlight, but never decompose completely when buried in landfills. Plastic bags can exist up to 1000 years without being decomposed by sun light and/or microorganisms (Clapp & Swanston (2009) citing UNEP, 2005).

Research has demonstrated that the thickness and weight of a plastic bag does not impact on the ease with which it may become litter if placed in a waste receptacle and dispersed by the wind (Tough, 2007 citing Verghese, 2006). Waste if poorly managed becomes a danger to health, a nuisance, and possibly a major social and economic problem. Plastic bags do not have any boundaries; hence they pollute places several kilometres away from where they are dumped. This is because of their negligible weight and structure which make it possible for them to be filled up with air just like balloons, and get blown and dispersed over large areas (Mangizvo, 2012).

[6]Zoomlion is a waste management and environmental sanitation company in Ghana and Africa.

Anthony (2003) reports that accumulation of plastic bag wastes causes environmental pollution that can be manifested in a number of ways. One of the problems is deterioration of natural beauty of an environment. On land, plastic bags are some of the most prevalent types of litter in habited areas. Littering is often a serious problem in developing countries where waste collection infrastructure is less developed than in wealthier nations. Impacts on human health of plastic bag waste are perhaps the most serious of the effects associated with plastic bags, ranging from health problems associated with emissions to death.

Ahrens (2011) citing the Ocean Conservancy[7] found that 5% of all marine debris collected over the past 25 years was plastic shopping bags, with 7,825,319 bags collected from beaches, streams, and waterways during that period. They can harm animals that accidentally consume them and sometimes lead to deaths. Clapp and Swanston, (2009) citing Krulwich, (2000), stated that the key rationale specific to India's imposition of a ban on the use of plastic bags is that they pose a health threat to free-roaming sacred cows. Cows eat discarded bags along with other garbage in the streets, and starve to death because the plastic bags clog their digestive systems Air pollution caused by the emission of toxic chemicals and CO_2 during the manufacturing of plastic bags is a significant part of the environmental impact of this product (Ellis et al 2005). Ellis et al (2005) citing the Institute for Lifecycle Environmental Assessment (1990), state that the manufacturing of two plastic bags produces 1.1 kg of atmospheric pollution, which contributes to acid rain and smog. Acid rain and smog are recognized as a serious threat to natural and human-made environments. Ellis et al, (2005) make reference to the Institute for Lifecycle Environmental Assessment (1990) stating that the manufacturing of two plastic bags produces 0.1 g of waterborne waste, which has the capability of disrupting associated

[7] An organisation started in 1972 to fight for a healthy ocean

ecosystems, such as waterways and the life that they support. According to a report by the Environmental Protection Agency (EPA) to the UNFCC in 2011,), emissions from the waste sector in Ghana constituted an average of 10% between 2000 and 2006, which is approximately 8% higher than the 1990 levels. Disposal of solid waste to land with relative deeper depth and to sanitary landfill sites is increasingly becoming common practices in urban waste management. This provides suitable conditions for the production of methane, which is not managed in any way in Ghana. Growing rates of per capita waste generation especially in the urban areas due to population increase and urbanisation are generally driving the increases in emissions (EPA, 2011).

A social consequence of poor sanitation and waste management is its effects on children. According to Owusu (2010), citing Bartlett (1999), poor living environments have particularly far-reaching consequences for children and adolescents as they are more vulnerable than adults to a range of environmental concerns and more likely to be affected in ways that have longer-term repercussions. It is widely acknowledged that clean and well-kept neighborhoods are not only good for the health of children but also affords them opportunities for companionship, recreation and social learning (Owusu, (2010) citing UNFPA, 2007). In addition, the environment serves as the arena for cultural rules and norms that guide the activities and behaviors which are reinforced and reproduced through the repetition of those daily activities in which people participate (Owusu (2010), citing Pellow, 2002). An important effect of this observation is that children's world view is likely to be affected by what they observe in a community. Children who grow up within an environment with garbage all around and poor sanitary practices are unlikely to behave any differently from their older community members

who litter in the community (Owusu, 2010). This may partly account for indiscipline behavior towards littering and the lack of appreciation of good sanitary practices.

2.4 Approaches undertaken by Countries to Reduce Plastic Bag Waste

Over the years, countries across the globe have introduced policies to regulate the use of plastic bags. Policy makers in many countries have perceived plastic-bag littering, its associated waste disposal and consumer behaviour as a cause of environmental problems. Policy options to address these problems fall into two general categories: command and control (CACs) and market-based economic instruments (EIs) (UNEP, 2004). However, EI is the one that has been used widely to address plastic bag waste. Economic instruments make use of market mechanisms and provide one important approach to address this challenge. They encompass a broad array of policy tools, ranging from pollution taxes and marketable permits to deposit-refund systems and performance bonds.

Unlike most global issues such as climate change and gender equity which have been addressed at the international level especially by countries in the North, the issue of plastic bag waste management has not received that much international attention. In a study by Clapp &Swanston (2009) to examine the pattern of an international adoption of an anti-plastic bag norm, they concluded that although the global North does play a key role in decisions affecting the global South, the case of plastic bag waste management requires that people take decisions based on their unique environment. The differences in culture and diversity of nations should be taken into consideration when making such legislations. It was also noted that in instances where the plastics industry has a strong economic interest in resisting a bag ban, it tends to be more

successful in its attempts to influence legislation over plastic bags, be it through structural, instrumental or discursive means.

India's anti-plastic bag sentiment took hold in the 1990s and laws were passed in various states and cities to restrict their use (Clapp & Swanston,(2009) citing Edwards and Kellett, (2000). Gupta (2011) analyzed the relevance of the ban on the reduction of plastic bags in India and noted in the findings that the ban was not very effective. This was because consumers continued to use the plastic bag despite the ban. It was also found that shops did not obey outright the ban on the use of plastic bags. The proportion of consumers (93.8%) using plastic bags in Delhi was not very different from the proportion of consumers (96.7%) using plastic bags in Ghaziabad (where there was no ban on the use of plastic bags. Gupta (2011) assigns two possible reasons for the high usage; in a situation of no actual penalties (de facto v de jure), the shop owners resorted to the use of the cheapest bags. Also, most users were unaware of the legal and social cost dimensions to plastic bag use due to the absence of adequate and accurate information on the subject. However when incentives were introduced to entice consumers to send bags to the shops, the consumption of plastic bags reduced drastically.

Dikgang et al (2010) noted that the case of South Africa has not been different. The plastic-bag legislation in South Africa combined elements of regulation with a levy per bag, similar to that applied by the Irish, in an effort to reduce the consumption of these bags. Charging for bags ensued in May 2003 with a fixed nominal price of 46 rand cents for 24-litre bags across all retailers. South Africa banned the use of High Density Polyethylene (HDPE) plastics bags less than 30 micrometer which are the thinner plastics bags and imposed a tax on the use of thicker plastics bags. This has allowed retailers to sell the bags to consumers and not distribute them for

free. It was apparent from a study by Mangizvo (2012) in Alice[8] that the ban had not deterred individuals and organisations from over-consumption and littering of plastic bags. They continued to use plastic bags in a manner that was unsustainable. Customers continued to demand for plastic bags during grocery shopping because the amount paid for these bags at the till is quite insignificant. Thin plastic bags continue to be issued out by street vendors. The awareness levels on the dangers of plastic bags were quite low according to the study and as a result the plastic bags continued to be used to pollute the environment. Plastics bags are still readily available in South Africa even after the ban on production and usage of plastic bags in 2003. According to Mangizvo (2012), the main issue is lack of awareness and concern by different stakeholders who include consumers and retailers on the potential negative impacts of plastic waste on the environment. Market centres; retailers and customers continued to use the thin multi- coloured bags which pose a grave threat to the environment.

Botswana on the other hand introduced plastic bag legislation in 2007. Dikgang et al, (2010) carried out a study to find out if it had changed the behavioural pattern of the consumption of plastic bags of the citizens. They concluded that the tax on plastic bags led to a significant decrease in the demand for plastic bags per BWP[9] 1,000 of shopping across all the selected firms for the study. Within 18 months of the imposition of the ban, overall plastic bag use fell sharply—by 50%—compared to pre-levy consumption. The partial success of the Botswana levy was due to the constant high prices of the plastic bags. Even after the initial significant decline in consumption, prices of bags continued to increase. Over here the issue of awareness was not factored but the high amount charged for the use of plastic bags in shops discouraged people completely from its use. Other African countries that have taken steps to reduce the plastic bag

[8] A small town in the Eastern Province of South Africa
[9] Pula is the currency for Botswana, an African country.

menace include Kenya, Tanzania, Rwanda, Egypt and Ethiopia. In 2011, Kenya outlawed plastics bags that are less than sixty (60) microns. In Egypt the ban on the use of plastic bags has created employment opportunities for women. Women have been charged with creating cloth bags to replace plastics bags and thereby creating employment for them.[10]

In Asia, some countries have also taken measures to reduce the use of plastic bags. In 2002, Bangladesh banned the use of all plastics bags, citing the prevalence of plastic bag litter in clogging municipal drainage pipes. The clogged pipes allegedly led to several floods between 1989 and 1998 that inundated two-thirds of the country. To prepare for a nationwide ban, the government aired several commercials and documentaries on television outlining the adverse effects of polyethylene in public life and plastered educational posters within cities and towns. The ban on plastic bags led to an increase in the use of jute bags, woven from renewable, biodegradable jute plants common to Bangladesh (Ahrens, 2011). By 2008, the charge was credited with a 90 percent drop in plastic bag use (Cordray, 2010). China also banned plastic bags that were less than .025 millimeters thick in 2008. Bags of that description were called "white pollution" by the government, and retailers who continued to use them were assessed fines as high as $1,500 if they continued to issue them. By 2009, the government reported a 66 percent decrease in plastic bag distribution among Chinese supermarkets (Ahrens, 2011). European nations like Ireland have banned the use of plastics altogether. The Netherlands, Belgium, Spain and Norway have also introduced plastic tax to raise funds into an Environment Fund to be used to reduce waste or research new ways of recycling. Italy and Germany have equally banned the use of plastics bags (Roach, 2008).

[10] www.cleanup.org.au

2.5 Overview of Past and Present Environmental and Regulatory Frameworks in Ghana

Environmental sanitation is aimed at developing and maintaining a clean, safe and pleasant physical and natural environment in all human settlements to promote socio-cultural economic and physical well-being of all sections of the population (ESP, 2010). A healthier and wealthier population will tend to generate more of all waste types (domestic, industrial, commercial, institutional and hazardous). The challenge of increasing disease burden from poor environmental sanitation, improving the attitudes and behaviour of individuals, households and communities towards environmental sanitation remains central in any effort aimed at making sustainable progress. There is therefore the need for urgent action based on a clear national strategy (policies, plans, and programmes) to manage this trend supported by sustainable financing.

Environmental policy can be defined in several ways. Mickwitz, (2003) citing Lindquist (1996) differentiated between definitions based on function, institution and purpose. A definition based on function would define policies that affect the environment as environmental policy, whereas an institutional definition would view policies undertaken by: a certain set of institutions; an environmental ministry; certain agencies; etc., as environmental policy. Environmental policy can be seen as courses of action which are intended to affect society – in terms of values and beliefs, action and organisation – in such a way as to improve, or to prevent the deterioration of, the quality of the natural environment (Mickwitz, (2003) citing Lindquist (1996). Environmental policy instruments are a set of techniques that governmental authorities wield their power in attempting to affect society – in terms of values and beliefs, action and organisation. The power is used to improve, or to prevent the deterioration of the quality of the natural environment

(Mickwitz, (2003) citing Vedung, 1998). Regulations aim at modification of the set of options open to agents. Instruments used include: standards, bans, permits, zoning and restrictions.

The most comprehensive environmental policy in Ghana is the National Environmental Policy and National Environmental Action Plan enacted in 1991. The Policy seeks to improve living conditions and the quality of life of the entire citizenry and to harmonize economic development with natural resources conservation. The Action Plan was the first comprehensive plan for environmental protection for Ghana in which the following activities are spelled out: Investment related to the environmental protection institutional building commitment of the government to policy making, legislation and management of land resources, forest and wildlife, water, marine and coastal ecosystem, human settlements and pollution control.

Waste management practices in Ghana are guided by the Environmental Sanitation Policy of 1999 which was revised in 2010. The document spells out the roles of the various stakeholders including the private sector. The policy also gives the local assemblies the right to manage waste at the local level. Hence there are bye-laws to this effect. The problem, however, is the fact that solid waste in the policy is defined as comprising all solid waste material generated by households, institutions (including health care waste from hospitals and clinics), commercial establishments and industries and discharged from their premises for collection; all litter and clandestine piles of such wastes; street sweepings, drain cleanings, construction/demolition waste, dead animals and other waste materials. All solid waste (plastics, food, concrete, leaves, etc) are put together and they all end up at the landfill site. The primary responsibility of solid waste management lies with TMA, even though the private sector does assist in the collection of waste in Tema.

Although there is no legislation on plastics, there are relevant laws and ordinances that regulate its use. There is the Criminal Code 1960, Act 29 Chapter 8 (Public Nuisance) ' Whoever does any of the following acts shall be liable to a fine not exceeding 50 pounds, namely throwing of rubbish in the street or in front of premises, nuisances defacing public notices or buildings, drumming etc. Cap 75 of May 13, 1911 (Mosquito Ordinance) permits the lawful entry of sanitary officers into individual premises to destroy mosquito larvae. There is also the Town and Country Planning Ordinance- Cap 84. The plastic producing companies have standards to adhere to which is closely monitored by the EPA; permits are issued by EPA before commencement of operations by any plastic producing company in the country. The companies also have to produce quarterly and annual reports for EPA to ascertain whether they are complying with regulations that bothers on their operations in the country.

In Ghana, the Local Government Act, 1993 (Act 462) empowers the district assemblies by Section 10 (3) (e) to be responsible for the development, improvement and management of human settlements and the environment of the districts. Each district assembly is also established by Act 462 as the Planning Authority (Section 46 I). One important function of the Planning Authority very relevant to and having implications for waste management is its powers of enforcement. There is therefore a legal and legitimate basis for the intervention of the assemblies to control and deal with plastic waste littering. There are bye laws made pursuant to Section 79 of Act 462. The bye laws give exclusive responsibility to the assemblies or their registered agents or contractors for the management of both solid and liquid waste within their jurisdiction or administration.

2.6 Diffusion of Innovation Theory

This research is being shaped by the diffusion of innovation theory. The multidisciplinary nature of diffusion research cuts across various scientific fields; a diffusion approach provides a common conceptual ground that bridges these divergent disciplines and methodologies. One can understand social change processes more accurately if the innovation is followed over time as it courses through the structure of a social system (Rogers, 1983).

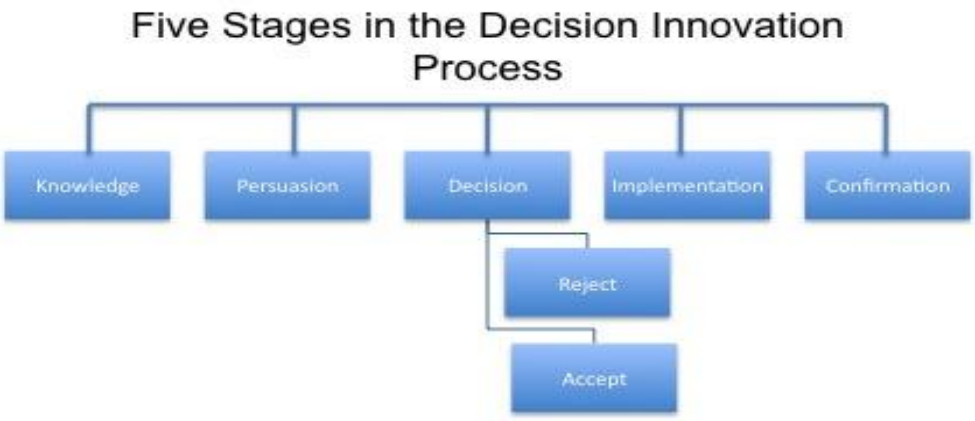
The diffusion of innovation theory has been used to explain how innovations have penetrated into a society and have been fully adopted or how it has failed to be accepted by the target population. Rogers (1983) defines diffusion as the process by which an innovation is communicated through certain channels over time among the members of a social system. Diffusion scholars have long recognized that an individual's decision about an innovation is not an instantaneous act. Rather it is a process that occurs over time and consists of a series of actions. The steps identified in an innovation process include; recognition of need or problem through research, development, commercialization of an innovation, diffusion and adoption and then consequences.

The diffusion of innovation and an adoption as a process is not generic; it varies from product to product and or service to service. Some products or service offerings gain quick acceptance, and the diffusion is fast and rapid; for other products and services, the process may be slow and take considerable amount of time. Diffusion of innovation and subsequent adoption is impacted by socio-economic, cultural, technological as well as legal factors; it is also impacted by individual determinants like psychological variables and demographics; these are all forces in most cases "uncontrollable" by the marketer. Plastics have evolved over the years to be used to serve a

variety of purposes all over the world. Unlike most innovations, plastic bags were not marketed widely but have been accepted widely by people.

Time does play a role in the diffusion of innovation. Time does not exist independently of events but it is an aspect of every activity. A conceptual and analytical strength is gained by incorporating time as an essential element in the analyses of human behavioural change. Time is involved in diffusion in the innovation decision process by which an individual passes from first knowledge of an innovation through its adoption or rejection (Rogers, 1983). The process involves five (5) steps presented in the frame below:

Figure 2.1: A model of stages in the Innovation-decision



Source: Wikipedia, 2013

In the diagram above, an individual is exposed to the innovation when the person gets knowledge about the product. Knowledge occurs when an individual is exposed to the innovation's existence and gains some understanding of how it functions. Persuasion occurs when an individual forms a favourable or unfavourable attitude towards the innovation. The individual

makes a decision when engaged in activities that lead to a choice to adopt or reject the innovation. The innovation is then used by the individual - implementation and then confirmed (Confirmation) when an individual seeks reinforcement of an innovation-decision already made, but may reverse this previous decision if exposed to conflicting messages about the innovation. In that event though the individual might have accepted to use the innovation, certain information on the product received later is likely to change the individual's attitude towards the product.

At every level of the diagram described above, communication is very important. Rogers (1983) defines communication channel as the means by which messages get from one individual to another. An obvious principle of human communication is that the transfer of ideas occurs most frequently between two individuals who are alike, similar or homophilous[11]. Such communication is likely to be more effective and rewarding. It is likely to lead to knowledge gain, attitude formation and change and overt behaviour change,

An important factor affecting the adoption rate of any innovation is its compatibility with the values, beliefs and past experiences of social system[12].The structure of a social system can impede or facilitate the diffusion of innovation in the system. System norms and diffusion can also be a barrier to change. Rogers (1983), citing Katz (1961) remarked that it is unthinkable to study diffusion without some knowledge of the social structures in which potential adopters are located as it is to study blood circulation without adequate knowledge of structures of veins and arteries.

[11]Homophily is the degree to which pairs of individuals who interact are similar in certain attributes; such as beliefs, education, social status and the like.
[12]The set of interrelated units that are engaged in joint problem solving to accomplish a common goal

Plastic bags are known to be cheaper, lighter and in most countries they replace the use of paper as a shopping bag. Today, between 500 billion and 1.5 trillion plastic shopping bags are used each year worldwide (Clapp and Swanston, (2009) citing Spokas, 2007). Estimates suggest that 8 billion plastic shopping bags are used per annum in the United Kingdom, 4.3 billion in Australia, 9.8 billion in Hong Kong, 3.3 billion in Bangladesh, 100 billion in the United States and 300 billion to 1 trillion in China (Environment Australia, 2002).

Leadership influences the acceptance or rejection of an innovation. In countries such as Ireland where the government has banned the use of plastic bags, it has been widely accepted by the general public. However, in South Africa, the use of thicker plastic bags has not been that effective as one would have thought probably due to the lack of enforcement on the part of government. Leadership therefore influences other individual's attitudes or overt behavior informally in a desired way with relative frequency. When the social system is oriented to change, leaders are quite innovative; but when the norms are opposed to change, the behavior of the leaders also reflect this norm. Leader lead in the promotion of new ideas, or they can head an active opposition.

Although an innovation is towards solving a problem, sometimes it leads to several problems which have to be solved and these could be the consequences of the innovation as Rogers (1983) describes them. The plastic bag innovation has had consequences on the environment: land, air and water with attendant health problems on humans and possible death in animals. The relevance of the diffusion of innovation theory to the study is to assess the awareness level of consumers towards the harm improper disposal of plastics cause on the environment. If they are aware, are they willing to accept a new innovation that can serve the same purpose as the plastic bag? What level of education do people need to change their attitudes towards its use and also

come up with different ways of saving the environment? What role would the institutions such as EPA and TMA have to play in order to resolve the problem of indiscriminate disposal of plastic bags? These are the questions that the study seeks to answers.

2.7 Conclusion

The research has been informed by the degradation of the environment due to the increasing use, improper disposal and management of plastic bags. The management of the bags as noted is indeed a challenge to many countries; developing and developed. Many governments have chosen the route of taxes or levies on plastic bags, to great success. Perhaps in a culture where convenience often comes before environmental concern, society did not scrutinize the innovation before accepting it fully as Rogers (1983) proposes. Plastics are good and indeed plastic bags have helped to relieve the woes of retailers but there is a problem to the environment if misused.

The bags have diffused into the society and it has come to stay. The increasing populations in developing countries with its attendant problems of urbanisation and inadequate funds for managing waste have equally worsened the challenge of managing the waste emanating from its use. Perhaps it is time institutions of state, individuals and the private sector design a new innovation to manage the problem once and for all.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

The research approach and methodology chosen for the study are detailed in this chapter. Thus, it describes the sampling method and tools used to collect information from the target population. The chapter is divided into two sections; the first section describes the methods and tools used in collecting data for the study. The second section gives a description of the study district and area.

3.2 Research Design

Research design situates the researcher in the empirical world, and connects the research questions to data (Punch 2005). It is therefore the basic framework outlining relationships between the activities required in order to effectively address the central stages of the study. A descriptive research as defined by Neuman, (2006) is one in which 'the researcher begins with a well-defined subject and conducts research to describe it accurately' (p. 35). It provides an accurate portrayal or account of the characteristics, for example behaviour, opinions, abilities, beliefs, and knowledge of a particular individual, situation or group. The result is a detailed analysis of the respondents. The descriptive design was therefore chosen to meet the objectives of the study; understand and analyse consumer attitudes towards the use and disposal of plastics bags.

3.3 Methodology

The research method adopted for the study determined its outcome. There are mainly two approaches to social science research - quantitative and qualitative. Although the two approaches are different, they do complement each other, as well. They are similar because they are both a means through which a researcher can collect and analyse data to examine the patterns of social behavior in order to understand and explain them (Neuman, 2006). In this study the two approaches are combined to capitalize on their strengths and to compensate for the weaknesses of each approach.

Quantitative research is empirical research where the data are in the form of numbers and qualitative research is empirical research where the data are not in the form of numbers (Punch 2005). The former approach in research is used to collect data to measure variables and test hypothesis that are linked to general causal explanations whereas the latter approach makes it possible for the researcher to conduct a detailed examination and assign reasons to explain a phenomenon. But data collected using either approaches can be analysed to explain a social issue. Integrity is assured when a quantitative approach is used because of the reliance on an objective technology, precise statements, standard techniques, numerical measures and statistics (Neuman 2006). A qualitative approach on the other hand uses tools that enable the researcher to conduct detailed examinations of the study; as regards the role institutions play to ensuring proper disposal and management of plastic bag waste. This allows for replication of the study. A combination of the two approaches; quantitative and qualitative approaches will enable the researcher make objective comparisons. The two approaches also gave the researcher an insight into the activities of the selected institutions as well as know the attitudes of the selected sample on the use and disposal of plastic bags. This allowed for generalisations.

3.4 Source of Data

Information gathered for the study was mainly primary and secondary. The primary data was information gathered from the field through the administration of a structured questionnaire and interview. Researches that have been done on the topic, documents from the TMA, EPA and other publications were reviewed as secondary data to add to the information gathered. The study also made use of the internet for access to websites that had very useful information on plastic shopping bags. .

3.5 Methods of Data Collection

There are a number of tools used to collect primary data. For this study, questionnaires and interviews were used to learn about people's beliefs or opinions on the use, disposal and management of plastic bags. An interview is one of the main data collection tools in qualitative research. It is a very good way of accessing people's perceptions, meanings, and definitions of situations and constructions of reality (Punch, 2000). Interviews are therefore very useful in finding out how people understand social issues. An interview 'is a short-term, secondary social interaction between two strangers with the explicit purpose of one person's obtaining information from the other' (Neuman 2006, pp 305). Interview was therefore used to collect information from the institutions; TMA, plastic producing companies and waste collection companies. The aim of using an interview was to obtain accurate information from these institutions because it offered the researcher the chance to probe for clarification.

Questionnaire on the other hand is one the approaches for collecting information from a large sample especially when a survey is to be done. A structured questionnaire aimed at eliciting detailed and varied information from the respondents was used using closed and open ended

questions. The questionnaires were administered personally to the respondents by the researcher to obtain detailed information.

3.6 Target Population and Sampling

The target population of the study consists of consumers: female and male who reside in Tema, but precisely those who visit the Tema Community One market. The market is located within the Tema Metropolitan Assembly (TMA) in the Greater-Accra Region. The market was chosen because it has the highest concentration of commercial activities and it also has a mixture of culture and gender. Different groups of people converge at the market centre daily to transact businesses and the main means of transporting goods is usually the plastic bag. Institutions such as the TMA, private solid waste collection companies and EPA were also selected as respondents due to the leadership role they play in the management of the environment in the Metropolis and the nation respectively.

Punch (2006) states that all research involves sampling because no study, whether quantitative, qualitative or both can include everything. Punch (2006) citing Miles and Huberman (1994) makes reference to the fact that a researcher cannot study everyone everywhere doing everything, hence, the need to do sampling to study just a section of the population at a particular place at a point in time. The population of Community One according to the 2010 Housing and Population census of Ghana is about 160,213 (Ghana Statistical Service, 2010).

3.7 Sampling

Sampling procedures are required for any valid survey. This is due to the fact that it is often not economically feasible to cover every unit of the population. Hence a sample needs to be selected from the population using clearly defined procedures. A random sample was used to get a sample

size of 100 from the population. A random sample is one 'in which the researcher uses a random number table or similar mathematical random process so that each sampling element in the population will have an equal probability of being selected' (Neuman 2006 pp 227). The goal was to get a representative sample from the population such that the study of the small size of 100 can still produce accurate generalisations about the population in Tema. A convenient sample of 100 for the study was based on the limited time for the study and also the cost involved in doing a study involving large numbers. 50 males and 50 females were randomly sampled. The unit of analysis therefore is the individual.

A purposive sampling technique however was used to select persons to interview from TMA, solid waste collection companies and the EPA to enhance the researcher's understanding and learn more about the role that these institutions play in the management of plastic bag waste.

3.8 Data Analysis

The quantitative data was analysed using the Statistical Package for Social Science (SPSS). The carefully recorded information collected from the field was imputed into the SPSS to generate tables and simple frequencies to analyse the data. The analysed data was compared to other studies conducted on plastic bags and its management and implications identified and recommendations made.

The qualitative data was analysed through content analysis. . Content analysis is a technique for examining the content or information and symbols contained in written documents (Neuman, 2006). The careful analysis of such data was to address the research questions and objectives. The content analysis assisted in making meaning of the interviews conducted with the

institutions in order to gain more knowledge of the role they play in the management of plastic bag waste.

3.9 Limitations of the Study

Tema Community one (1) is made up of twenty-one (21) suburbs. The actual population of the market is unknown because consumers and retailers move in and out of the market daily. It was therefore difficult selecting a sample size using the population of the area. This notwithstanding, the proportion of females in the market is more than the males because women engage in informal activities such as trading more than men. Also, it is the role of women in Ghana to prepare meals at home which means they have to go to the market. The purpose and scope of the study had to be explained carefully to men before they answered questions. Hence the actual target population of getting an equal sample size for women and men could not be achieved. Moreover the study was very limited because of time constraint and finances. There was also lack of data and record on the amount of solid waste generated and collected in Tema over the years. Since solid waste is not segregated, getting information on plastic bag waste was equally not impossible.

3.10 General Characteristics of Study District

Tema is the capital of the Tema Metropolitan Assembly (TMA). There are over five hundred (500) industries in the Metropolis and thus the Metropolis serves as the industrial hub of the country. The country's biggest Port and Harbour facilities are situated in Tema, and they contribute substantially to the revenue of the State as well as the Metropolis for development ventures to ensure sustained well-being of the citizens. The Tema Port serves as an outlet for the

flow of a wide range of goods to and fro from other parts of the country as well as neighboring countries like Togo, Benin, and Nigeria and beyond.

The service sector in the metropolis covers a wide range of tertiary activities. These include hairdressing, driving, selling and petty trading; tailoring and dressmaking. There is a bulk breaking markets in Community 9 to facilitate marketing and distribution of farm produce. The Community 1 market serves as the most important daily market in the Metropolis. There are however a few markets of relatively less significance dotted in other parts of the Metropolis, such as Community 2, Ashaiman and Tema Manhean. Tema handles about 70% of all shipment to Ghana and some land locked countries in the West African Sub-Region (Medium Term Development Plan 2010-2013). Tema has over the years developed from a small fishing village to become Ghana's leading seaport and an industrial city. Tema has a lot of industries producing aluminum, refined petroleum, chemicals, food products, and building materials.

3.10.1 Location and Population

Tema is a coastal district town situated about 30 kilometers east of Accra, the capital city of Ghana. It shares boundaries on the North East with the Dangme West District Assembly (DWDA), Southwest by Ledzokuku Krowor Municipal Assembly, North West by Adentan Municipal Assembly and the Ga East Municipal Assembly (GEMA), North by the Akuapim South District Assembly and the South by the Gulf of Guinea. The Ashaiman Municipal Assembly is an in-lock enclave within the TMA. TMA covers an area of about 396km^2 and lies within the coastal savannah zone. The Greenwich Meridian (i.e. Longitude 0º) passes through the Metropolis, which meets the equator or latitude 0° in the Ghanaian waters of the Gulf of Guinea. The southern tip of the Metropolis lies on latitude 5º41" North (TMA_MTDP 2010-2013).

According to the 2000 Ghana Population and Housing Census and Household Survey, the total population of the Metropolis was 298,432 with males and females forming 49% and 51% of the population respectively (TMA-MTDP 2010-2013). With a growth rate of 2.6%, the population has now reached 402,637 (GSS 2010).

3.10.2 Environment of Tema

The built up area is made up of the well planned communities, peri-urban settlements and the industrial area. The well planned communities and the peri-urban areas form about 40% of the total land area with industrial and commercial areas forming 15%. With rapid population increase, the built up areas continue to increase and this has compounded the environmental and sanitation problems and challenges that faces the metropolis. Some houses have been constructed in waterways, and this together with the proliferation of other unauthorised structures contributes to flooding. This is especially a problem in unplanned communities such as Tema Manhean, Lashibi, Zeenu and in some planned areas as well.

3.10.3 Waste Management in Tema

Municipal Solid Waste (MSW)—more commonly known as trash or garbage—consists of everyday items we use and then throw away, such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, paint, batteries and plastics. This comes from our homes, schools, hospitals, and businesses (US Environmental Protection Agency, 2012). Tema like any city in Africa is battling with waste management due to increasing population withits attendant problems of slum development has made plastic bag waste management a problem for Tema. The TMA although has an organized system of collecting solid waste by involving the private sector, it still faces a number of challengers such as not

being able to determine the amount of waste generated daily and to think of how much of the waste is from plastic bags. Solid waste collection in communities 3, 5, 6, 13, and 14, 18, 19, 20 is carried out on franchise bases. Service beneficiaries pay a user fee which is determined by the TMA. Occasionally, some residents contract the services of some unemployed youth (usually called "boola-boola boys") who move from house- to -house with wheel barrows to collect refuse for an undefined fee. Their system which is proving quite effective and could be regularised and improved upon with the necessary logistical support. However, final disposal of waste is the sole responsibility of the Assembly. All solid waste collected used to be dumped at an abandoned gravel pit near Kpone but a newly-engineered sanitary landfill has been constructed in the same area.

3.10.4 Solid Waste Management Problems

Despite all these efforts by TMA to improve solid waste collection in Tema, there are still problems. Most inhabitants dispose of their refuse indiscriminately irrespective of the health hazards associated with such practice. Whereas some have defined the problem as attitudinal, others have attributed it to the fact that there are no waste bins at vantage locations where people can easily dispose of waste. Residents also continue to complain that refuse collection trucks do not come on time and are not regular. Population density influx of migrants and slum development is also a problem.

Information gathered indicates that about 10% of industries do not properly treat their waste before disposing them. According to the TMA development plan, Tema Oil Refinery (TOR) still discharges poorly treated residual petroleum oil into the Chemu Lagoon via the industrial drain. Wahome and Tema Steel Works; establishments that work on scrap metals are also reported to

be releasing untreated metallic dust into the atmosphere. Additionally, the Ghana Textile Limited (GTP) and some paint production industries also discharges off industrial liquid waste into the industrial drain. The EPA also report that apart from these major industries, about 80% of Small and Medium Scale mechanic shops scattered within the Metropolis spills petroleum oil into domestic drains which normally ends up in the sea.

Due to the problem of sanitation in the Metropolis, malaria continues to top the chart as the most reported disease at Out Patients Departments (OPD) in hospitals followed closely by hypertension and acute respiratory infections. This trend indicates that sanitation related diseases are predominant.

3.11 Tema Community One Market

The Community One (1) market serves as the most important daily market in the Metropolis. It is situated in the central part of Tema and close to the Tema Port harbor. The population of Tema was 31,465 and has risen to 160, 213 (GSS, 2013). The area comprises of some communities and the market is just part of it. The waste generated in the market for March 2013 was 1,424.76. The truck that collects the waste from the market makes on average about seven trips a day to the landfill site (Landfill site, TMA 2013). Out of the waste generated in Tema daily about 18-20% is made up of plastic bags (Waste Management Department, TMA 2013).

3.12 Conclusion

This chapter has discussed the research design and methods for undertaking the study. The sources of data collection have been noted as mainly through primary and secondary. The two main approaches for gathering information from the field which is the qualitative and

quantitative have also been discussed. The two approaches are been used in the study because they do complement each other. They offer certain advantages to the collection and analysis of the data in order to address the questions and objectives of the study. Reasons have also been assigned for choosing the sample size randomly and purposively. The main tools for data collection from the field will be through questionnaires administered by the researcher to elicit for responses whilst interviews will be conducted with some members of the institutions involved in the management of waste. The chapter has also included information on the study district and area; Tema and Tema Community One Market respectively. It is the researcher's belief that the tools chosen will assist in adequately addressing the research questions and objectives in the next chapter.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter analyses and discusses the findings from the field on the use and disposal of plastic bags in the Tema Community One Market in Tema. The chapter is divided into six major sections. Section one (4.2) discusses the socio-demographic background of respondents. It provides information on the gender, educational level and age of respondents for the study. Section two (4.3) analyses the trends of plastic bags use in the metropolis and the factors accounting for these trends. In Section three (4.4) the chapter discusses the approaches of plastic bags disposal in the metropolis. Section four (4.5) analyses the effects of the improper disposal of plastic bags on the environment and Section five (4.6) analyses the role played by institutions (TMA, EPA, Zoomlion and Rural Waste) in the management of the plastic bag waste. The chapter is concluded in Section five (4.7).

4.2 Background of Respondents

A total of one hundred (100) respondents participated in the study. These respondents were in two categories: consumers of plastic bags and institutional stakeholders. Overall, ninety-four (94) consumers were conveniently selected, while six (6) respondents from various institutions were also purposively selected. Discussion on the background characteristics is solely on consumer respondents.

Table 4.1 below covers the gender of consumer respondents. There were more females 50 (53.2%) than males 44 (46.8%).

Table 4.1: Sex of Consumer Respondents

Sex	Total Respondents	Total (Percentage)
Male	44	46.8
Female	50	53.2
Total	**94**	**100.0**

Source: Fieldwork, 2013

4.2.1 Educational Level of Consumer Respondents

Table 4.2 below shows that majority of the respondents 35 (37.2%) had completed either Secondary/ Vocational/ Technical education, 30 (31.9%) had completed primary education, 14 (14.9%) had also completed middle school 9(9.6%). Whereas 9 (9.6%) had no formal education only 6 (6, 4%) had completed tertiary education.

Table 4.2: Educational Level of Consumer Respondents

Education	Total Respondents	Total (Percentage)
No formal Education	9	9.6
Middle School	14	14.9
Primary Education	30	31.9
SHS/Voc/Tech	35	37.2
Tertiary Education	6	6.4
Total	**94**	**100**

Source: Fieldwork, 2013

4.2.2 Occupation of Consumer Respondents

Table 4.3 below discloses the occupation of the respondents. Majority of the respondents were traders 40 (44.0%), 21 (23.1%) were self-employed with 9 (20.9%) indicating other means of employment. 6 representing (6.6%) of the respondents were students with the least 5 (5.5%) being public servants.

Table 4.3: Occupation of Respondents

Occupation	Total Respondents	Total (Percentage)
Trader	40	44.0
Student	6	6.6
Public Servant	5	5.5
Self employed	21	23.1
Others	19	20.9
Total	**91**	**100.0**

Source: Field data, 2013

4.2.3 Age of Consumer Respondents

Table 4.4 below depicts the age categories of the consumers. The age range shows that majority of them were between the ages of 30 to 41 years representing 40%. 35(38.9%) were between the ages of 18-29 years and only 19 (21.1%) were aged beyond 42 years.

Table 4.4: Age of Consumer Respondents

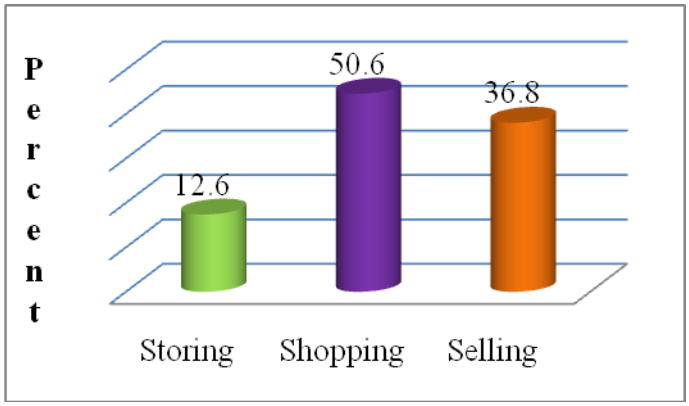
Age	Total Respondents	Total (Percentage)
18-29	**35**	**38.9**
30-41	**36**	**40.0**
42+	**19**	**21.1**
Total	**90**	**100**

Source: Fieldwork, 2013

4.3 Characteristics of Plastic Bags Usage by Consumers

This section discusses the various ways in which consumers use plastic bags. It also analyses the trends of plastic bags consumption in the study area, especially factors accounting for the increasing usage. Figure 4.1 below depicts responses on the various applications of plastic bags.

Figure 4.1: Use of Plastic Bags by Consumers in Tema Community one Market



Source: Field data, 2013

In Figure 4.1 above, consumers' views were sought regarding the usage of the bags. Majority of them representing 50.6% indicated that they use the bags for shopping. 36.8% also indicated that they use the bags for selling items and only 12.6% said they use them for storage. The responses show that the plastic bag is probably what most people use for shopping and selling items in the market. Indeed, the findings suggest very few of the consumers use the plastic bags for storing items.

The use of the plastic bag has received much attention in recent years and a lot of work has been done to understand the importance of the bags to consumers and retailers. The need for a durable shopping bag led to the innovation of the plastic bag. Rogers (1983) in the Diffusion of Innovation theory identified that the recognition of need or problem as the first step for an innovation. It means that every innovation must solve a particular problem. Long after the innovation of the plastics, Peters (2006) conducted a study and it was revealed that the manufacture of two plastic bags produces 72% fewer pollutants than a single paper bag. The plastic bags have therefore replaced paper bags which were found out not to be environmentally friendly. This is because it is reported that, the United States alone used 10billion paper grocery bags requiring 14 million trees to be cut down (Peters, 2006 citing the American Forest and Paper Association, 1999).Rayne (2008) confirmed the assertion that plastic bags are widely used to transport small consumer goods, particularly food. It is therefore not surprising that they have been widely accepted in Tema for shopping, storage and for selling based on the views of the consumers.

4.3.1 Reasons for Use of Plastic Bags

It has been established from Figure 4.1 above that consumers use the bags mainly for shopping (50.6%) and for selling (36.8). The least (12.6%) indicated they use the bags for storage. It was necessary to find out from consumers their views on why they use the bags. This was very relevant particularly because of the characteristic of the plastic bags. They are made from polymers which have distinct characteristics: very light in mass with varying degrees of strength and the ability to be designed for each specific application. This makes them unique among basic material types like the paper hence its acceptability across the globe. In the table below, consumers' reasons for using the plastic bags are reviewed.

Table 4.5: Reasons for use of Plastic Bag by Consumers in Tema Community One

Reasons	Total Respondents	Total Percentage
Low cost	17	18.1
They are lightweight	26	27.7
They are easily available	33	35.1
Lack of alternative	10	10.6
They are free	8	8.5
Total	**94**	**100**

Source: Field data, 2013

Table 4.5 suggests that 35.1%, representing majority of consumer respondents said they use the bags because they are easily available on the market, 27.7% said it is due to the ease with which the bag can be handled due to its lightweight,18.1% of them said the bags are not expensive and that it requires a few pesewas to obtain,10.6% said they use the bags because there is no alternative whilst 8.5% of consumer respondents indicated that they receive them free from the

market after every purchase. In effect, all consumer respondents identified for the survey at the Tema community one market justified their use of the plastic bags. This is based on the different reasons they assigned to its use.

4.4 Trends of Plastic Bags Use in Tema Community One

In recent times the plastic bags has received so much attention in the media that it causes problems to sanitation. There have been efforts by both the government and the private sector towards environmental sanitation. Plastic bag particularly has been singled out as the number one cause of environmental challenge. The proportion of plastic bag waste found in the solid waste composition has equally increased over the years. An estimation of the proportion of solid waste generation from Ghana's five largest cities (Accra, Kumasi, Sekondi-Takoradi, Tamale and Tema) in 2008revealed that plastic and rubber accounted for 8% (MLGRD, 2008). However, Rockson et al (2011) also investigated the characterization of solid waste at final disposal sites of these five major cities listed above and they report that the second most significant waste fraction was plastics which constituted 17%. This is an indication that the use of plastics has increased in recent years. But there is no statistics to indicate the increasing use of plastic bags in Tema Community One.

The study ascertained from consumers whether the use of plastic bags has increased in recent years hence the numerous challenges with its management. Consumer responses were analysed qualitatively. One consumer stated that the use of the plastic bags has increased in recent years due to population increase as he notes:

> *'The demand of plastic bag by users has increased over the years due to population increase and emerging trading activities at the market centres'*(Male student, 32years).

Another consumer said that the use of the bags has increased in recent years due to the fact that it has been accepted probably because of the earlier responses by consumers that there is a lack of alternative and therefore it seems to be the only means through which goods bought from the market are carried home. The view made by the consumer is stated below:

> *'Plastic bag usage is an accepted practice these days. Ghanaians have widely accepted it because it is more modern' (*Male Self-employed, 39 years).

The black plastic bags which are also the ones normally used in the market, is known for its ability to conceal goods from public view. Interestingly, a consumer stated that:

> *'The black plastic bag popularly called 'ewiasi eye sum' has promoted all kinds of bad activities. Some people defecate in them and leave them in bushes and at the shores. It is a problem for us because we use them every day' (*Male Self-employed above 52 years average).

Another consumer shared her views on why the use of the bags has increased in recent years as follows:

> *'I always get so many plastic bags when I buy few food items from the market and I throw them away as soon as I get home'(*Female Seamstress, 26 years).

Further, another consumer expressed concern and stated:

> *'Everything bought these days is put in a plastic bag. The bags are enticing. The different designs are attractive. They are used to sell almost everything in the market'(*Female Trader, 35 years).

Following from the responses from consumers, it can be concluded that the bags serve varying purposes for consumers. The bags are also widely used because there are no alternatives, they are low-priced however very easy to handle and moreover people get them for free after every

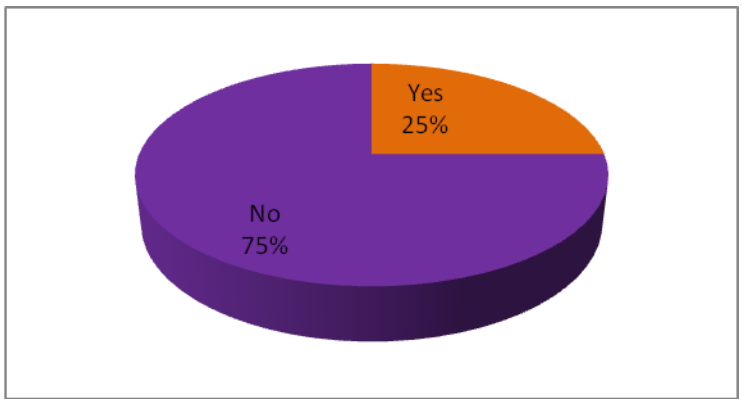
purchase of goods at the market. It is also gathered from the responses that the bags have been widely accepted because they are attractive and it is also deemed to be modern. More so, population growth has also led to its increasing use as a result of emerging trading activities at the Tema Community One market. The bags have indeed been widely commercialized and hence have penetrated into the society to be fully adopted by consumers and retailers in the market. The plastic bag gained quick acceptance and its diffusion has been fast and rapid.

The revelations by consumers' confirm what the American Chemistry Society (2005) found out about the plastic bags. It was noted that the bags have proven to be durable, lightweight, and versatile. It was revealed that the uniqueness of the plastic bags has made them acceptable and widely used in almost every society in the world. In the US alone, 10 billion of them are used each year, costing retailers $4 billion which is passed on to the customer in the price of goods (Ahrens, 2011). Conservative estimates suggest that, today, people use between 500 billion to 1 trillion of the bags worldwide and about a million every minute (Clapp and Swanston, 2009 citing Spokas, 2007).

4.4.1 Plastic Bag Reuse

Consumers have indicated that they use the bags for various reasons as shown in Table 4.5. Some of the consumers have also stated that the use of the bags is on the increase because of the rise in population. Even though consumers admitted that the bags are lightweight, they are of the view it can easily get torn after or in the course of its use which calls for replacement. Consumers' views on reusing of the bags were therefore sought. This is illustrated in Figure 4.2.

Figure 4.2: Reuse of Plastic Bags



Source: Field data, 2013

Figure 4.2 above captures responses from consumers on the reuse and non-reuse of plastic bags. It reveals that 25% of consumers reuse the bags after serving its initial purpose whereas 75%, representing majority of consumers indicated otherwise. The responses by majority of the consumers informed the study how little has been done to encourage consumers reusing of plastic bags. This is evident in the initial findings where some consumers admitted that obtaining plastic bag requires an insignificant amount of money, whereas others revealed that it was obtained freely after every purchase of items in the market.

These responses indicate that consumers have no knowledge on what the bags can be used for the second time. The plastic bag has been in existence for almost fifty (50 years). It was mainly designed to aid consumers and retailers in trading. It then means that the second use of the plastic bag has not been explored yet, hence after using the bag once, neither consumer nor retailers have need for it again. Time is essential in human behavioural change as it is relevant to any innovation. Maybe with time, the majority (75%) of consumers who stated they have no need for

the bag after its first use might have a need for it. Some of the reasons given by some consumers are stated below:

> *'They are always torn by the time I get home and I cannot use them for anything else but to throw them away in the bin'(*Female public servant, 33 years).

A consumer also stated that:

> *'No customer will take the old bags even when they are not torn; they always want new ones so as for me I don't use them again'*(Female trader 37 years average).

Lastly another consumer indicated that:

> *'They are so light that they cannot be used again. I can get one to buy for 5 pesewas very easily' (*Female self-employed, 37 years average).

Again, the study further investigated the reasons why 25% of consumers stated that they reuse the bags. There were two responses that run through.

> *'I store rubbish in them at home' (*Female self-employed, 31 years).

This view was shared by many whilst a few others indicated that they reuse the bags for making fire.

> *'I use them for making fire at home' (*Female Trader, 40 years).

This information was given by a female. It was revealed in the study that females who use charcoal as energy for cooking, place the plastic bag (mostly black ones) between the charcoal and light matches to make the fire. The bag burn till it becomes mixed with the charcoal. They are therefore used in place of kerosene. This is probably due to the petroleum component used during the processing of the bags.

These responses indicate that the bags are being reused by 25% of consumers but not for shopping, selling or for storage as revealed in the earlier findings. The bags are reused for storing rubbish at home and are disposed of after a second use. Those who use them for making fire however, end up polluting the environment again with the burning of the plastic. This confirms a report by the Marrickville Council (2010) that the thin bags (HPDE) are indeed of very poor quality and cannot be reused. This research supports the claims by majority 75% who do not reuse the plastic bags because they get torn easily and therefore cannot be reused after initial use. This view by the Environment Protection and Heritage Council (2007) also confirms the findings of majority not reusing the bags after it has served its original purpose [transportation] consumers usually view the bags as undesirable items and therefore dispose them off.

4.4.1.1 Relationship with Gender and Reuse of Plastic bags

There is a perception by some section of Ghanaians that the disposal of domestic garbage is especially the role of female. On the field during the data gathering, the researcher had to plead with some male to respond to the questionnaire because some of them when approached told the researcher that issues on plastic bag use and disposal could be discussed very well with female. They did not want to have anything to do with the research. This prompted the researcher to conduct another investigation using consumers' sex to develop a gender dimension of reuse of the plastic bags using the cross tabulation. The cross tabulation of the relationship between gender and reuse of the bags is illustrated in Table 4.6.

Table 4.6: Relationship with Gender and Reuse of Plastic bags

Sex		Yes	No	Row Total
Male	Number	8	34	42
	Percent (%)	19.0	81.0	
Female	Number	15	35	
	Percent (%)	30.0	70.0	100.0
Colum Total		**23**	**69**	**92**

Source: field data, 2013

Table 4.6 shows that 81% representing 34 of males do not reuse the bags, whilst 35 (70%) of female also do not reuse the bags. However, 15 (30%) of female reuse the bags as against 8(19%) of males who reuse the bags. This finding suggests that majority of male are very particular in getting new plastic bags after every purchase. However, females are more likely to reuse the bags as indicated in earlier findings for making fire or for storing garbage.

An important factor affecting the adoption rate of any innovation is its compatibility with the values, beliefs and past experiences of social system[13].In this case if a policy is passed on reuse of bags, it is more likely to have more female doing it than males. Hence, there might be the need to encourage more males to reuse the bags. Therefore the structure of a social system (patriarchy) can impede or facilitate the diffusion of innovation in the system. System norms and diffusion can also be a barrier to change.

4.5 Disposal of Plastic Bag Waste

This section discusses the modes through which consumers' dispose of plastic bag waste. The final disposal of solid waste in the Tema metropolis is the responsibility of TMA. Managing

[13]The set of interrelated units that are engaged in joint problem solving to accomplish a common goal

waste indeed is a very expensive and daunting task (TMA MDTP, 2013).Organised solid waste collection in Tema dates back to the 1960s. During this period the responsibility for providing this service was in the hands of the Tema Development Corporation (TDC). The population at the time was less than 28,000. Every household was provided with a free dustbin for the storage of domestic solid waste, which was emptied daily, except for Sundays. By the mid-1970s the system undoubtedly broke down. From the late 1990's deliberate efforts were made to encourage the private sector to deliver substantial portion of collection and transport services following the successful application of the contracting method by TMA (NESSAP 2010). This was mainly due to fast population growth, and the consequent increase in the waste produced.

In Table 4.7, the study sought to find out from consumers the current methods they use to dispose of solid waste.

Table 4.7: Methods used by Consumers for Plastic Bag Waste disposal

Method	**Total**	**Total Percent**
Burning	7	7.4
Burying	1	1.1
Solid waste company	39	41.5
Dumping in communal container	38	40.4
Open dumping	9	9.6
Total	**94**	**100**

Source: Field data, 2013

Table 4.7 reveals that, 41.5% of consumers representing the majority use the solid waste company to dispose of their waste. 40.4% dump their waste in containers normally placed at vantage

points in the community. 9.6% of consumers use open-dumping to dispose of solid waste and 7.4% burn their waste with 1.1% being the least suggesting that waste is buried. The fact that majority of respondents use the solid waste company is because Tema started using the service in the 1990s. Moreover, Tema has a lot of planned communities with well laid out streets which makes them accessible to trucks that collect the waste hence the majority of residents using the service. The other method of disposing of solid waste is the use of the communal containers which is the only means of disposal in the market. The old methods of burning and burying are gradually fading out in cities and open dumping is not encouraged due to public knowledge on environmental best practices.

Similar methods are reported in the 2000 and 2010 housing and population census. In 2000, 4.8% of households had their waste collected directly from their dwellings, 7.9% burnt their household refuse. A total of 3.9% of households buried their refuse while 25.9% dumped at unspecified locations including vacant lots, drains, embankment of water courses, rivers, lakes and wetlands. However, it seems there has been an increase in the number of people using the services of solid waste collectors for solid waste disposal. This is because in the 2010 Population and Census report for Greater Accra Region, a significant proportion of households 25.7% dump their solid waste in containers and almost half 48.5% of households had their solid waste collected from their homes in contrast to the 2000 report which indicated that only 4.8% used the solid waste collectors (GSS, 2013).In the findings, it was revealed that 41.5% of consumers use the solid waste collectors. This is close to the report by the GSS in 2010 of which 48.5% of residents used the services of the solid waste collection companies.

4.5.1 Linkages between methods of plastic bags disposal and socio-demographic variable

In the Ghanaian context, there is a perception that females have a defined role when it comes to disposing of waste in their surroundings. This perception that a man has nothing to do with domestic garbage has eaten so fast into the Ghanaian society. Using cross-tabulation, the researcher explored the linkages between the different disposal methods in relation to the socio-demographic characteristics of the respondents.

Table 4.8: Relationship with Consumer means of disposal and Age, Education and Occupation

Variable		Burning	Burying	Solid waste company	Dumping in communal containers	Open dumping	Row Total (RT)
Sex							
Male	(No.)	4	1	16	16	7	**44**
	(%)	9.1	2.3	36.4	36.4	15.9	**100.0**
Female	(No.)	3	0	23	22	2	**50**
	(%)	6.0	0.0	46.0	44.0	4.0	**100.0**
Column Total (CT)		**7**	**1**	**39**	**38**	**9**	**94**
Educational Levels							
No formal education	(No.)	2	0	2	2	3	**9**
	(%)	22.2	0.0	22.2	22.2	33.3	**100.0**
Primary school	(No.)	3	1	12	12	2	**30**
	(%)	10.0	3.3	40.0	40.0	6.7	**100.0**
Middle school	(No.)	0	0	6	6	2	**14**
	(%)	0.0	0.0	42.9	42.9	14.3	**100.0**
Secondary	(No.)	2	0	16	15	2	**35**
	(%)	5.7	0.0	45.7	42.9	5.7	**100.0**
Tertiary	(No.)	0	0	3	3	0	**6**
	(%)	0.0	0.0	50.0	50.0	0.0	**100.0**
		7	**1**	**39**	**38**	**9**	**94**
(CT)							
Occupation of Respondents							
Trader	(No.)	3	1	6	23	7	**40**
	(%)	7.5	2.5	15	57.5	17.5	**100**
Student	(No.)	0	0	1	5	0	**6**
	(%)	0.0	0.0	16.7	83.3	0.0	**100.0**
Public servant	(No.)	0	0	4	1	0	**5**
	(%)	0.0	0.0	80.0	20.0	0.0	**100.0**
Self employed	(No.)	2	0	16	2	1	**21**
	(%)	9.5	0.0	76.2	9.5	4.8	**100.0**
Others	(No.)	2	0	9	7	1	**19**
	(%)	10.5	0.0	47.4	36.8	5.3	**100.0**
(CT)		**7**	**1**	**36**	**38**	**9**	**91**

Source: Field data, 2013

It is noted from Table 4.8 that male (15.9%) are more inclined to deposit their solid waste anywhere than female (4.0%). It also shows that 36.4% of males indicated that they use the solid waste company as a means for disposing of solid waste but as many as 46.0% of females use this service.

Interestingly, it was revealed that the higher a person's education, the more likely the person will use the services of the solid waste collecting companies. For instance for respondents who have no formal education, the same number representing 22% use burying, burning, solid waste collectors, dumping in open containers for disposing of waste whereas 33% engage in open dumping. This is contrasted with respondents who had tertiary education which was represented by only six (6) and three (3) representing 50% said they use the solid waste company whilst the other half also said they dump in containers.

It was also noted that traders are more likely to use the containers as the means of solid waste disposal compared to that of a public servant. A total of 57.5% representing 23 of traders dumped their solid waste in containers whilst 20%, just one person indicated that the method of disposal of solid waste is through the container.

The Diffusion of Innovation theory by Rogers (1983) can be employed to explain the relationship further. One can understand social change processes more accurately if an innovation is followed over time as it courses through the structure of a social system (Rogers, 1983).The theory has been used to explain how innovations have penetrated into a society and have been fully adopted or how it has failed to be accepted by the target population. Solid waste collection and management has been a problem for major cities in the country over the years. So from the late 1990's deliberate efforts were made to encourage the private sector to partner with

assemblies to assist in solid waste collection from residents homes. It is reported that in 2000 only 4.8% of households had their waste collected directly from their dwellings by the private companies, however the figure rose to 48.5% in 2010 (GSS, 2013). In the findings, it was revealed that 41.5% of consumer respondents from Tema Community one market indicated that they use the services of the solid waste collectors.

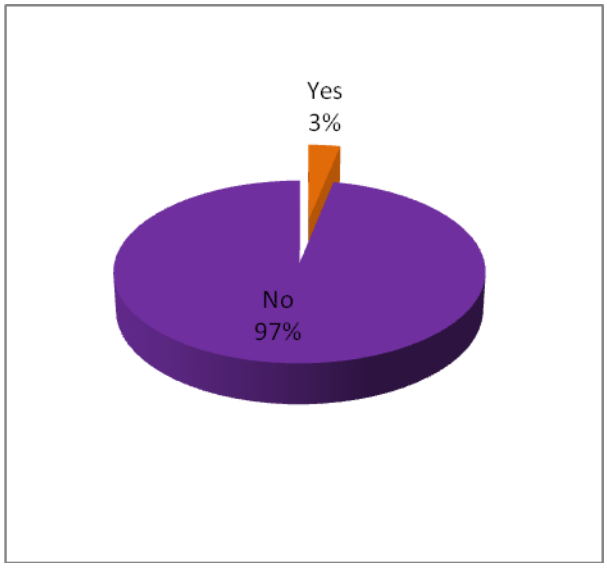
In Table 4.8, it was revealed through the cross tabulation that females (46.0%) use this service more than males (36.4%). This is probably impacted by socio-economic and cultural factors. Females are obliged to take care of the home and this involves cooking which generates waste. This could be explained that they adopt practices which best suit them and which can in the long run help to serve best their interest. Burning, burying and open dumping all have some repercussions on the environment but not as much effect as using the solid waste collection companies and dumping in containers. In Table 4.8, more females tend to choose disposing of solid waste in containers or having the waste service company pick up as compared to males who preferred to dump anywhere.

Individuals get exposed to an innovation when knowledge about the product is received through communication. Knowledge occurs when an individual is exposed to the innovation's existence and gains some understanding of how it functions. The knowledge gained about an innovation assists the individual to relate accordingly with the product. In Table 4.8, it was noted that the level of a consumer's formal education determined disposal method. It is therefore assumed that a consumer who has attained tertiary education knows the implication of either burying or burning waste and therefore used the solid waste collection companies or prefers to dump in a container. But consumer with no formal education would dump solid waste anyhow as reflected in Table 4.8.

4.5.2 Solid Waste Segregation

When plastic bag wastes are mixed up with the solid waste and sent to the landfill they become incorporated into the waste mass within the landfill, contributing to the increasing size of waste at the landfill. Citizens' ability to separate waste is a way of reducing solid waste sent to the landfill site. In Figure 4.3 below, consumers' responses on waste segregation are sought. The study sought to know whether or not consumers separate plastic bag waste from solid waste before disposal.

Figure 4.3: Reponses to Segregation of Solid waste before Disposal



Source: Field data, 2013

Figure 4.3 above, reveals that 97% being majority of consumers said they do not see the need for separating plastic bag waste from solid waste. However, 3% fewer of consumers said they do some form of waste separation. Indeed, the responses by majority of the consumers attest to the reality of non-separation of waste in the metropolis. Currently, waste segregation at source has not been explored in the city.

It was therefore prudent for the study to find out from the majority 97% why they do not separate plastic bag waste from solid waste. Below are some of the explanations consumers gave for non-separation of waste before disposal.

> *'There is no need to put rubber in one container and leftover of food in another. Where can I take them? All the waste go to one place so there is no need to separate'(*Female Trader, 37 years).
>
> *'Because there is only one container and it is for all solid waste. It is not necessary'(*Female self- employed, 28 years).

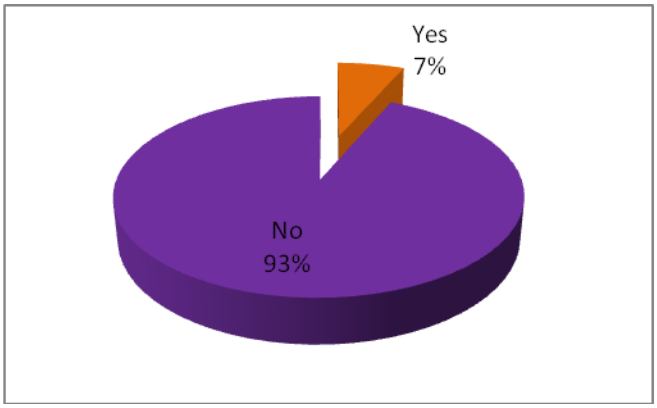
These views were shared by the majority who virtually did not see the need to separate plastic bags from solid waste since they all go the same place-landfill.

Waste separation at source increases the value of the waste and makes it a more lucrative commodity. It is reported that Egyptians have been recovering non-organics from waste since these items first appeared in solid waste (Palczynski, 2002). In fact, they have never considered metals of any kind as waste as do plastics and paper. Whole towns and communities have established their economic survival and activities around the recovery and recycling of non-organic waste (Palczynski, 2002). Almost 80% of the solid waste generated in Ghana can be recycled. Organic waste constitute 60% of waste and can be recycled into compost; glass makes up 2% and this can be made into beads; paper constitutes 7% and can be used for paper or toilet tissue and plastics which also makes about 17% can be turned into pellets (Rockson et al 2011). When all these are recycled, it leaves very little of solid waste sent to landfill sites. Waste separation is definitely something that has to be explored to reduce the waste generated and the huge cost involved in its management

4.5.3 Awareness of Disposal Site

Operations of the engineered sanitary landfill site at Kpong located in Tema started operation in 2013. It was constructed to last for 15years and to replace the old dumping site in Tema which used to emit smoke, a nuisance and also posed health risks to scavengers and workers at the site. Solid waste was also dumped haphazardly, not covered in addition to the contamination of underground water. The new landfill site however, has leachate-collection pipes directed into manholes and treatment plant before being discharged to check underground water contamination. The site is to be covered daily in layers to prevent degradation of the land. Currently, Tema has only one sanitary landfill site which is the only final means of disposal for all solid waste generated in the metropolis (TMA, 2013). The researcher therefore wanted to know consumers awareness of where their waste is sent to when disposed of. Consumers' responses are illustrated in Figure 4.4.

Figure 4.4 Responses to awareness of disposal site



Source: Field Data, 2013

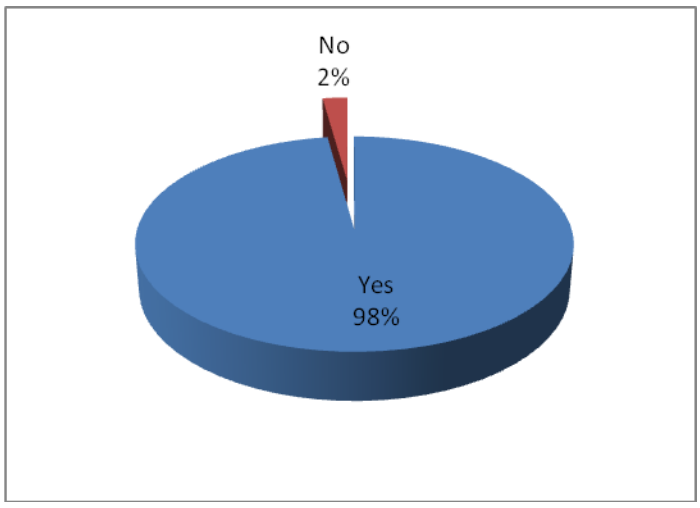
Figure 4.4 above, reveals that majority 93% of the consumers were unaware of where solid waste collected was sent to whiles 7% indicated they knew the area where the landfill site was located. This could probably account for the increasing waste generation in the metropolis. Because for

majority of the consumers, if waste is made daily and taken from homes or markets and not seen again, then there is a justification to continue making more waste after all it will be taken to the landfill site. However, if people were aware of the cost involved in managing waste, and the implications of keeping the landfill site, probably on their own they might have started some form of waste minimization. Already, it was evident from the field that residents who live near the landfill have started complaining of the stench due to poor management. This is the only place where all waste collected is sent to. So if people continue making waste without knowing the implications of their actions, then solid waste management becomes a daunting task indeed. However if management take it upon themselves to educate consumers on the dwindling land space for landfill sites, then maybe we can all devise new innovations to deal with the problem.

4.6 Environmental Effects of Improper Disposal of Plastic Bags

This section discusses consumers' level of awareness of the implications of improper disposal of plastic bag waste on the environment. The section sought answers from consumers on ways to curb the problems that improper disposal of plastic bags waste have on the environment and also discusses alternatives to the use of plastic bags. Figure 4.5 below illustrates the responses by consumers' on their level of awareness of the environmental effects of improper disposal of plastic bags waste.

Figure 4.5: Awareness on the implication of Plastic Bag waste disposal

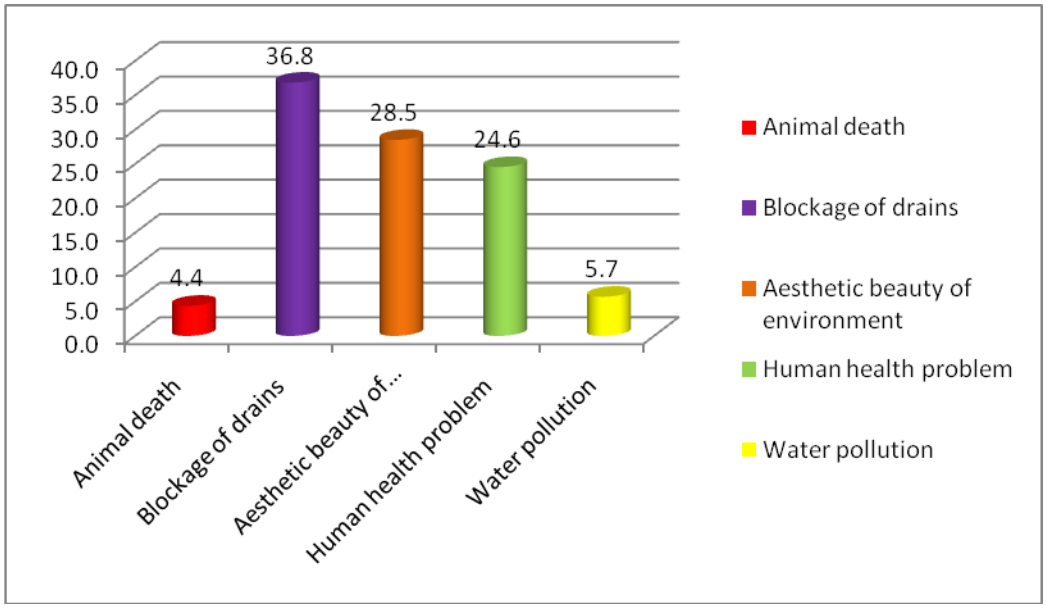


Source: Field data, 2013

Figure 4.5 above, reveals consumers opinions on the level of awareness on the issues of improper disposal of plastic bag waste. Two separate responses were received: 98% majority of consumers admitted that they are aware that there are environmental implications of improper disposal of plastic bag waste. However, 2% of the consumers suggested otherwise. This implies that a good number of consumers are aware of the implications of improper disposal of plastic bags on the environment. Although, the researcher acknowledges the level of awareness of majority of consumers on the environmental effects of their actions, the minority of consumers who suggested otherwise, raises concern that can undermine efforts in achieving environmental sanitation sustainably.

The researcher further investigated from the majority of consumers to what effect improper disposal of plastic bag waste has on the environment. Consumers' responses are illustrated in the figure 4.6.

Figure 4.6: Environmental Effects of Improper Disposal of Plastic Bags



Source: Field data, 2013

Figure 4.6 above, reveals that, 36.8% majority of consumers indicated that the improper disposal or the lack of management of the plastic bags waste cause blockage of drains and 28.5% said it destroys the beauty of the environmental. 24.5% indicated it causes human health problems, 5.7% said it causes water pollution and 4.4% of the consumers attributed the effects of improper disposal of plastic bags to animal death.

It is clear from the responses that consumers understand the effects of improper disposal of plastic bags as they highlighted their views accordingly. Of course, based on the findings it could be observed that in one way or the other all the reasons impact largely on human health. This is because majority of consumers observed that, the blocking of drains by plastic bags waste preventing the free flow of water not only breeds mosquitoes but at the sametime causes floods which can destroy lives and property. To support this finding, it is reported by the Asian News, in 2005 that the city of Mumbai, India experienced massive monsoon flooding, resulting in at least 1,000 deaths, with additional people suffering injuries. City officials blamed the destructive

floods on plastic bags which clogged gutters and drains, preventing the rainwater from leaving the city through underground systems (Ellis et al, 2005).

More so in Ghana, at least 6 of the top 10 diseases – malaria, diarrhoea, diseases of the skin/ulcers, intestinal worms, acute eye infections and typhoid fever, are all related to poor environmental sanitation. They constitute 70 – 85% of OPD cases in health facilities. They are mainly caused through contamination of environmental media (water, air, soil) and food by bacteria, viruses and parasites from poor disposal of refuse and excreta which also promotes breeding of disease vector. This has a huge implication on health expenditure of the country. It is estimated that 4.9% of GDP substantial portion is spent on addressing poor environmental sanitation-related diseases (NESSAP, 2010).

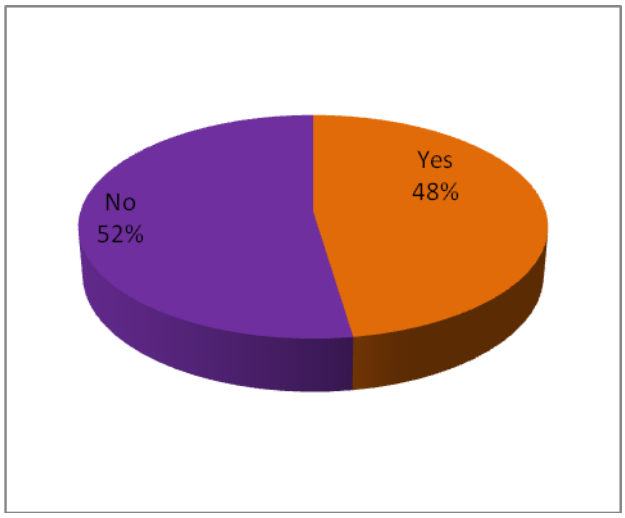
Minority of consumers with a total of 4.4% attributed the improper disposal of plastic bags waste as a threat to animal lives, whiles 5.7% of consumers also attributed improper disposal of plastic bag leading to water pollution. Thus, when waters are polluted by plastic bags, they destroy aquatic life. This confirms a report by Peters (2006) citing the Center for Marine Conservation, that plastic bags are among the 12 items of debris most often found in coastal cleanups. The bags are more of a threat to wildlife, as they easily confuse the bags for food (ibid). The Marrickville Council (2010), reports that the HDPE bags end up in the environment blocking drains, killing marine wildlife and forming long lasting toxic pollution in landfill sites.

4.7 Suggestions by Consumers on the management of Plastic Bags Waste

In this section, consumers' responses on how plastic bag waste can be managed are analysed. Consumers' views on ways to minimize the problems caused by the lack of proper management

systems of the bags on the environment were sought. In Figure 4.7 consumers' opinion on whether there should be a substitute for the plastic bags or not was sought.

Figure 4.7: Consumers Opinion on Plastic Bag Substitution



Source: Field data, 2013

Figure 4.7 reveals that 52% of respondents opposed the idea of finding a substitute or substitutes for the plastic bags whereas 48% of them were in support of finding a plastic bag substitution. The use of the bags has become accepted such that some consumers could not readily think of alternatives to its use hence the majority 52% indicating that there could be no substitute for the plastic bags. This supports earlier findings where consumers revealed that they use the bags because of the lack of alternatives. Of the 52% majority of consumers who could not think of any material replacing the plastic bag they gave the following reasons:

One of them stated that:

> *'The use of everything is expensive. Plastic bags are not the only cause of dirt on our streets and in gutters. Sand also makes gutters dirty. I admit that plastic bags have made cities dirty but banning them or finding alternative will not solve the problem. What people need is to be educated on the effects of the improper disposal of the bags.*

*Education on proper management of the plastic bag will prevent shoppers requesting for new plastic bags after shopping all the time'. (*Female trader, 44 years average).

Another consumer revealed that:

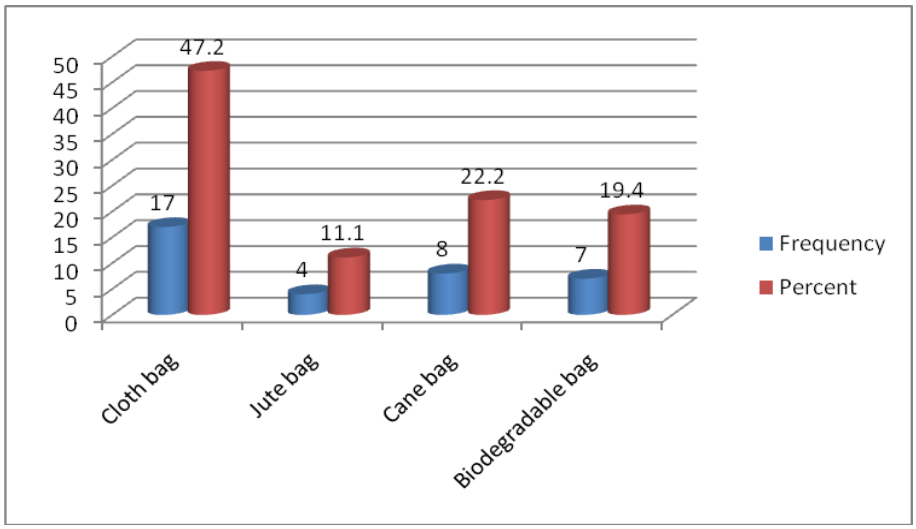
'*People should be encouraged to reuse the bags by keeping it in a good condition since its use as a carrier is preferred by most people due to its lightweight*'(Male Student, 24 years).

Lastly, a consumer revealed that:

*'When can there be alternatives? For now TMA should introduce spot fines for littering. We should all check our actions, so if you see somebody littering, you tell the person not to do so. What can we use when we replace the bags? I don't know of any option'(*Male Trader, 46 years).

Although the majority of consumers indicated that finding alternatives to the use of the plastic bags now was not forthcoming the minority 48% gave various suggestions. This is presented in Figure 4.8 below.

Figure 4.8: Recommended Alternatives to Plastic Bag by consumers



Source: Field data, 2013

In Figure 4.8 above, the minority 48% of consumers who indicated that there should be a substitute for plastic indicated their preference. Figure 4.7 depicts consumers' support to plastic bag substitution. Majority (47.2%) of consumers recommended the use of cloth bag, 22.2% favoured cane bag, whereas 19.4% said biodegradable bags and 11.1% opted for jute bags respectively. The outcome of the findings reveals that more consumers are in favor of cloth bag when used for shopping since it can last longer as compared to the thin plastic bag. In effect when this is opted for and accepted, it can replace the plastic bags use and thereby reduce the environmental effects caused by the improper disposal of plastic bag waste.

In Egypt when the cloth bags replaced the plastic it created employment for females who were tasked with producing cloth bags (Cleanup Australia). Another finding reveals that proportion of consumers shared different views by suggesting that replacing the plastic bags with biodegradable, cane and jute bags will equally address the environmental challenges posed by the improper disposal of plastic bags with its effect on the environment. In a similar context, the findings are quite revealing because in Bangladesh, the ban on plastics bags led to an increase in the use of jute bags, woven from renewable, biodegradable jute plants common to Bangladesh (Ahrens, 2011). This is however in support of 11.1% respondents who suggested the introduction of biodegradable bags in replacing the plastic bags.

Currently, the most popular alternative to the bag is biodegradable or "bio-plastic" bags. There are many biodegradable products available and they have the same characteristics of natural fibres but not all have negative environmental impact. Alternatives to the plastic bags have to be assessed for environmental and social impacts across their potential life cycles, or a life cycle analysis before they can be recommended. In New Zealand, consumers have adopted the use of thicker LDPE bags and cloth or sacking bags from various sources; rigid plastic boxes and

baskets; thick plastic bags; cloth bags; and the oldest market containers, cane woven baskets (Tough, 2007).

The use of these alternatives depends on a range of factors such as socio economic status, country, age, price, availability and other numerous social and cultural factors (Tough, 2007). In Table 4.9 below, consumers' views are sought on ways to reducing plastic bag waste.

Table 4.9: Ways to Curb Plastic Bag Waste Problems

	Total Respondents	**Total Percentage**
Ban	29	30.9
Enforce sanitation laws	38	40.4
Introduce biodegradable bags	23	24.4
Introduction of levy	4	4.3
Total	**94**	**100**

Source: Field data, 2013

Table 4.9 reveals that majority of consumers representing 40.4% suggested the enforcement of sanitation laws, 30.9% opted for the introduction of levy and 24.4% said there should be the introduction of biodegradable bags, whiles the remaining respondents representing 4.3% indicated that there should be the introduction of plastic bag levy. The issue of enforcing sanitation laws as suggested by majority of the consumers requires institutional strengthening. Suggestions were made by some consumers in curbing plastic bags waste in the environment. These included the review of legislation on sanitation and a comprehensive policy on plastic bag laws.

For instance in Botswana, the introduction of a plastic bag legislation in 2007 led to a significant decrease in the demand of the bags. It was noted that within 18 months of the imposition of the ban, overall plastic bag use fell sharply—by 50%—compared to pre-levy consumption(Dikgang

et al, 2010).The partial success of the Botswana levy was due to the constant high prices of the plastic bags. The success rate of the tax on the bags in Botswana was due to the high tax imposed by the government on consumers which discouraged its use. This is in support of the findings where 4.4% of respondents suggested that a levy or tax on the bags use is likely to reduce its use by consumers and thereby reduce the havoc it causes on the environment. It is also reported that in Somaliland, people were educated and possible alternatives to the use of the bags discussed before the ban was implemented (Bøhne and Thomsen, (2011) citing Irin, 2005).

Relating the finding in Table 4.8 to polices that have been implemented in other countries to curb the plastic bag menace, Gupta (2011) found that in Delhi where a ban was imposed on its use, the proportion of consumers (93.8%) using the bags was not very different from the proportion of consumers (96.7%) using them in Ghaziabad, where there was no ban on the use of plastic bags. Gupta (2011) assigned two possible reasons for the high usage; in a situation of no actual penalties (de facto v de jure), the shop owners resorted to the use of the cheapest bags. Also, most users were unaware of the legal and social cost dimension to plastic bag use due to the absence of adequate and accurate information on the subject.

Gupta's work has varying implications on the responses given by consumers in this study. If people are unaware of the implications of their actions then obviously, certain measures advocated by consumers is not likely to yield any meaningful impact. All the actions will have to be implemented alongside education on sanitation for the citizens so that they will know the implications of their action on the environment and then support policies that will be implemented. The adoption or rejection of any of the suggestions made by consumers will depend on time apart from leadership. It takes time for people to either adopt or accept an innovation. People might get so used to the plastic bags such that when a substitute is found, they

might still hold onto what they have always known. The beliefs, values and past experiences of a social system[14]all affect the adoption rate of any innovation.

Leadership influences individual's attitudes or overt behavior informally in a desired way with relative frequency. When a social system is oriented to change, leaders are quite innovative; but when the norms are opposed to change, the behavior of the leaders also reflect this norm (Rogers, 1983). Leaders are supposed to lead in the promotion of new ideas. All the suggestions by consumers: ban, enforcement of sanitation laws, use biodegradable bags and the introduction of a levy or tax can work effectively if institutions are strengthened. Leadership therefore influences the acceptance or rejection of an innovation.

4.8 Institutional Analysis on the Management of Plastic Bags waste

This section analyses the role played by institutions in plastic bag waste management in Tema. The institutions were represented by EPA, TMA, Rural Waste Company Limited and Zoomlion Company limited. The work was to get firsthand information from these institutions on the management of plastic bag waste in the metropolis. The main objective was to approach the stakeholders in solid waste management and ask them their views on the present system of management and the way forward. The questions asked to meet the objectives were on regulations and strategies that have been adopted by these institutions for the management of plastic bag waste. There were two (2) representatives from TMA and Zoomlion Company limited, one (1) from EPA and Rural Waste Company limited respectively.

[14]The set of interrelated units that are engaged in joint problem solving to accomplish a common goal

4.8.1 Profile of Institutions (TMA, EPA and solid waste companies)

This section gives a brief profile of the four institutions that participated in the study. They are as follows:

- **TMA**

TMA was established by Act (462) as the planning authority for its area which is Tema. The local Government Act, 1993 (Act 462) empowers the TMA by section 10 (3) (e) to be responsible for the development, improvement and management of human settlements and the environment in the area. One important function of TMA very relevant to and having implications for waste management is the power of enforcement. TMA's bye-laws give it exclusive responsibility for the management of both solid and liquid waste within its administrative jurisdiction. The primary responsibility of solid waste management rests with TMA. From the 1990's however, TMA has involved the private sector in solid waste management in the metropolis. Currently, the assembly works with eight (8) of such companies to assist in the collection of waste. They are: Terry White Limited, J. Stanley-Owusu Limited, Amanie General Waste, Ababio Ventures, Rural Waste Company Limited, Asibod Company Limited, Meskworld Company Limited and Zoomlion Company Limited. Solid waste collection in Tema is carried out on franchise and contract basis. In low density areas, residents pay a user fee ranging from five (5) to fifteen (15) Ghana cedis monthly. The fee is determined by the private waste collection companies in consultation with TMA. In high density areas such as Manhean, they are given communal containers. All the solid waste collected is sent to the landfill site by the companies.

- **Zoomlion Company Limited**

Zoomlion Company Limited was formed under the company's Act in 2006 as a business to manage waste and sanitation issues in Ghana and Africa as a whole. It started with a few members of staff and has grown over the past seven years. It has branches in other African countries such as Togo, Angola, Zambia, Equatorial Guinea and Liberia. It is committed to building relationship with private sector customers, Ministries, Department and Agencies (MDAs) of central Government, Metropolitan, Municipal and District Assembly (MMDAs) and communities. Zoomlion collects waste from communities 1, 10, 11, 12, Sakumono, Kpong- Katamanso, parts of Lashibi, Ashaiman and Manhean all suburbs in Tema. Residents pay a fee of twelve (12) to fifteen (15) Ghana cedis. Zoomlion collects waste from residents once a week.

- **Rural Waste Company Limited**

Rural Waste Company Limited on the other hand was formed in 2010 under the company's Act as a business for the management of waste and sanitation issues in Ghana as well. Its main client in Tema is GHAPOHA. It works in close partnership with other stakeholders to maintain high standards of sanitation in the metropolis. Rural Waste collects solid waste from its client's residence and office daily.

- **Environmental Protection Agency (EPA)**

The Environmental Protection Agency (EPA) Act, 1994 (Act 490) established the EPA which is mandated to provide environmental standards and compliance management. The EPA works in effective partnership with all stakeholders to catalyse change towards making environmental protection a commonly held value for sustainability.

4.8.2 Perspectives of Institutions on Plastic Bag Waste Management

The Environmental Sanitation Policy (ESP) was revised in 2010 to incorporate certain aspects of sanitation which were lacking in the first publication in 1999. The revised policy is to redirect efforts in achieving a clean, safe and healthy environment because it recognizes environmental sanitation as one of the most powerful drivers of human development. In the policy, solid waste is defined as comprising of all waste material generated in households, institutions, commercial establishments and industries and is therefore treated together. Although there is no mention of plastics in the document, in the NESSAP (2010) broader action plans have been developed by the Ministry for Local Government and Rural Development (MLGRD). These have been further incorporated into activities in the Medium Term Plan of TMA.

The EPA being the regulatory body on environmental sanitation was asked if there was a policy on plastics and for that matter plastic bag. The question was relevant because the ESP did not have a section on plastic waste management. The representative from EPA admitted that:

> *'The regulations on environment is scattered actually in various documents. There is no policy on plastics or plastic bags. The only clear strategy for plastic bag is the one in the NESSAP. At least, the strategy makes mention of ways to reduce plastic bag waste in the environment. At the assembly level though there are bye-laws that monitors citizens' activities on sanitation' (*Senior Officer Built Environment- EPA).

The researcher could not lay hands on the TMA bye-laws because nobody at the assembly had seen a copy in years or was not willing to part with the old copy left on the shelf. However an attempt was made to locate a copy of that of the AMA which was dated 1995. There was no mention of plastic waste in the document and sanitation issues are scattered. However, EPA is to

provide environmental standards and compliance management and work in effective partnership with TMA to catalyse change towards making environmental protection a commonly held value for sustainability. Assemblies have bye-laws which they are supposed to implement to ensure environmental standards are adhered to. It is therefore the function of EPA to provide the guiding principles for the actions of the environmental sanitation and waste department of the assembly. There is staff of EPA that go round occasionally to monitor and ensure that environmental regulations are not flouted. These are well trained officers from the unit who embark on periodic checks on industries located in Tema. With the operation of the landfill site, EPA was fully involved right from the beginning. They also visit the site to ensure that standards are adhered to.

The researcher could not get an updated document on the number of plastic producing companies and recycling companies in the country. However, EPA indicated that currently, there are about twenty (20) plastic producing companies and eight (8) recycling companies in the Greater Accra Region (Senior Officer, Built Environment-EPA). The activities of these companies are monitored by the EPA. Before the establishment of a plastic producing company, it is given clear guidelines and the company has to be registered. The guideline spells out what they are supposed to do. The company also submits quarterly and annual reports to EPA which informs them whether these companies are complying with due procedures. EPA also visits regularly to ensure that indeed guidelines are followed (Senior Officer, Built Environment-EPA).

The different means of achieving the policy objective of Reduction, Re-use, Recycling and Recovery (4Rs) has gained attention across the world. In Ghana, it was revealed by the responses by consumers that these policy measures still remain at exploratory levels. Consumers do not see the relevance of separating waste since the system has not been developed to accommodate segregation. Before there can be such an activity in the country, there has to be a guiding

principle, a strategy in place led by the EPA. The institutions confirmed that waste segregation still remains at exploratory levels. A senior officer at TMA- Waste Department stated that:

> *'Plastic bag waste is not separated from solid waste. All solid waste collected is sent to the landfill site. However at the landfill site, scavengers retrieve some plastics for sale to recycle companies. It is something the Assembly would like to do but it comes back to the issue of finances' (*Senior Officer, Waste Management Department-TMA).

4.8.3 Institutional Challenges in Dealing with Plastic Bag Problems

This section deals with the challenges that hinder institutions from addressing the environmental problems caused by the indiscriminate disposal of plastic bags waste. It also reviews some of the responses by the representatives of the institutions.

With the increasing population and urbanisation as well as slum development in Tema, plastic bag waste has certainly become a challenge to TMA. The assembly still faces the challenge of indiscriminate waste disposal in the metropolis by residents. Before TMA started operating the sanitary landfill site, all waste was dumped at an abandoned pit at Kpong. The trucks were not weighed to determine the amount of waste but now, waste collected can be quantified. The representative from TMA indicated that even now it is quite difficult to know the exact amount of solid waste generated in the city and even much more difficult to know the constituent of plastic bags. Although knowing the quantity of plastic bag waste was very relevant to the work, it was very difficult getting figures from TMA, EPA, Zoomlion and Rural Waste. When the representative from TMA was asked on the quantity of waste generated and collected in Tema and the amount of plastics bags, this is the response:

*'When anybody asks me that question, I shudder and sometimes I am at a loss as to what to say. This is because it is very difficult to quantify the amount of waste generated in the city. Before operations at the new landfill site, the trucks used to dump waste without being weighed. However at the new landfill site, we can have the chance to weigh the trucks before they dump. I can say that waste generated in the city daily is about 600 tonnes but not all is collected so about 500-550 tonnes is collected. Plastic bags make about 18-20% of the daily waste collected'(*Senior Officer, Waste Management Department-TMA).

With operations at the sanitary landfill site, TMA can now have records of solid waste collected in the city but cannot determine the quantity of solid waste generated in the city. This is because not all waste generated is collected and moreover inert and organics also add to the waste stream. However, some of these are not dumped in communal containers or given to the solid waste collection companies. This TMA indicated is a challenge to the management of solid waste in the city.

Of the eight (8) solid waste collection companies in Tema, none of them engage in recycling any of the waste. One of the two who participated in the study was asked a question pertaining to waste segregation and this is what the representative from Zoomlion said:

'*Waste is segregated at the landfill site after the trucks have dumped them there. It is only at the landfill site that scavengers try to retrieve some of the items for recycling. The condition under which they work is very bad. What I know is that the black polythene bags are not of much interest to them because they are so dirty and light and one has to expend so much energy to get a few clean ones. They only look for plastic chairs, tables,*

*bowls, and water sachets because they are the ones that the companies buy from them.' (*Senior Officer, Zoomlion).

The assertion that the plastic bags are not picked by the scavengers was re-echoed by a Senior Officer at the Waste Management Department-TMA. The scavengers have to collect so much because the plastics are weighed before being sold. Moreover, it was revealed that the bags get too dirty and it takes a lot of energy to wash them for recycling.

Currently, the sanitary landfill site in Tema happens to be the only site for dumping all solid waste collected in the city. It does not only serve just Tema but also receives solid waste from other parts of the Greater Accra Region. Sanitary landfill sites happens to be the best option for Ghana at the moment as other waste management practices have still not been explored. EPA stated that as the regulatory body for monitoring environmental standards, they played a key role in the establishment of the site. The EPA visits the site regularly to ensure that the guidelines for operating such a facility is adhered to. A visit to the site by the researcher in an interview with the senior officer at the site revealed that the landfill site is under threat of not serving the number of years for which it was built.

'The sanitary engineered landfill site started operations early this year. The site is being overstretched due to the amount of waste it receives daily. Waste is being sent from Accra and its suburbs including Achimota and Ashaiman. This has led to huge queues daily before trucks off load the waste. The delays are due to the fact that the trucks have to be weighed and it delays the conveyance of waste from the city as well. The site now takes about four times its constructed capacity and on average 100 trucks a day. The truck from Tema Community one alone makes about six to seven trips daily. If waste is therefore left at the market for a long time then it means the truck is in queue at the

*landfill and waiting to offload before picking the rest of the waste'(*Senior Officer, Landfill site-TMA).

The problem at the landfill site was further highlighted by the representative of Rural Waste Company Limited, who said:

*'One challenge that affects our work is the delays we face at the landfill site to offload the trucks. First the trucks have to be weighed and there is always a long queue of trucks waiting. The time for opening the place is a bit late too. It would be ideal to start operations very early in the morning like 6am but it seems we cannot have it that way. Our client GHAPOHA insists that waste be lifted from their offices and residents daily. But if trucks are delayed at the final disposal site then it affects the way we can work'. We have discussed with TMA so as to sort this problem out but not been has been done. Well we can't also ask the people who work at the site to come to work at 6am which will work best for us. There are a lot of trucks who use the site now so it has implications on our operations' (*Senior Officer, Rural Waste Company Limited).

There are barriers to the use of landfills. In 2008, a survey of landfills in US revealed that 82% of surveyed landfill cells had leaks, while 41% had a leak larger than 1 square foot(Clean Air Council, 2010).On the whole, the institutions mentioned challenges that affect their operations as the attitude of people towards waste, the non-enforcement of laws on sanitation, the perception and value people placed on waste, the lack of funds and the lack of resources. The representative from Zoomlion indicated that the waste segregation project for instance requires a lot of resources. He said:

'The resources (human and financial) involved in running such a project effectively is currently not available. It will involve a lot of public education because if bins are

> *provided for plastics and people put food items meant for composting in them, then it becomes a challenge. The government will have to be fully committed to this project because if not it will mean financial burdens on individuals and the private companies undertaking the project. A public private partnership in the long term is likely to work best. It is something that ought to be done because the current practice of using landfill sites is a problem. Communities in the region are not ready to release their lands for landfill projects so we have to recycle more so as to reduce the pressure on land'(*Senior Officer, Zoomlion Company Limited).

Specifically, the EPA gave challenges such as the ones stated below:

> *'There is always non-compliance on the part of people. People tend to do the wrong thing when you are not around. Unfortunately EPA cannot be everywhere all the time. The lack of resources to do monitoring hinders the progress of our work. Personnel to embark on periodic inspection in areas are a problem. Due to the lack of staff to embark on regular monitoring of activities, people and industries sometimes flout the environmental bye-laws hence the sanitation and environmental challenges we continue to face. The non-separation of solid waste is also a problem. There is the need to have resources because managing solid waste is a huge task and it involves a lot of funds'. There is however some success stories because the assemblies and industries do corporate with us' (*Senior Officer, Built Environment-EPA).

The researcher went on further to findout from the respondent if indeed there was a major challenge hampering TMA's lead-role in the management of plastic bag. The representative said:

*'One challenge is the huge resources involved in managing waste. The other daunting problem is the attitudes of people towards waste management and the environment. Whereas some residents do pay for the collection of their solid waste, others see it as the responsibility of the Assembly and hence are not willing to pay towards waste management It is mostly in these locations of the city that garbage is left unattended. 'Some of the bye-laws are old and needs to be revised. There are also political interferences which hinder enactment on some occasions. One other challenge is the amount of waste that is sent to the landfill site. It is not too easy to manage the site because it involves funds' (*Senior Officer, Waste Management Department- TMA).

4.8.4 Strategies by Institutions to Manage Plastic Bag Waste

This section reviews actions taken by the institutions on plastic bag waste management and also looks at the strategies that are yet to be implemented to further manage plastic bag waste.

TMA has a Waste Management Department, responsible for the provision of bins at vantage points on streets in the city. The team also sensitizes residents on sanitation issues. However the specific actions undertaken to tackle sanitation in the city are: enforcement of bye-laws on environmental sanitation; provision of adequate sanitation facilities (litter bins and refuse containers); ensuring effective supervision of communal sanitation and creating awareness on environmental sanitation practices. However, the some other actions include:

'Recycling should be infiltrated in current waste management and also we should encourage separation at source. It is time TMA and the country as a whole explored waste to energy solutions. In Tema we have to take advantage of the recycling companies and encourage people to recycle more in order to reduce the amount of waste generated in the city. But above all the bye-laws of the assembly must be revised to reflect modern

*times. Some of the sanctions are also too old'. (*Senior Officer, Waste Management Department- TMA).

Zoomlion indicated that the company has over the years undertaken numerous actions to assist in whatever way possible to address sanitation issues in the country. However, there were plans to implement waste segregation in some cities in the country.

*'There are plans to start waste segregation on a pilot basis in planned areas. A research has been done by the research and development department of the company. The programme which is expected to roll out soon is expected to help reduce waste sent to the landfill site. We continue however to support in whatever way possible to ensure sanitation. When people approach us for support to embark on clean-up exercises, we provide equipment to them at no charge at all.' (*Senior Officer, Zoomlion).

Following from the discussion, for an effective management of plastic bag waste in the metropolis and that of the country, there has to be a revision of the bye-laws and the ESP to incorporate plastics. There are plans underway to team up with Zoomlion on the separation of waste in the capital. It is hoped that this will help to reduce the plastic bag waste in the system and thereby reduce the amount of waste at the landfill sites.

4.9 Conclusion

The chapter has analysed the primary data gathered from the field in relation to the secondary data and the theory; Diffusion of Innovation. The findings show that some consumers attest to the fact that the use of plastic bags has increased in recent years as it is used for several purposes. The increasing use has been attributed to the characteristic of the bags. It was also noted that

consumers are not reusing the bags due to its lightweight however some have found reason to reuse the bags for other things. Waste is not segregated because leaders have not explored the possibility yet. Hence consumers do not actually see the value of waste segregation. This means that the traditional method of disposing of solid waste is the means through which plastic bag waste is also being disposed of. These have implications on the environment especially with the increasing population, urbanisation and slum development.

Indeed poor solid wastes management with its immediate and visible impact remains a major challenge to TMA and its partners. The lack of regulation on plastics and the old bye-laws and sanction fees do not reflect the current ways of managing plastics and especially plastic bags. Environmental sanitation is both a public good and a civic responsibility involving all levels of human activity. Policy actions and how individuals, households and communities respond to policies depend largely on how information is disseminated. Waste segregation is a new innovation yet to unfold, how people accept it depends on how it is packaged taking into consideration the social system of the country; the values and beliefs.

CHAPTER FIVE

SUMMARY, RECOMMENDATIONS AND CONCLUSION

5.1 Introduction

This chapter summarises the main findings of the study, advances recommendations based on the findings and finally draws some conclusions.

5.1.1 Summary of Key Findings

This study set out to explore and ascertain the use and disposal of plastic bags and its environmental effect. The use of the bags has increased with the rapid population expansion in the Tema Metropolis and has brought with it environmental and sanitation problems. The aim of the study was therefore to investigate consumers' attitudes towards the use of the plastic bags. Specifically, it sought to examine consumers' attitudes towards the use and disposal of plastic bags in Tema Community One; to examine the reasons for the increasing use of plastic bags by consumers; to examine alternatives to the use of plastic bags; and to assess the role institutions (TMA, waste collection companies and EPA) play in plastic bag waste management within the Metropolis.

A combination of quantitative and qualitative approaches was used to enable make objective comparisons. The two approaches also gave insight into the activities of the selected institutions as well as know how consumers use and dispose of plastic bags. The total sample size for the study was one hundred (100) which was made up of ninety-four (94) consumers and six (6) respondents from selected institutions. The quantitative data was analysed using the Statistical

Package for Social Science to generate charts, tables and simple frequencies to analyse the data for easy understanding. The qualitative data was analysed through content analysis.

5.2.1 Consumer Attitudes Towards Plastic Bag Use and Disposal

From the research, it came out clear that indeed plastic bags serve varying purposes for consumers. They are mostly used for shopping, selling and storing and at the same time for transporting goods from the market to the homes. The study further revealed that consumers use the plastic bags because there were no suitable alternatives, its low-price and lightweight makes it easy to handle. Moreover, consumers get the bags for free after every purchase of goods at the market. This has made the bags popular with consumers partly due to its benefits.

From the survey it was disclosed that waste segregation at source has not been explored in the city because majority of consumers do not segregate their waste. Thus, consumers' mix up plastic bag wastes with other solid waste for disposal. Again the mode in which consumers' dispose of plastic bag waste was identified. The study revealed that consumers use the solid waste company, communal container, open dumping, burying or burning the plastic bag waste. It was further noted that majority of consumers use the services of the solid waste company and others use the communal containers. However, very few of the consumers bury, burn or openly dump the plastic bag waste.

Over the years, the amount of plastic bags found in the waste stream has increased from 8% in 2008 to 17% in 2011. Thus, from the research it became clear that consumers were aware of the environmental effects of not disposing of plastic bag waste properly by stating some of the effects as blockage of drains, animal death, and a threat to human health to mention a few. This

was confirmed by consumers who preferred to use the solid waste company and the communal containers because they are the best form of disposing of plastic bag waste.

5.2.2 Trends in the Use of Plastic Bags

Analysis of the field data revealed that plastic bags are not being reused by consumers due to its lightweight. In most cases, the bags get torn during or after use or soiled. But some consumers have found reason to reuse them for making fire and for storage of garbage. Findings from the content analysis revealed that population growth, emerging trading activities; the characteristics of the bags have led to the increasing use of the plastic bags. The characteristics of the bag have also led to its increasing use in recent years. Consumers use the plastic bag because it is attractive, accessible and inexpensive.

Moreso, it was noted that the bags are not reused and in situations where they are being reused, they are used once and dumped at the landfill site. Waste is also not segregated so plastic bag waste keep adding to the solid waste at the landfill site and the quantity increases now and then.

5.2.3 Alternatives to the Use of the Bags

Another major finding from this study is that more consumers expressed the willingness to opt for the use of cloth bag as compared with consumers indicating a preference for the jute, cane and biodegradable bags. The cloth bag is currently available on the market and it is been used by some shoppers. The other alternatives are, however, not readily available; this possibly explains why more consumers suggested the use of the cloth bag for shopping, storing and selling as replacement for the plastic bags.

5.2.4 Institutional Role in the Management of Plastic Bags

There have not been researches to identify the waste management technology that can best suit the nation. The institutions confirmed that waste segregation still remains at exploratory levels. The institutions face challenges in their operations such as the attitude of people toward waste, the non-enforcement of laws on sanitation, the perception and value people place on waste and above all the lack of funds and resources.

5.3 Recommendation

The study could not look into all the issues pertaining to solid waste management in the metropolis because TMA could not provide up-to-date information on researches that had been done in recent years. Thus, based on the findings from the study, the following measures are suggested to be considered by stakeholders in order to curb the environmental menace of the plastic bag wastes in TMA.

- **Policy, Managerial and Technical Changes in Plastic Bag Waste Management**

The existing environmental policies and laws should be reviewed with the aim of formulating new harmonised ones (laws) that will strengthen stakeholder participation in overall environmental planning and management. Policy formulation and implementation for plastic waste management broadly should consider the needs of all levels of the community. It is therefore recommended that a clear policy direction by way of the development of District/Regional/National waste management action plans or strategies on plastics is developed. It will be ideal to revise the ESP and TMA's old bye-laws to include action-driven policy on

plastic waste management. This is because in the current ESP, there is no section on plastic waste management and this reflects in TMA's bye-laws.

There should be a mix of three broad categories of policy instruments namely: regulatory; economic; and voluntary based for an effective and sustainable plastic waste management. The regulatory component will address issues such as regulation of technologies and the performance of the plastic producing and recycling companies. Economic instruments manifest themselves in the form of prices (taxes, charges and subsidies) or property rights such as creation of property rights for plastic waste handling. Voluntary based instruments will take care of the provision of information through public awareness and setting up of voluntary codes of practice.

For immediate implementation and action, the institutions (TMA and EPA) should put in place measures such as reducing in circulation the thin plastic bag menace in the city's environment by putting in place a policy that sets out to give a minimum thickness standard of 20 microns which can be later revised to 30 microns. It will be ideal to introduce thicker plastic bags which can be reused because, currently, the thin plastic bags (black) are not picked by scavengers at the land fill site due to its thinness. There should be the creation of a plastic bags levy on consumers and retailers. However, with the thicker bags, consumers will reuse them and are likely to be used for recycling if not soiled. The positive benefits of plastic waste recycling in national policy formulation and budgetary support is very important to the success of creating a safe and clean environment.

- **Research and Development (R&D)**

It is imperative that the nation invests in R&D spearheaded by universities, NGOs and waste management institutions to identify plastic bag waste management technologies that can best suit

the nation. These researches should aim at exploring strategies such as Reduction, Re-use, Recycling and Recovery of plastic bag waste management.

Specifically, research should be conducted in the following areas:

- Alternatives to the use of the bags which will be more environmentally friendly;
- Development and management of the waste infrastructure of TMA by establishing proper solid waste collection systems and proper management of the landfill site;
- Undertaking of a technology needs assessment with respect to plastic waste recycling;
- Development of plastic waste recycling technologies that are cost effective and environmentally friendly;
- Consumer behaviour and preferences to find innovative ways of reaching out to the consumer so as to educate them on the need to change some consumption patterns;
- Sustainable approaches to waste minimization, cleaner production and waste segregation at source;
- Occupational health and safety concerns associated with plastic waste recycling;
- Alternative packaging materials;
- Market preferential for recycled plastic products;
- Streamlining and strengthening of the waste management services through the active involvement of the private sector, community-based organizations, retailers and consumers.

It was revealed in the study that majority of consumers do not segregate waste because this has not been developed by institutions tasked with the management of solid waste. It is highly recommended that waste separation at source is introduced in Tema. Waste separation has

diverse advantages. Plastic waste can be recycled into pellets for the manufacturing of more plastics. If waste is separated at source, the quantity of plastic bag waste sent to the landfill site will reduce drastically and provide employment for those who collect and process the recyclable materials so that the demand for virgin material is reduced.

- **Strengthening Private Public Partnership (PPP)**

The government should be fully committed towards encouraging partnerships with the private sector to assist the waste departments of MMDAs in tackling sanitation issues. The private sector could include business associations, private and professional engineering and research institutions, development partners and other bodies equipped with rich experiences and knowledge in plastic bags waste management. Encouraging more of such partnerships will mean that the private sector will continue to share their expertise, resources and assist the waste departments devise innovative strategies towards sanitation. Already, Zoomlion has started a waste compost plant in Accra and had undertaken a research to start waste segregation on pilot in the city. This sort of partnership is likely to lead to the creation of more recycling plants with bigger capacity to recycle more plastic waste which can equally provide jobs for the youth.

The private sector can also help to build the capacity of the sanitation departments of MMDAs, and EPA as well as offer support in modern technology in ensuring that the appropriate plastic waste recycling solutions are used in industrial, manufacturing and market activities, and that the technologies used are environmentally friendly, producing the least amount of wastes possible. The Government should find innovative financial support for recycling and upgrading of plastic waste management infrastructure such as financial incentives to promote private-public partnerships in the development and management of waste infrastructure. Other measures can

include incentives such as tax rebates and/or soft loans for all scales of plastic recycling. The government should create an enabling environment for plastic waste recycling by reducing electrical/water tariffs to encourage private businesses to set up such ventures.

- **Strengthening Institutions to deal with Plastic Bag waste**

The lack of human and material resources poses a challenge to MMDAs and EPA in dealing with the enforcement of laws on sanitation. This coupled with the old bye-laws by MMDAs makes the handling of sanitation issues in the country generally a daunting task. It is therefore recommended that government shows enough commitment and transparency towards waste management by allocating adequate budget to deal extensively on sanitation issues which in this case have been made worse by the increasing use and lack of management practices of the plastic bag waste. The capacity of staff of the waste management departments of MMDAs should equally be upgraded to understand issues of recycling, recovery and reuse of plastic bags so that they can educate the public on good environmental standards. Also the research department and monitoring officers of the EPA should be adequately equipped to handle sanitation and regulatory practices of industries particularly plastic producing and recycling.

As part of strengthening these institutions, the following measures can be undertaken:

- Development of a data bank of plastic waste recycling technologies and contacts of technology suppliers;
- Setting up demonstration projects that will show the economic and environmental efficacy of plastic waste recycling;

- Publishing a waste minimization, reuse, and recycling guide targeting all sections of the public;
- Development of an inventory of health and safety concerns of plastic waste management;
- Developing appropriate technologies for collection, sorting, transportation, recycling and selling of plastic wastes;
- Training NGOs, civil society, youth and women groups, civic leaders, the private sector in modern ways of plastic waste recycling and recovery.

- **Media and other Stakeholder Participation**

Plastic bag waste management is basically a welfare and development matter and it is commonly accepted that public participation is essential for its success. Stakeholder participation entails the involvement of all categories of people on the identification of their felt needs, mobilization of resources, and deciding on the direction and execution of programmes and projects. It should be noted that the success of any strategy will depend on a multi-stakeholder engagement, which will include research institutions, business associations, plastic bag manufacturers, retailers, government, ministries, agencies and departments, metropolitan, municipal and district assemblies, youth groups, informal waste recyclers, community based organizations, non-governmental organizations, consumers, traditional authorities and donors in plastic bag waste management.

Environmental education on plastic bag waste management, both formal and non-formal, is vital to changing people's attitudes to appreciating a clean and safe environment. More often than not people engage in certain practices because they are ignorant about them. There is therefore the

need to create a mechanism for stakeholder participation and dialogues so as to empower and enable the public participate in sound environmental practices.

For any effective solid waste management policy to function properly there should be a collective effort of all stakeholders (households, private sector, assemblies and EPA). One key partner in all of this is the media. The media should contribute to sensitizing residents of Tema and its environs on proper disposal of plastic bag waste. Such efforts must be seen as part of their corporate social responsibility. Other activities could include: coordinating the preparation and distribution of posters in English and other local languages on how to innovatively manage plastic bag waste; coordinating the preparation and presentation of weekly radio and TV programs on the environmental impacts of indiscriminate dumping and littering of the urban environment with plastic bags waste and **c**ommissioning of the preparation and publication of bi-monthly feature articles in the print media on environmentally sound strategies of dealing with plastic bags waste.

The Ministry of Education can assess the current quality of environmental education offered in primary, secondary and tertiary institutions in terms of curriculum content and design instructions to educate pupils and students on environmental issues. More so, the Ministry can coordinate and facilitate the organisation of environmental competitions among local communities, youth and women groups, divisional schools and other institutions on innovative approaches of plastic bags waste management.

The National Commission for Civic Education (NCCE), established to provide citizenry education should equally embark on campaigns aimed at creating awareness to empower all stakeholders from national to local levels to actively participate in environmental management.

A day can be set aside as an "Environmental Day" to disseminate best practices and technologies for managing plastic bags waste. It is worthy to note that the success of Botswana's plastic bag levy was due to the inclusiveness of all stakeholders and their commitment to the strategies introduced by the central government.

- **Public Education and Awareness Creation on Environmental Issues**

The relationship between public awareness and demand for sound environmental management may be challenging. A lot of information is required for the grass root population to understand and appreciate the importance of managing plastic bags waste in an environmentally sound manner. Any awareness creation strategy should aim at informing people generally about the dangers of dumping plastics into the environment and the second should target specific individuals, groups and sectors so as to enable them maximise the plastic waste recycling opportunity for job creation. General sensitisation activities should aim at ensuring that more of the population has access to essential plastic waste management information. This may necessitate development and dissemination of reader friendly information packs and briefs in English and other local languages.

5.4. Conclusion

Indeed poor solid waste management with its immediate and visible impact remains a major challenge to TMA and its partners. The lack of regulation on plastics and the old bye-laws and sanction fees do not reflect the current ways of managing plastics and especially plastic bags. Generally, people are aware of the environmental effects the bags can cause to animal and human life.

Environmental sanitation is both a public good and a civic responsibility involving all levels of human activity. Policy actions and how individuals, households and communities respond to policies depend largely on how information is disseminated. Waste segregation is a new innovation yet to unfold, how people will accept it depends on how it is packaged. Maybe it can help solve the environmental challenge on the use and improper disposal of plastic bag waste. Leadership will therefore be important to influence the acceptance or rejection of the innovation on waste segregation. Time is equally important in any measure towards solid waste management. The introduction of an alternative, a ban or even taxes will all take time for it to be accepted by the society. Knowledge is however essential therefore all actions towards plastic bag waste management will have to be implemented alongside education on sanitation for the citizens.

These recommendations will need to be continuously reviewed and adapted so as to address practical realities, changing needs, priorities and preferences of consumers and retailers. The recommendations also take cognizance of the fact that it will be difficult to address plastic bag waste management challenges in total isolation of the entire solid waste management problem. Hence, the successful implementation of these recommendations will also depend on the presence or absence of an effective solid waste management programme. There is need for political will, enthusiasm and top commitment on the side of the Government, MMDAs, CBOs, NGOs to assure adequate allocation of resources towards implementation of the recommendations aimed at creating a safe and clean environment. These recommendations will set the tone for the management of plastic waste in Tema and be replicated across the country.

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APPENDIX 1

MA Development Studies Programme

ISSER, University of Ghana, Legon

Questionnaire for Respondent ***at Tema Community One Market***

This questionnaire is aimed at collecting data on the research topic: ***"Deconstructing the Use and Disposal of Plastic Bags in Tema Metropolis: A Case Study of Tema Community One Market".*** The research work is in partial fulfillment of the requirements for the award of Master of Art in Development Studies. The information provided will be used solely for academic purpose. Thank you for your co-operation.

Section I. Bio data of Respondents

Sex:

Male [ ] Female [ ]

Age:

18-29 years [ ]
30-41 years [ ]
42+years [ ]

Educational background:

No Formal Education [ ] Primary education [ ]
Secondary education [ ] Tertiary education [ ]

Occupation:

Trader [ ] Student [ ]
Public servant [ ] self- employed [ ]

Residence:

Section II. Use of Plastic Bags

1. Do you use plastic bags?

   Yes [ ]

   No [ ]

2. What do you use plastic bags for?

   ……

3. Why do you use plastic bags?

   They are cheap [ ]

   They are light in weight [ ]

   They are easily available [ ]

   Lack of alternative materials [ ]

   They are free [ ]

4. Do you re-use plastic bags from the market?

   Yes [ ]

   No [ ]

5. If Yes, please why?

   ……

6. If No, please why

<u>Disposal of Plastic Bags</u>

1. Does solid waste company collect the solid waste you generate?

   Yes [ ]

   No [ ]

2. If yes, which solid waste company?

   ……

   How often is the waste collected?

   Daily [ ]

   Once in a week [ ]

   Twice in a week [ ]

3. If no, how do you get rid of solid waste?

   Truck boys collectors [ ]

   Open dumping [ ]

   Dumping in bins [ ]

   Burying [ ]

   Burning [ ]

4. Do you separate plastic bag waste from other solid waste before disposing of?

   Yes [ ]

   No [ ]

5. If yes, please why?

   ……

6. If no, please why?

   ……

7. How do you dispose of your plastic bag waste?

   Solid waste company [ ]

Open dumping [ ]

Dumping in bins [ ]

Burying [ ]

Burning [ ]

8. Do you know where plastic bag waste collected is sent to?

Yes [ ]

No [ ]

9. Can plastic bag waste be dangerous if not disposed of properly?

Yes [ ]

No [ ]

10. If yes, please give reason?

……

Would you pay for the collection of your plastic bag waste?

Yes [ ]

No [ ]

Environment and Management of Plastic Bags

1. Is the use of plastic bag on the increase?

Yes [ ]

No [ ]

If yes, please how?

……

What could be the reasons why plastic bag usage is on the rise?

Cheap to buy [ ]

Common [ ]

Convenient [ ]

Not re-used [ ]

Free [ ]

If other, please specify……

2. In your opinion, is there an effect on the increasing use of plastic bag on the environment?

Yes [ ]

No [ ]

If yes, what is the effect?

……

3. Are you aware of what plastic bag waste can be used for?

Yes [ ]

No [ ]

If yes, please specify

……I

s plastic bag waste causing problems in the environment?

Yes [ ]

No [ ]

4. If yes, what are the problems?

Animal death	[ ]
Human health problem	[ ]
Blockage of drains	[ ]
Deterioration of environment's beauty	[ ]
Water Pollution	[ ]

5. What should be done to curb the problems with the use of plastic bags?

Ban	[ ]
Enforce sanitation laws	[ ]
Introduction of levy	[ ]
Introduce biodegradable bags	[ ]

6. Should there be a plastic bag substitute?

Yes [ ]

No [ ]

7. If yes, what can be used in place of plastic bag?

Cloth Bags	[ ]
Cane Bags	[ ]
Jute Bags	[ ]
Biodegradable bags	[ ]

8. If no, give reason(s)?

……

9. Who should be responsible for managing plastic bag waste?

Tema Metropolitan Assembly ` [ ]

Plastic waste companies [ ]

Households [ ]

Plastic recycling company [ ]

10. What role should the institution play?
11. Should there be bye laws for the use and proper disposal of plastic bags?

Yes

No

12. Additional comments (if any)_____

APPENDIX 2

MA Development Studies Programme

ISSER, University of Ghana, Legon

Interview Guide for TMA

This guide is aimed at collecting data on the research topic:***"Deconstructing the Use and Disposal of Plastic Bags in Tema Metropolis: A Case Study of Tema Community One Market".*** The research work is in partial fulfillment of the requirements for the award of Master of Art in Development Studies. The information provided will be used solely for academic purpose. Thank you for your co-operation.

Questions

1. How much waste is generated in the city daily?
2. What quantity of waste is collected daily?
3. What proportion of this waste is from plastic bags?
4. How is TMA managing plastic bag waste at the landfill site?
5. How many private waste collection companies are in partnership with TMA?
6. How many of these companies are solely for plastic waste collection?

   Please name them;
7. Do the waste collection companies recycle the plastic bag waste?
8. How many plastic producing companies are in Tema?
9. How many of them are engaged in recycling?
10. Are residents in Tema aware of the role of TMA in the management of plastic bag waste?
11. Does the assembly have bye-laws on sanitation?
12. What has been the success and challenge with its implementation?

13. Are there Action-led initiatives on plastic waste management?
14. What measures has the assembly outlined in educating the public on plastic waste management?
15. What plastic waste management strategies should TMA adopt from other countries metropolis?

Additional comments (if any)

APPENDIX 3

MA Development Studies Programme

ISSER, University of Ghana, Legon

Interview Guide for Environmental Protection Agency (EPA)

This guide is aimed at collecting data on the research topic: ***"Deconstructing the Use and Disposal of Plastic Bags in Tema Metropolis: A Case Study of Tema Community One Market".*** The research work is in partial fulfillment of the requirements for the award of Master of Art in Development Studies. The information provided will be used solely for academic purpose. Thank you for your co-operation

Questions

1. How much waste is generated in the country annually?
2. How much of this waste is from plastic bags?
3. How many plastic producing companies operate in the country?
4. How many of the companies use recycled material for production?
5. Are there policies that guide their operations?
6. How does the EPA monitor their activities?
7. How does the EPA collaborate with Assemblies to manage plastic bag waste?
8. What are the successes and challenges in implementing environmental laws?
9. How do you manage the challenges?
10. Are there Action-led initiatives on plastic waste management?
11. What strategies are needed for the reduction in consumption of plastic bag
12. What can be done to reduce plastic waste pollution
13. Additional comments (if any)

APPENDIX 4

MA Development Studies Programme

ISSER, University of Ghana, Legon

Interview Guide for Waste Collection Companies in Tema

This guide is aimed at collecting data on the research topic: ***"Deconstructing the Use and Disposal of Plastic Bags in Tema Metropolis: A Case Study of Tema Community One Market".*** The research work is in partial fulfillment of the requirements for the award of Master of Art in Development Studies. The information provided will be used solely for academic purpose. Thank you for your co-operation

Questions

1. When did you start operating as a waste collecting company?
2. What motivated you to start this company?
3. Which area(s) of Tema do you operate?
4. How much do you charge residents for the service?
5. How many times in the week do you visit the area to collect the waste? Do residents separate the waste
6. Do you separate the waste?
7. What proportion of the waste is from plastic bags?
8. Where do you send the waste?
9. Is the waste segregated at the dump site?
10. Do you educate residents on the need to separate waste?
11. What are the successes and challenges that you face in your operations?
12. Do you recycle any of the waste collected?
13. Are there Action-led initiatives on plastic waste management?

14. What strategies are needed for the reduction in consumption of plastic bags?

15. What can be done to reduce plastic waste pollution?

16. What are the challenges that your institution face in the management of plastic bag waste

17. Additional comments (if any)……