UNIVERSITY OF CAPE COAST

ASSESSING MUNICIPAL SOLID WASTE MANAGEMENT IN MANKESSIM IN THE MFANTSEMAN MUNICIPALITY

 $\mathbf{B}\mathbf{Y}$

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FEBRUARY 2017

DECLARATION

Candidate's Declaration

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

Candidate's Signature:	Date:
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Name:

Supervisor's Declaration

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

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ABSTRACT

Over the past decade, there have been various efforts by the Central as well as Local governments in Ghana to ensure that effective systems are in place to manage waste generated in the country. Despite these efforts, waste management in the country still leaves a lot to be desired. The case of Mankessim Township in the Mfantseman Municipal Assembly is not different. This therefore raises questions about effectiveness of these efforts, requiring an assessment of current municipal solid waste management systems as a basis for planning and making improvement in the system. It is against this background that this study was undertaken. The mixed method approach (triangulation) whereby a combination of interviews, questionnaire administration and field observation were employed by the study. In all 391 subjects comprising of 378 residents of Mankessim and thirteen key informants were used for the study whose population consisted of residents aged 18 years and above and other key stakeholders. The sample was selected using a combination of stratified and simple random sampling approaches. The study revealed that the MMA does not have sufficient skips within Mankessim, resulting in the township being regularly littered with waste. This is especially the case in public places such as markets and lorry stations where collections of waste were usually found at vantage points because of logistical challenges of getting them collected regularly and on time. The study recommends that the MMA prioritizes waste management and increase attention and resources to the sector.

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DEDICATION

To my Husband and Children

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LIST OF ACRONYMS

CBOs	Community based organizations
DACF	District Assembly Common Fund
DESSAP	District Environmental Strategic Sanitation Action Plan
EGF	Externally Generated Fund
EHD	Environmental Health Department
EPA	Environmental Protection Agency
ERP	Economic Recovery Program
ESP	Environmental Sanitation Policy
GIE	Groupesd'InteretEconomique
GSS	Ghana Statistical Service
IGF	Internally Generated Fund
ISWM	Integrated Sustainable Waste Management
JICA	Japan International Cooperation Agency
MLGRD	Ministry of Local Government and Rural Development
MMA	Mfantseman Municipal Assembly
MMDAs	Metropolitan Municipal and District Assemblies
MSW	Municipal Solid Waste
MSWM	Municipal Solid Waste Management
NGOs	Non-Governmental Organizations
NIMBY	Not In My Back Yard
OECD	Organization for Economic Cooperation and Development
РНС	Population and Housing Census

PNDC	Provisional National Defense Council
SAP	Structural Adjustment Program
SOEs	State Owned Enterprises
SPSS	Statistical Product and Service Solution
UNEP	United Nations Environment Program
UNSP	United Nations Settlement Program
UESP	Urban Environmental Sanitation Project
USEPA	United States Environmental Protection Agency
UNDP	United Nations Development Program
WMD	Waste Management Department

CHAPTER ONE

INTRODUCTION

Background to the Study

There is a widely held perception that there existed a near perfect balance between human beings and the environment at the dawn of creation. This near perfect balance continued to hold for a relatively long period of time, even though with time threats to sustaining the balance continued to grow. Key factors among these threats have been increase in population size, changes in belief systems and ever changing ways of life. Waste generated by human beings during the time referred to above was in small quantities, largely biodegradable and were recycled by nature without difficulty. However, since the onset of the second millennium, this balance has become difficult to maintain. There is a widespread perception that explosion in human population, industrialization, irresponsible lifestyles and difficulties in controlling peoples' behaviour account for the absence of a good balance between human beings and the environment today. Due substantially to human activities on earth, the nature-established equilibrium between human beings and the environment has been broken and hence resulted in environmental problems (Porter & Boakye-Yiadom, 1997; Kendie, 1999; Davies, 2008; and World Bank, 2012).

An environmental problem has been defined as either an inadequate supply of a resource essential to human health (e.g. sufficient fertile lands) or the presence of pathogens or toxic substances in the human environment which can impact negatively on human health or physical resources such as forests or agricultural lands (Habitat, 1989 cited in Silitshena, 1996). The management of these environmental problems (with special reference to waste) has therefore become an important developmental issue. The enormity of the waste problem is only partially reflected in the astronomical amount of solid waste generated each year at the global level.

According to the World Bank (2012), the amount of municipal solid waste grows even faster than the rate of urbanization throughout the world. In 2002, there were 2.9 billion urban residents in the world who generated 0.68 billion tonnes per year of municipal solid waste. Ten years down the line (in 2012), urban residents have increased to just about 3 billion (less than 3% increase) with municipal solid waste generated rising to 1.3 billion tonnes per year (almost 100% increase). This development (nearly doubling of municipal solid waste generation over a period of ten years as the people who generated them increased marginally over the same period), partly illustrate the growing problem of waste management. The other aspect of the problem can be viewed from the prediction made by the World Bank report to the effect that by 2025, urban residents will increase to 4.3 billion whilst municipal solid waste will rise to 2.2 billion tonnes per year.

Despite the increasing rate of waste generation at the global level and the apparent worsening waste management situation, there are important differences between developed countries and developing countries as far as waste management is concerned. Levels of waste generation per capita are greater in developed countries than they are in developing countries. This is usually attributed to higher levels of consumption in developed countries. The waste stream of developing countries is usually dominated by organic materials whiles those in developed countries are dominated by plastics, metals and paper (United Nations Environment Programme, 2005). However, in recent times, plastics (especially sachets) are becoming common in developing countries. Further, in developing countries, it is observed that if waste is measured by weight, at least half of waste generated is organic and biodegradable. According to OECD (2006), per capita waste generation in OECD countries has increased by 14 per cent since 1990 and 35 per cent since 1980. This, notwithstanding, waste management is a bigger problem in developing countries than it is in developed countries.

In the developed countries, their technological advancement coupled with other factors put them in a better position to tackle the problems associated with waste management better than it is in developing countries. Nonetheless, both developed and developing countries are faced with challenges like NIMBY(Not In My Backyard) sentiments among others. In the developing world some nations seem to be facing this problem squarely whiles others are characterized with inadequate collection from generation points to unsafe disposal of the solid waste. According to UNEP (2009), high income nations spend as low as 10 per cent of their waste management budget on waste collection due to upfront community participation in waste management which facilitates waste recycling and recovery activities. On the other hand, middle and low income countries spend as much as 80-90 per cent and 50-80 per cent of total budget respectively on waste collection alone, as residents hardly participate significantly (in terms of financial contribution) in that segment of the chain.

Availability of financial and other resources has been one of the major impediments in waste management throughout the world. This is more acute in developing countries where income levels are very low. The relatively increased availability of financial and other resources in developed countries reflect the development of various financing mechanisms in these countries for the purposes of managing waste generated. Some of these mechanisms include weight-based charging schemes, variable charging schemes, volume-based schemes and various combinations of these schemes. Developed countries normally have well developed financing mechanisms and are therefore able to generate more funds to manage their waste as compared to developing countries. In many developing countries, local governments and authorities rely significantly on central government for funds to manage waste. In Ghana, for example, a significant proportion (between 10 and 20 per cent) of financial resources ceded to the local government through the District Assemblies' Common Fund for developmental or capital expenditures is devoted to waste management. Given financial challenges that many developing governments face, the ripple down effect on local governments and authorities as well as residents is obvious.

The challenges with levels of financial and other resources available for waste management often reflect capacity for waste management. Waste management capacity comes in different forms and varies from various stages in waste management. In essence, capacity refers to ability to perform certain tasks. And given that waste management takes place along a chain, the level of capacity relates to various stages along the chain. JICA (2005) identifies three main areas or levels in relation to waste management capacity. These are individuals, organizations, and institutions and societies.

With regards to individuals, capacity looks at the knowledge and skills of individuals engaged in waste management services. Organizational capacity also focuses on physical, human and intellectual assets, leadership, organizational management frameworks, and organizational cultures that are needed for the purposes of achieving set goals and objectives in waste management. Finally, institutional or societal capacity regards the existence of enabling environment, conditions, policies, customs, frameworks, norms and mechanisms that are all required to ensure that the waste management system works. On the average, the level of capacity in developed countries in relation to these areas or levels is greater than that in developing countries.

In order to manage municipal solid waste sustainably and to avert environmental problems and health burdens associated with poor solid waste management, almost every local or city government throughout the world is mandated to provide waste management services to its residents. In South Africa, Schedule 5B of the Constitution mandates local governments to provide waste management services (including but not limited to waste removal, waste storage and disposal services). In Australia, the need for the involvement of local government in waste management is provided for under Public Health legislation where local governments are obliged to collect and dispose of rubbish that could constitute a health hazard to the community if not removed from its proximity to citizens (Cossey, 2007).

The government of Ghana during the PNDC regime in the mid-1980s sought help from the Bretton Woods Institutions to enable it restructure the economy. This led to the implementation of Structural Adjustment Program (SAP) which had two phases of implementation: Economic Recovery Program I (ERPI) and Economic Recovery Program II (ERP II). Since the 1980s and 1990s after the implementation of SAP, privatization of activities (both economic and otherwise) hitherto performed by the government has become an unstoppable force. Since then, the idea of privatization has gained so much recognition to the extent that it hasbecame part of official policy, as authorities saw it as an attractive way to reduce the financial burden of public servicing, resulting in the privatization of many State Owned Enterprises (SOEs) as well as increased private participation in activities previously undertaken exclusively by the state. In 1995, when the Government of Ghana implemented the Environmental Sanitation Project I with the support of the World Bank, most cities in Ghana went into privatization of waste management. In assessing the quality of public and private modes of solid waste collection in Accra, Post andObirih-Opareh(2003: pg. 61) established that "... privatization has benefited consumers in terms of wider coverage, higher frequency, and more reliable services, but [also accept] that there are a number of drawbacks, notably worsened labour conditions and increased environmental dangers".

In Ghana, the Ministry of Local Government and Rural Development (MLGRD) is recognized as a lead sector agency for environmental sanitation. MLGRD is charged with the formulation of policies, legislation and model byelaws, technical guidelines and supervision, and oversight responsibility for the actual implementation of policies at the decentralized Metropolitan, Municipal and District Assemblies (MMDAs). Section 10 (3 d and e) of the Local Government Act, 1993(Act 426) of the Republic of Ghana as amended from the Local Government Law, 1988(PNDCL 207) states that:

- Assemblies should initiate programmes for the development of basic infrastructure and provide municipal works in the district;
- Assemblies should be responsible for the development, improvement and management of human settlements and the environment in the districts.

The Assemblies, therefore, have the statutory responsibility for planning, programming and budgeting for the efficient provision of a wide range of services in order to promote the socio-economic development of the communities within their jurisdiction. One of such services, which is core to this study, is the management of solid waste. Further, the Environmental Sanitation Policy, ESP (2010) acknowledges that ensuring good sanitation is the responsibility of all citizens, community, private sector, institutions and NGOs. Solid waste management shall be carried out by Waste Management Department within the MMDAs. The service may be provided either directly or indirectly by the private sector. However, the MMDAs shall in all cases at least provide twenty per cent of

the service directly. Despite this, authorities charged with the responsibility of providing municipal solid waste management services (together with other municipal services) have found it increasingly difficult to play this role. The difficulty has been aggravated by the lack of effective legislation, weak enforcement of bye-laws, inadequate funds and services, and inability of municipal authorities to provide the services cost-effectively (United Nations Environment Programme, 2005).

Several scholars have shared their views on reasons why most Sub-Saharan African countries are still grappling with environmental problems of which solid waste disposal are part. Some scholars are of the view that most of these countries lack adequate funding and suffer rapid population growth(Porter &Boakye-Yiadom, 1997; Onibikum&Kumuyi, 1999). Yet Kendie (1999), argues that population pressure and lack of funding are nothing more than convenient excuses used by authorities to justify low investment in the provision of waste disposal facilities. He states that the upsurge in waste disposal problems stems from the fact that "attitudes and perceptions towards waste and the rating of waste disposal issues in peoples' minds and in the scheme of the official development plans have not been adequately considered" (pg. 71).

According to Mfantseman Municipal Assembly's District Environmental Strategic Sanitation Action Plan (unpublished), which supports the view of Kendie (1999), Ghana is in sanitation crisis partly due to the long neglect of the sector and poor attitude towards sanitation issues. The municipality has not been spared and has its fair share of this nation–wide crisis. Sanitation problems abound in this municipality. In the area of solid waste it is faced with ineffective collection and improper disposal of solid waste generated. Solid waste collection services in Mankessim Township, specifically, include door to door collections for waste generators who are willing to subscribe for such services.

In addition to the door to door collection, communal waste containers are placed at vantage points within communities in the more accessible residential areas and communal collection for low income areas. Elsewhere in the township, there are huge poorly kept waste dumps, often very close to residential and commercial areas (for example near the main market and in Edumadze). Some of the collected waste is dumped at the municipality's dumpsite at Ewoya. The remaining waste that is neither collected by the Assembly nor Zoomlion is dumped at unapproved dumps dotted at several points within Mankessim Township. It is worthy to note that some individuals informally collect refuse from households for a fee. There are also a number of rag pickers and scavengers who comb the refuse dumps and communities to collect materials for sale to dealers.

Statement of the Problem

Over the past decade, there have been various efforts by the Central as well as Local governments in Ghana to ensure that effective systems are in place to manage waste generated in the country. Despite these efforts, waste management in the country still leaves a lot to be desired. This therefore raises questions about effectiveness of these efforts, requiring an assessment of current municipal solid waste management systems as a basis for planning and making improvement in the system. The situation in MMA is not any different. The volume of municipal solid waste generated from commercial and domestic sources (particularly consumption activities) has been increasing steadily in Mankessim Township. Yet municipal authorities responsible for the management of municipal solid waste have obviously not been able to organise adequate collection and safe disposal of waste within Mankessim. Evidence of this (see image below) can be seen at various collection centres. Residents and traders are therefore worried about the poor state of solid waste which threatens public health and the environment.

According to the Municipal Environmental Health Officer at the Assembly as well as the Assembly's Municipal Environmental Sanitation Strategy and Action Plan (unpublished), improper environmental sanitation and solid waste management has been one of its major challenges over the years. An issue of major concern has been the collection and disposal of solid waste. Further, an observation of parts of Mankessim including the market shows visible aspects of the poor state of solid waste management including choked gutters, unauthorized dumpsites (situated at the heart of some residences), indiscriminate littering, huge piles of solid waste and solid waste clogged water bodies. Plate 1 presents an image of the wastemanagement problem confronting authorities.



Plate 1: Waste Dump in Mankessim Source: Field Work (March, 2016)

The dumpsite presents unsightly scenes of heaped decomposed and semidecomposed domestic wastes, which pollute the environment and produce offensive odour. These heaps attract flies and other disease-vector organisms most of which pose serious health hazards to the environs and the populace. The stench emanating from these heaps becomes a nuisance to human habitation. Leachate from the dumps pollutes water bodies with poisons and pathogens.

In spite of the fact that the implementation of the solid waste management action plan of the municipalityis in its fifth year, municipal solid waste management in Mankessim remains an intractable challenge for the municipal authorities. In view of this, there is a burning need for research to create a thorough understanding of the existing situation to pave way for lasting solutions to be put in place. Yet only a couple of studies focusing on aspects of the problem can be identified. One of such studies was undertaken by WasteCare Associate (2007) on behalf of Community Water and Sanitation of the Central Region. The study gathered information on household waste storage, availability of refuse dumpsite, methods of refuse disposal and perception of residents on refuse management. Little or no insight was given as to how management is being carried out by the municipal authorities in charge of managing waste. Also issues concerning institutional capacity, financing and involvement of stakeholders in managing the waste problem were not outlined or discussed. This study seeks to fill this gap as a step towards finding lasting solutions to the problem of solid waste management in Mankessim.

Objectives of the Study

The main purpose of the study was to assess the existing waste management system in Mankessim Township in the Mfantseman Municipality. The specific objectives were as follows:

- Assess the existing solid waste collection and disposal methods in Mankessim Township;
- Evaluate the diverse combinations of partnerships between the major stakeholders in managing solid waste in Mankessim Township.
- Assess the capacity (personnel, logistics, finance, and technology) of waste management institutions involved in solid waste management in Mankessim Township.
- Assess the attitudes and perceptions of households towards solid waste and its management; and

• Make recommendations for improving municipal solid waste management system and practices

Research Questions

With reference to the above specific objectives, and within the context of the main purpose of the research stated above, the following key questions guided the conduct of this study:

- What are the existing solid waste collection and disposal methods in Mankessim Township?
- What are the diverse combinations of partnerships between the major stakeholders in managing solid waste in Mankessim Township?
- What is the capacity of key stakeholders involved in solid waste management?
- What are the attitude and perceptions of households towards solid waste and its management?

Relevance of the Study

The poor management of municipal solid waste has been shown to have negative effects on human health and the environment. In addition, substantial amounts of scarce resources are spent on waste management. Ghana's population and that of Central Region and Mankessim Township continue to grow steadily, along with human activities and waste generation. Between 2000 and 2010, Ghana's population increased from 18,912,079 to 24,658,823 whilst that of Central Region increased from 1,593,823 to 2,201,863. In 2000, MankessimTownship had a population of 32,671 in 2000 and by 2010 the population had increased to 38,313(Ghana Statistical Service, 2013). In these circumstances, there is the need to assess the current waste management system for the purposes of proposing ways to improve the current system to meet the needs of the ever increasing rates of waste generation which accompanies population growth.

Mankessim is an important location because it hosts one of the largest markets in Ghana and its population continues to grow rapidly, raising the stakes with regards to the relevance of waste management. As a major market centre located along an international highway, the cost of any out-break of communicable or viral diseases will be huge. An outbreak of cholera in Ghana in 2014 claimed more than 128 lives (Dotse, 2014) and improper waste management (especially at markets) has been identified as a major cause. All efforts to avert such out-break and ensure proper waste management (including a review of current waste management system) are therefore important.

The study will also make an important contribution to knowledge by providing information on the current state of solid waste management system. It will also provide information on challenges facing various stakeholders involved in the waste management chain and ways of addressing those challenges. The study will also serve as a useful reference material for the management of solid waste, to the authorities of waste management in the Mfantsiman Municipality and other MMDAs in Ghana. Finally the study will be relevant to academia and larger research communities especially where priority is given to the environment and specifically solid waste management.

Scope of the Study

The study covers Mankessim Township in the Mfantseman Municipality, the economic hub and largest settlement of the municipality. Due to time and financial constraints related to the conduct of such studies, the coverage of solid waste management systemexamined was relatively limited. The key issues to focus on shall be the existing solid waste collection and disposal methods employed in Mankessim, diverse combinations of partnerships between major stakeholders in solid waste management, capacity of waste management institutions and the attitude and perception of the households towards solid waste and its management.

Organisation of the Study

The study is organised into five chapters. The first chapter deals with the introduction of the study. This includes the background issues of solid waste management and various themes that are implicated. The second chapter is devoted to review of related literature. This includes theoretical and conceptual issues on solid waste management practices. The third chapter looks at the research methodology and other issues concerning data collection and methods of analysis employed in the study. Data from the field will be analysed and discussed to respond to research questions and objectives of the study in chapter four. Chapter five provides summary, conclusions and recommendations derived from the study

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

The problem of solid waste management is an important developmental issue and of global concern given its far-reaching consequences. In most developing countries, the collection of garbage is characterized by ineffective collection. This results in environmental problems leading to increased morbidity and mortality. This chapter reviews relevant literature in the field of solid waste management. This chapter is divided into two parts. The first part is divided into the following headings i) the definition and characterization of solid waste ii) the storage of solid waste iii) refuse collection and transportation iv) partnerships in waste management and v) financing of waste management. The second part deals with the underlying theories and conceptual framework for the study.

Definition of and Characterization of Solid Waste

Waste in general is a term which implies something unwanted, useless or filthy. The concept waste is usually difficult to define as views on the subject matter are usually subjectiveand often conflicting. However the concept is commonly referred to as any material that has no further use to the owner and is therefore disposed off. The concept of waste has extensively been touched on in several literatures. It has been defined differently by different scholars, though others question if comprehensive definitions are available in the literature. According to Palmer (2005: online) "the term is frequently left as an undefined primitive in spite of its critical importance" and "frequently, a list of types of waste is substituted for the underlying definition". Definitions of 'waste' are rather commonly found in such documents as dictionaries, encyclopaedia and technical reports of governments and organizations. Palmer (1998) suggests that any item that is without an owner can be seen as waste. He further goes on to say that an item becomes waste when the owner does not wish to take further responsibility for it. Davies (2008: pg. 4) also describes wastes as: "...unwanted or unusable materials ... that emanate from numerous sources from industry and agriculture as well as businesses and households ... and can be liquid, solid or gaseous in nature, and hazardous or non-hazardous depending on its location and concentration".

Jessen (2002) has noted that "waste is human creation" and "there is no such thing as waste in nature where cut-offs of one species become food for another". This notion of waste being a human creation is corroborated by(Pongrácz, 2002) in her redefinition of waste as "a man-made thing that has no purpose". Davies (2008) further noted that "what some people consider being waste materials or substances are considered a source of value by others". The issue of waste being a potential source of value thus a resource is supported by(Jessen, 2002) who noted that "our waste stream is actually full of resources going in the wrong direction".

Drawing from the views expressed above, the term waste can be defined as any substance (liquid, solid, gaseous or even radioactive) of human creation discarded into the environment because it is unwanted. A number of criteria including sources or origin (residential, commercial, industrial, municipal services, building and construction, and agricultural wastes), physical state (liquid, solid, gaseous, and radioactive), material composition(organic food waste, paper and card, plastic, inert, metal, glass, and textile) and the level of risk associated with waste substance(hazardous and non-hazardous) are used to classify waste into various types. Such classification of waste provides a basis for the development of appropriate waste management framework and strategy.

Solid waste as defined by Cointreau (1982) is any material (solid or semisolid) that has been abandoned and discarded because it is of no use to the owner. Solid waste is made up of institutional waste, commercial refuse, construction and demolition debris, household garbage, residential ashes, street cleaning and maintenance refuse, dead animals, abandoned vehicles, sanitation residues, catch basin and drain cleaningwaste and bulky waste. Zender(2012) also considered solid waste as refuse, garbage or any other material that is discarded which originates from industrial, commercial, mining and agricultural operations. In broad terms, solid waste are categorised into three main groups namely: municipal waste, industrial waste and hazardous waste.

The Department for Environment, Food and Rural Affairs (2013) defines municipal solid waste (MSW) as waste that is household or household-like and comprises of household,commercial and industrial waste collected by local authorities. These wastes are collected from places such as offices, schools and shops by the local authority or commercial company. Similarly Municipal waste is waste collected and treated by, or for municipalities. It covers waste from households, including bulky waste, similar waste from commerce and trade, office buildings, institutions and small businesses, yard and garden, street sweepings, contents of litter containers, and market cleansing. Waste from municipal sewage networks and treatment, as well as municipal construction and demolition is excluded.

For the purpose of this study, Municipal Solid Waste (MSW) refers to waste arising from residential and commercial activities in an urban area. Collection of such waste may or may not be undertaken by local government authorities.

Municipal Solid Waste Management

MunicipalSolid Waste Management(MSWM) involves activities associated with generation, storage, collection,transfer and transportation, and disposal of municipal solid waste. The management of municipal solid waste has become increasingly expensive and complex due to continuous and unplanned growth of urban centres and therefore requires proper infrastructure, maintenance and upgrade of all activities (International Journal of Environmental Sciences,2010).

The management of municipal solid waste usually consumes a greater percentage of municipal budgets in most developing countries. Despite this, its management is mostly characterized by ineffective collectionin most developing countries. In many cities in the south, solid waste collection is inadequate and poor, leaving waste uncollected in streets, dumped in vacant lands, drains and surface water, and burnt in the open air(Klundert, 2000).According to the Ministry of Local Government and Rural Development (MLGRD, 2010) close to 85 per cent of all refuse generated in Ghana is currently not collected and disposed of in a proper manner. The poor disposal of refuse both in communities and its management at final disposal sites remain an intractable challenge faced by all Metropolitan, Municipal and District Assemblies (MMDAs). Improper disposal or management of waste has grave consequences for environmental health as well as the natural environment.

In Ghana, there is substantial appreciation of problems associated with poor waste management, yet efforts to improve on the situation do not seem to be making much progress as associated environmental health burdens (diseases) continue to exacerbate. In March 2011, an international news agency *Reuters* reported that 60 people died from cholera outbreak and about 4000 people infected since the first cases emerged in September 2010(Reuters, 2011). That same report also revealed that 482 new cases were reported in a single week in March 2011. In October 2012, the Ghana Business News also reported that 50 people died and 5,800 people were infected by cholera between January and September, 2012(Asante, 2012). It is understood that numbers (both of deaths and reported cases) are those reported at various health facilities (mainstream/modern). This suggests that there could be other fatalities and cases that were not reported at these health facilities, further increasing Ghana's environmental health burdens and consequences for environmental health and the natural environments.
Apart from health problems or burdens associated with poor waste management in developing countries (mainly diseases), flooding as a result of poor drainage system is fast becoming an important developmental issue. Though primarily a liquid waste management issue, the contribution of municipal solid waste (in particular plastics and polythene) is increasing in importance. Major drainage systems in Accra and other cities in Ghana, for example, are chocked with all kinds of solid waste (especially plastics and polythene) and such municipal solid wastes have been blamed largely for various floods in the country, especially in Accra. On June 3, 2015, for example, one of such floods (combined with an inferno in Accra) claimed over 150 lives(Syme, 2015).

Although the management of waste is primarily the responsibility of cities and municipal authorities, there are many cases of successful stories in waste management involving a wide range of stakeholders in their implementation. Cities and municipalities are therefore encouraged to "do what they are good at and collaborate with other sectors in the society, such as private sector, communities and in some cases with the informal sector, in the interest of expanding waste managementservices and improving efficiency and effectiveness"(United Nations Settlement Programme, 2010).

Cointreau (1982) is of the view that in considering the various steps in solid waste delivery services, economically and socially appropriate technologies should be selected. According to him the collection of solid waste follows systematic steps (generation and storage, collection and transportation and disposal and or treatment) which are common to countries and related to each other in an orderly manner. In the view of Mansoor et al. (2005), planning for proper management must consider all these stages. They contend that, for a complete system of solid waste, all the stages need to be in place. The group of stakeholders around each of these stages could differ. For example, at the stages of generation and household storage, the households and community groups are important as compared to final disposal where municipal and local authorities are the key players. The key stages in the waste management chain termed as the functional elements of solid waste management are given in Figure 1.





Source: Eshun (2002)

Waste is initially generated and stored at its source of generation. The generated waste is discharged from its source of generation either through door to

door services or communal storage. With the door to door services, waste is picked up from the residence of the generator for a fee whiles a communal storage system is a system whereby waste is dumped into containers, which are usually temporary receptacles of waste that are patronized mostly by residents of the community in which these receptacles or containers are cited. Waste is then collected from the temporary collection points into vehicles and transported directly to a landfill or to a transfer station for recovery of reusable and recyclable materials before the rest is disposed-off at a landfill site(Eshun, 2002).

Storage of Municipal Solid Waste

Ideally, the moment waste is generated, the issue of storage comes to play and this isusually considered as a responsibility of the generator of the waste. Various forms of waste storage systems exist in different countries. Storage systems generally, may range from containers with lid to those without lid. The type of storage system has directeffect on the immediate environment within which it is stored.Improper storage of waste promotes the breeding of rodents and insect, produces unpleasant odour and prevent the efficient and economic collection of solid waste materials(Mansoor, Cotton, & Westlake, 2005).

Refuse Collection and Transportation

Refuse collection and transport involves thegathering of solid waste, and also the hauling of waste after collection to the location where the collection vehicle is emptied (Kreith, 1994). This aspect of solid waste management easily portrays how effective municipal authorities are or have been in managing waste. If the collection is delayed and done inefficiently, there is usually a public outcry to the municipal administration. It is estimated that about 70 to 80 percent of the cost of solid waste management is accounted for by the collection and transport aspect. The costly nature of collection and transportation is due partly to the fact that it is labour intensive(Nyang'echi, 1992).

In developed countries, the collection of waste from community containers and doors of waste generators are done using motorized collection vehicles (compact trucks). These standard collection vehicles are used mainly for the collection of low density and moisture content waste. Though the compact truck is capital intensive and requires a skilled operator, it has that advantage of compressing the collected waste into a high density chamber which prevents vectors and insects from getting into contact during collection and transportation. However, the acquisition and operation of the compact truck is mostly not within the finance of most municipalities in the developing world (UNEP,1998).

In developing countries, many collection methods exist due to the availability of cheap labour as compared to capital. And most of these methods are labour intensive. In low income areas, cheap and effective methods like the human based collection systems are employed making use of pushcarts /handcarts, pedal tricycles,wheelbarrow and two –wheel dollies with baskets , wheel equipment pulled , pushed or pedalled by people. This technique is mostly used in inaccessible areas in India, Indonesia, and the Philippines where there are limited walkways(Eshun, 2002). In areas where the topography is uneven and also in areas with traffic congestion, the animal based collection system is employed. Animals are used to pull a heavy cart or wagon and therefore requireno fuel. A

classic example where this method is mostly used is Tunisia. One disadvantage of this method is the operators travel long distances and are also exposed to unhealthy situation of waste(Cointreau, 1982). In Ghana, skip containers, dustbins, door-to-door services and pit systems are widely used. And various reports have indicated that skip containers and dustbins are most popular. However, collection and transportation logistics are in low supply (Abagale, Mensah, & Osei, 2012)

Methods of Refuse Disposal

Generally, the collection of waste is followed by disposal. In some areas, the collection of waste is followed by processing. The level of processing is usually dependent on the type of waste and the area concerned. The processing of waste may provide benefits like reducing the volume of waste for efficient disposal and producing energy.

Disposal methods vary widely and the most commonly recognized methods for the final disposal of solid wastes in earlier times were: dumping on land, canyons and mining pit; dumping in water; ploughing into the soil; feeding to hogs; reduction and incineration(Tchobanoglous, Theisen, & Vigil, 1993). Some of these practices still exist in cities, towns and villages today though they are considered unwholesome. Dumping in gutters are common in cities whiles dumping in water is prominent in coastal towns.

Contemporary methods of refuse disposal include sanitaryland filling, composting and incineration (Denison & Ruston, 1990). Sanitary land filling includes confining the waste, compacting it and covering it with soil. It doesnot only prevent burning of garbage but also helps in reclamation of land for valuable use(Centre for Environment and Development, 2003). The placement of solid waste in landfills is the oldest and definitely the most prevalent form of ultimate waste disposal (Zerbock, 2003). A classicexample of the use of sanitary land filling is in Australia where waste is landfilled because it's a large country with low population density.

Incineration involves the controlled burning of solid wastes in the presence of excess air (oxygen) at high temperature of about 1000 degrees Celsius and above to produce gases and residue containing non-combustible materials(Alam & Ahmade, 2013). Incineration method of waste management is only beneficial in regions where land suitable for landfilling is scarce due to geographical constrains, highly urbanized region or environmental conditions. The main benefit of incineration is reduction of weight and volume reaching up to 75 per cent and 90 per cent respectively(UNEP-ITEC, 1996).

Generally, conditions of waste disposal are not different from those in developing countries within the tropical climates. Though the environmental sanitation policy is strongly against open dumping, an overwhelming majorityof landfills in Ghana are open dumps(Mensah & Larbi, 2005).

Changing Landscape of Municipal Solid Waste Management

In the 1970s waste management strategies were focused on reducing environmental impact, this was therefore achieved by creating controlled landfill site. During that period, waste was mostly considered to be 'waste' and so was meant for dumping to reduce effect on the environment. Moving on to the 1980s and the early 1990s, the focus shifted on to new technological solution for waste management. From the mid-1990s until today the focus is on resource recovery(Read, 2003). According to UNEP (2009), the volume of waste to be disposed of finally can be drastically reduced if most of the waste could be diverted for material and resource recovery. The recovered material and resources could be utilized to generate revenue to fund waste management.

The above forms the basis for the adoption of Integrated Solid Waste Management (ISWM) system which is based on the 3Rs (reduce, reuse and recycle) principle. The concept of ISWM seems to have emerged out of the realization that only technical solutions to the problems of waste management are inadequate. ISWM system has been pilot tested in a few countries (Wuxi, Public Republic of China; Pune, India; and Maseru, Lesotho) and has been well received by local authorities. It has been shown that with appropriate segregation and a recycling system, a significant quantity of waste can be diverted from landfills and converted into resource (UNEP, 2009). Similarly, the United States Environmental Protection Agency (2002) has said that if a state or local government wants to plan for and implement ISWM, they have to consider a hierarchy of methods which are reduce, recycle, and incinerate/landfill.

Partnerships in Municipal Solid Waste Management

Even though municipal authorities are responsible for managing waste, there are other stakeholders who work in partnership with municipal authorities(usually partnership between public and private) or through their own initiative manage waste at the community level.

Public and Private Sector Partnership in Municipal Solid Waste Management

The literature suggests that in many developing countries, especially in Africa, and Ghana not excluded, government agencies on their own cannot provide solid waste services effectively and efficiently (for example Post &Obirih-Opareh, 2003). This therefore calls for the need for the public sector to establish effective partnerships with various private sector entities to efficiently provide municipal solid waste management services. There are, however, a handful of examples where government agencies on their own run efficient and often profitable municipal solid waste management services. Forexample a profitable network of waste utilization plants and recovery stations are run by the Shanghai municipal government (Cointreau, 1998). However, private participation in various aspects of waste management can greatly reduce costs and create employment opportunities. Private participation in the waste management chain can take the form of contracting (various parts of the chain), franchising, competitive bidding, and equipment leasing.

Coad (2005) is of the opinion that the private sector is more efficient as itisable to provide equivalent service provided by public service at a lower cost. The efficiency of the private sector is often higher because it is able to be more flexible in deploying its labour, and can motivate staffby incentive payments and career development opportunities, and in other ways.Schubeler (1996),however,is of the opinion that private sector involvement does not, in itself, guarantee effectiveness and low costs. Problems arise when privatization is poorly conceived and regulated and, in particular, when competition between suppliers is lacking.

In some Indian cities (e.g. Bangalore), garbage collection has been subcontracted to private contractors. Due to the success of this approach, several other countries in the region like Sri Lanka, Thailand and Philippines are also adopting the practice (Mathur, 1994). In Hong Kong, landfill management has been awarded to a private company based on build operate and transfer over a period of 60 years(Chua, Thia-Eng, & Garces, 1992). In Kuala Lumpur (Malaysia), private firms make more trips per day and collect more waste on each trip and hence are nearly 50percent more productive than the public service(Cointreau-Levine, 1991).

The ability of private companies to provide waste management service at low cost does not make privatisation a panacea for the inadequacies in solid waste service delivery in developing countries. Private companies are not motivated to serve the poor communities as they are unable to support waste collection with their own tax or user fees, generate least valuable garbage and constitute high collection cost. The low cost solution therefore calls for creative service provision and extensive mobilization of community members to help clean up their own environment (Coolidge, Porter, & Zhang, 1998). In Bamako (Mali), the Groupesd'intereteconomique (GIE) a community based organization, is engaged in waste collection in their own community. In the slums of Curitiba(Brazil), which cannot be reached by collection trucks, the municipal authorities motivatepeopleto dispose of their garbage by exchanging food for bags of garbage. The food is drawn from the state's agricultural surplus(Brooke, 1992).

In Ghana since the 1980s there has been a great push in support of private sector participation in activities hitherto undertaken solely by the public sectorfollowing the restricting of key parts of the Ghanaian economy along these lines with heavy support of the Bretton Wood Institutions. Further, the implementation of the Urban Environmental Sanitation Project in1995 by the Ghana Government with support from World Bank, most citiesintroduced private sector participation in waste management. Admittedly, most approaches to privatisation of solid waste collection and disposal are based on user fee system which stresses more on ability to pay. When this becomes the case, the poor residents especially those living in informal settlement such as slums, are automatically neglected because they not likely to be attractive to business.

Community and Individual LevelParticipation in Municipal Solid Waste

Management

Many developing countries have for a very long time allowed various levels of community and individual level participation of different forms in MSWM, especially in the areas of the collection and recycling of municipal waste. Scavenging epitomizes the community and individual participation in MSWS. Waste scavengers at dumpsites are part of, what is commonly referred to as, the informal sector in solid waste management. Other informal stakeholders include itinerant buyers of discarded products (from door to door), street waste scavengers (at the kerb-side or from containers) and waste scavengers at transfer stations. Scavenging constitutes activities that arelabour-intensive, low-paid, unrecorded,low-technology, and unregulated. It can render economic and environmental benefits, such as work forunemployed individuals, supplies raw materials for industry, reduces the demand for collection, transport and disposal equipment and facilities(Medina, 1997).

Even though waste pickers or scavengers have been involved in collecting recyclables from dumpsites for sale to recycling companies or for their private use over a long period, their activities have not been documented and so have not been integrated into the entire waste management system in Ghana. Most municipal authorities in Ghana do not recognize their activities due to the unhygienic conditions under which they work at the dumpsites

Funding Arrangement for Municipal Solid Waste Management

Financing waste management is an important issue and as earlier mentioned one of the main reasons why the problem of waste management is more acute in developing countries than it is in developed countries. In Ghana, very limited funds are made available to the solid waste management sector by Government, which is usually the main source of funds for the provision of waste management services. As a result the levels of service needed to protect public health and the environment are usually not attained. One of the main reasons has been the inability of local government agencies to design instruments for the collection of various fees and charges from waste producers to support resources ceded by the central government. Consequently, the financial basis for ensuring efficient municipal solid waste management services becomes weak, exacerbating the problems of waste management.

This notwithstanding, the resources available to local government agencies to translate power and competence at their disposal into development forms the subject matter of local government financing. In view of thisvarious legal instruments have been developed and many of these make financial provisions for the new local government system. Some of these provisions are contained in the Financial Memoranda for Assemblies, Section 27, Parts IV,VII,VIII of the Local Government Law of 1988(PNDCL 207), Section 111 of the Local Government Act of 1993(ACT462) as well as Articles 245 and252 of the 1992 Constitution of Ghana.

In Part IV of Section 6 and 7 of the Financial Memoranda, for example, MMDAs are enjoined to maintain valuable list and nominal role of all immovable properties and rateable populations respectively. This is, among other things, to enable local governments to charge property rates to generate financial resources to perform required municipal services, including solid waste management. Section 10(3b) also enjoins the District Assemblies to mobilize resources from within their own jurisdiction to finance capital expenditures and developmental activities as well as recurrent expenditures such as waste management. In addition, the Environmental Sanitation Policy (ESP,2010) proposes measures such as the establishment of local-level environmental sanitation fund to provide waste management services and actively implement systems to generate

sustainable revenue to cover the cost of waste management services within their jurisdictions.

Given these provisions and sources of revenues, the Mfantseman Municipal Assembly can rely on two main sources of revenue tofinance both capital and recurrent expenditures. These are the Internally Generated Fund (IGF) and Externally Generated Fund (EGF) dominated by the DACF and other resources provided by the central government (such as District Development Fund, Urban Development Grant, Social Investment Fund and other such grants and funds). The EGF may also include resources from donors such as grants and aid that have an environmental management component. Revenues that are generated internally by the Assemblies are supported by chapter 20,Article245 (Section A and B) of the 1992 Constitution of Ghana which states that: Parliament shall by law prescribe the functions of District Assemblies which shall include:

- the formulation and execution of plans, programmes and strategies for the effective mobilization of the resources necessary for the overall development of the district; and
- the levying and collection of taxes, rates duties and fees.

Further, some revenues that are available to MMDAs and identified above are either supported by the constitution or other legal instruments. For example the DACF is supported by Article 252 (Section 1-3) of Chapter 20 of the 1992 Constitution of Ghana which states that:

• There shall be a fund to be named as District Assemblies Common Fund;

- Subject to the provision of this Constitution, Parliament shall annually make provision for the allocation of not less than five percent of the total revenue of Ghana to the District Assemblies for development; and the amount shall be paid into the District Assemblies Common Fund in quarterlyinstalments; and
- The monies accruing to the District Assemblies in the common fund shall be distributed among all the District Assemblies on the basis of a formula approved by Parliament.

An integral part of the overall development agenda of a local government is the maintenance of a liveable settlement and clean environment. Financial capacities for Municipal Solid Waste Management can be enhanced by adopting relevant economic instruments and reforming fiscal measures.

In Ghana, Waste Management Departments find it challenging to generate income from the public by way of tariffs. Though several attempts have been made to overcome this challenge, it has yielded little success.Mensah and Larbi(2005) suggest that with the low central government budget and weak capacity for generating internal funds, most District Assemblies in Ghana are burdened with the sustainable operations at landfill sites.

Theoretical Perspectives

The diverse combinations of partnership between stakeholders in the management of solid waste can be viewed as valid or appropriate in the light of the functionalism and the general systems theory. According to Abuyuanl (1999) cited in Ahmed and Ali (2004), Functionalism theory posits that institutions must

survive by adapting to changing circumstances by means of interdependence on its various branches or partners. Coordination among stakeholders or actors or partners in solid waste management adapts to this theory well if these stakeholders or partners or actors are viewed as part of a whole organization responsible for delivering solid waste management services. Here, partners from both the public sector, private sector and civil society may be viewed as interdependent organs or parts of a larger organization, with each charged with a special role to play towards the attainment of the organizations common goal of delivering effective solid waste management services.

The general systems theory analyses systems from three different viewpoints: (1) system relations to determine the nature of relationship between various components of a system; (2) system effectiveness to judge how satisfactory are relationships among various components of a system for the whole system to survive or make optimum use of resources; and (3) system dynamics to investigate what forces a system to change and the direction in which the change occurs. The very first perspective on system relation is of much relevance to this study in that when considering coordination among stakeholders for effective solid waste management delivery, clear demarcation of roles and defined relationship among stakeholders must be made for effective service delivery. Partners or stakeholders must be charged to perform roles in which they have maximum potential to excel. For instance the private sector has a comparative advantage over the public sector in the case of primary collection and

must therefore be assigned such roles for effective solid waste management service delivery to prevail.

Governance has a range of connotations, but its usage in everyday language generally refers to the frameworks and mechanisms in which a government or a state together with its subjects governs its territory and the people under its jurisdiction for peaceful and harmonious coexistence. The use of the concept dates back a long way in both political and intellectual discussions referring to it as the job of managing a government or any other appropriate entity or organization(Hyden & Bratton, 1992). However, the current notion of governance transcends this traditional sense and views governance as the business of not only running the government but any other public entity as well(Kironde, 1999). Rhodes (1997), for example, remarks that "governance provides the institutional framework within which the civic-public realm is managed". Goss (2001) defines governance as "emerging new forms of collective decision making at local level which lead to the development of different relationships, not simply between public agencies but between citizens and public agencies".

According to Swilling (1995 cited in Onibokun and Kumuyi 2004), governance is about the way the frameworks within which the civil society operates and the power structures of the day are managed so that together, these two interdependent elements can make up a strong and healthy public realm. UNDP (1993) broadens the notion of governance and defines it as the mechanisms, processes, institutions and relationships through which groups and citizens articulate their interests, exercise their rights and obligations and mediate their differences.

Despite the fact that governance has been broadly defined in the literature covering the complex relations between government and the governed, some of the definitions have failed to touch on some aspects of governance, such as accountability and participation of social constituencies including civil society. Currently, governance has been conceptualized to include all frameworks and processes for exercising state powers through official institutions and procedures, the relations between the exercise of these powers and society at large, and the organizations a society sets up to respond to the state and promote society's interests(Kironde, 1999).

The state, civil society and the private sector are the regimes involved in good governance. All three are very crucial and have a role to play in the sustainable development of human beings. The state provides the foundation for peace, equity and justice. Civil society provides the foundation of liberty, equality, responsibility and self-expression whilst the private sector provides the foundation for the foundation for economic growth and human development (Roller, 2003 cited in Tsiboe and Marbell, 2004).

Although definitions of governance are not the same, one common theme that runs through all is the idea of forming partnerships between the state and civil society. This study embraces this conceptualization of governance as it focuses on how the three regimes of governance interact and combine resources to ensure effective solid waste management.

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Conceptual Framework for the Study

A conceptual framework is the building block of every study from the statement of problem through data collection to analysis of data. A study on waste management should therefore be based on an appropriate conceptual framework. There are many frameworks that define the variables to be measured in the study of solid waste management. However, a critical analysis of these frameworks indicates that the Integrated Sustainable Waste Management framework proposed by van deKlundert (2000) appeared more relevant for the study. To complement this framework, the Environmental "Production Function", and thePred'sBehavioural Modelwill be analysed and employed.

The Concept of Integrated Sustainable Waste Management

There are different definitions of Integrated Sustainable Waste Management (ISWM). Klundert (2000: pg. 3) defines it as "a waste management system that best suites the society, economy and environment of a given location, a city in most cases". In such formulation, the concept of ISWM, in addition to its technical or financial-economic sustainability considerations, also focuses on socio-cultural, environmental, institutional and political aspects that influence overall sustainability of a waste management system. Therefore, the ISWM concept refers to a strategic and long-term approach to dealing with waste management. Waste management is seen in the ISWM mechanism as an equity and public health issue, which means that everybody has a right to a regular waste collection and proper sanitation, but at the same time the burden of waste management falls equitably on the shoulders of all in the society. In effect and in general the rich is expected to pay more than the poor, and at the same time those who generate substantial amount of waste (either among the rich or poor) will contribute more to the financing of waste management than those who generate less waste.

The Three Key Pillars of ISWM

The concept of ISWM is made up of three key pillars that not only hold the concept but also collaborate in unison to realize the strategic goal of the concept. These pillars are as follows: stakeholders, system elements and sustainability elements. As shown in Figure 2 below, sustainability can be looked at from at least six angles, from a technical, environmental, social, economic, financial, institutional, and policy/political perspective. It is, therefore, advisable to consider these aspects, whenever a waste management system is being planned, analysed, and monitored. The relevance of 'time' factor is reflected by its inclusion in the conceptual framework. Given the uniqueness of time as a resource, it is included as a separate element in the figure. It is imperative that the element of time is neither forgotten nor eliminated, as development and planning are long term issues, which need time.



Figure 2: Integrated Sustainable Waste Management Framework

Source: Author's Construct (Adapted from Klundert, 2000)

Stakeholders in Municipal Solid Waste Management

One key feature of the ISWM framework is its participatory approach and the involvement of various stakeholders. This is demonstrated in the ISWM framework above, identifying and involving a wide range of stakeholdersor actors such as service users, service providers, intermediaries and or regulators. The functions, interest and concerns of these stakeholders are briefly described below:

Local Government and Agencies

Local authorities are considered the legal owners of waste once it is put out for collection. It is therefore their responsibility to provide waste collection and disposal services in their area of jurisdiction. Their responsibility for waste management is usually stated in byelaws and regulation and may be derived, more generally, from policy goals regarding environmental health and protection. Local governments are usually motivated by political interest besides their legal obligation to manage waste. According to Schubeler (1996), the success of solid waste management from local government perspective may be dependent on user satisfaction with provided services, approval by higher government authorities and financial viability of the operation. He goes on to explain that higher government confers upon local government the authority to mobilize resources needed to manage solid waste and to enforce bylaws and regulations. Problems often arise when local governments are unable to raise the needed revenue to provide the required services.

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Central Government Agencies

National or central governmentagenciesmust ensure that local governments have the necessary powers, authority and capacity to manage solid waste effectively. In pursuance of this, institutional and legal frameworks should be put in place by national governments. In many developing countries, national governments delegate their responsibility to manage waste without adequate support to building the capacities of local governments (Schubeler, 1996).

Assistance from national to local government may come in the form of provision of guidelines and/or capacity building measures in the fields of financial management, administration, technical systems and environmental protection. In the event where effective management calls for the collaboration of several bodies, national government may step in to establish appropriate forms of association. Finally national government intervention is often required to resolve cross jurisdictional issues between local governments.

Households and Service Users

Households, communities and service users form an important stakeholder group in ISWM framework. This is not surprising given that they constitute the source of most of the waste. Schubeler (1996) is of the view that residential households are usually concerned with receiving effective and dependable waste collection service at no cost or reasonably low price. They are sometimes unconcerned about where the collected waste is disposed offas long as the quality of their living environment isnot affected. Interest in disposal heightens when dump sites are close to their place of residence and affect the quality of their living environment.

Community based organizations(CBO's) are usually formed in communities where the waste management services, particularly collection, are poor. As CBO's originate from within a community and are usually led by community leaders, they have a more in-depth understanding of their local community, engage actively and frequently with community members and hence are in a better position to prioritize problems within their contexts(Tukahirwa, 2011). They are often formed to improve services, improve environmental conditions or petition the government for improvement in services. CBOs which may arise in upper and middle income neighbourhoods as well aslow income areas may become valuable partners of government in local waste management. Community groups have the potential of managing and financing local collection services, operating waste recovery and organizing composting activities when sufficiently organized.

Schubeler(1996) further noted that other service users, including small and large scale industries institutions and commercial establishments, are similarly interested in receiving affordable and reliable collection services. Industrial enterprises are more concerned with efficiency in production and therefore may have a strong interest in reducing the amount of waste generated as a result of their production activities. In collaboration with government authorities and or specialised private enterprises, industries can play a very active role in managing waste collection, treatment and disposal.

Non-Governmental Organizations(NGOs)

Non-Governmental Organizations(NGOs)are neither governmental organizations nor private ones but operate between these two realms. Originating outside the communities with in which they work,NGOs often have a mission of improving the environment or the quality of life for poor or marginalised groups; as part of efforts to achieve this mission, they may stimulate small-scale enterprises and projects. They can help increase the capacity of its members to play an active role in local waste management by contributing to:

- Peoples' awareness of waste management problems;
- Organizational capacity and the formation of community based organizations (CBOs);
- CBO's voice in municipal planning and implementation processes;
- Channels of communication between CBOs and government authorities;
- Technical know-how of locally active CBOs; and
- Access to credit facilities.

Informal waste workers and enterprises may also gain support from NGOs in the form of assistance to organize themselves, improvement in working conditions and facilities, increased earnings and access to social services such as health care and schooling for children(Tukahirwa, 2011).

Private Sector Enterprises

Private sector enterprises tend to be involved in collection of waste, in sweeping of streets, in the recovery of materials, and, increasingly, in the construction and operation of landfills, incinerators, and compost plants, as concessionaires or contractors from the responsible government authority. Unlike governments, private sector companies do not have any direct responsibility for maintaining public sanitation or health, so their involvement is limited to functions in which they can make a profit. Private Sector Waste management service providers are primarily interested in earning a return on investment and can operate in various forms of partnership with the public sector. To ensure equitable service delivery from private sector enterprises, the municipal authorities must retain the responsibility for user fee collection. Otherwise their profit orientation may lead to concentration of service in high income areas with little incentive to provide service in low income areas where revenue potentials are weak (Post &Obirih-Opareh, 2003).

Informal Private Sector and Donor Agencies

The informal private sector comprises of waste management activities carried out by individuals, families, groups or small enterprises. These activities are usually unregistered and unregulated. Workers in this sector are basically motivated by the fact that they can generate some revenue from these activities. In some cases informal waste workers belong to religious, caste or ethnic minorities. In general, however, the marginalized and unstable social and economic circumstances of informal waste workers make it quite difficult to integrate their contribution into the ISWM system (Davies, 2008).

Numerous bilateral and multilateral donor agencies are engaged in supporting MSWM in low income countries. For some donor agencies, ISWM is often a component within a broader development programme aimed at improving urban management capacities and or urban environmental protection.For sustainability of waste management to be achieved, it is important to consider the roles, interest and power structures prevalent in waste management. Experiences inseveral countries have shown that cooperation and coordination between stakeholders such a CBOs,NGOs, local government, service users donor agencies and the private sector (formal and informal), will ultimately lead to sustainability of waste management system, such as behavioural changes and sharing of financial responsibilities. On the other hand, ignoring certain activities or groups will lead to a decrease in sustainability of the system, for example increase in unemployment or health hazards (UNEP, 2009).

Aspects of Solid Waste Management

Integrated Solid Waste Management has a number of aspects or pillars that must be duly considered when a system is being designed. USEPA (2002) discusses these aspects in detail. These aspects regard the consideration of institutional, social, financial, economic, technical and environmental factors or issues that are implicated in waste management. These factors vary from place to place. Based on these factors, each community has the challenge of selecting the combination of waste management activities that best suits its needs. Visvanathan and Tränkler (2003) define some aspects of an integrated solid waste management as follows:

Economic aspect should take into account measures which provide adequate resources for the waste management system to avoid its collapse due to lack of funds. It should apply the "Polluter Pays Principle" for the waste generators; and provide technical and financial assistance for private and community participation.

Environmental aspects ensure that negative impact by way of creating nuisance and aesthetic problems in the short run and emission of landfill gases and discharge of leachate causing air, water and soil pollution in the long run is avoided by ensuring that the technical aspects is provided with adequate storage, transport, and disposal facilities.

Social aspects emphasize awareness creation on practiceslike waste reduction, reuse and recycle benefits as well as environmental health benefits of cleanliness and health effect arising from the lack of ISWM system. Active involvement of the government and private organizations as well as NGOs has been observed to be very helpful in ISWM.

Technical aspects are concerned with the planning and implementation and maintenance of collection and transfer systems, waste recovery, final disposal and hazardous waste management.

Institutional arrangements would call for the administrative and legal setup with law enforcement machinery for the implementation of the program to ensure effectiveness. The government should strengthen the capacity of institutions in charge of solid waste management with education, training and infrastructural support.Political Aspect concerns the formulation of goals and priorities, determination of roles and jurisdiction, and legal and regulatory framework (Visvanathan and Tränkler, 2003).

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A Framework for Assessing Policy Effectiveness

To assess the capacity of and linkages between the waste management institutions, the Environmental "Production Function" (Figure 3) developed by the World Bank will be employed.



Figure 3: Environmental "Production Function

Source: World Bank (2007)

The urban environmental problem is usually viewed as an environmental "production function" or process where variousinputs interact to produce an output – environmental quality. The first environmental factor is the level of environmental pressure shaped by the scale, composition and efficiency of economic activity. These impacts are mediated and influenced by government policies which define legal parameters such as permissible levels of pollution, allowable levels of resource degradation, production techniques and consumption

patterns.Institutions are responsible for enforcing policies and regulations. The policies and regulations should not be ambiguous or overlapping, otherwise their implementation is likely to generate perverse accountability and virtuous outcomes. To discharge their mandates effectively, institutions require adequate human, physical, and financial resources backed by legislative authority. The most critical factor in determining environmental outcomes is the level of accountability, which establishes how effectively institutions use their availableresources and fulfil their mandates (World Bank, 2007). Figure 3 presents schematic summary of drivers of environmental performance. In this context, a more effective waste management policy would deliver better environmental outcomes as predicted by the environmental production function.

Pred'sBehavioral Matrix

This behavioural matrix model was propounded by Allen Pred in 1967 (see Figure 4). The model views a decision making situation as a function of quality andquantity of information available in a given set up (environmental awareness). The model explains that in a given time and space, some individuals may use information optimally based on the quality of information they have (Bnn). They constitute the rational decision maker in the economic theory. On the other hand, those without quality information may not be able to make rational decision (B11, B12, B21, and B22). However, others may not have adequate information but would be able to makerational decisions (B1n, B2n) whilst others may obtain optimal information but make irrational decisions (Bn1, Bn2, Bn3), according to World Bank (2007).

	Towards optimised use of information
Towards optimised quantity and quality information	B11 B12 B13B1n B21 B22 B23B2n
	Bn1 Bn2 Bn3Bnn

Figure 4: Behavioural Matrix Model

Source: World Bank (2007)

This model has been adopted to help explain how individuals and stakeholders respond to the solid waste management situation in MankessimTownship. Thus it helps to understand how households use their knowledge or information on hygiene to pursue cleaner surrounding by avoiding indiscriminate dumping and participate actively in efforts to maintain a cleaner environment. However, the variable does not spell the reasons for the use and non-use of the information even when quality information is available.

Summary of Key Variables for the Study

From the above frameworks considered for the study, the key variables relevant to this study are institutional arrangement(stakeholders and their levels of

coordination), institutional capacity (human resource, equipment and finance) as well as social aspects of management of solid waste (attitudes and perception of theresidents towards the waste problem and its management). These variables are considered relevant to the study because management of solid waste involves coordination 5of stakeholders, the capacity of institutions in dealing with the problem and how the local stakeholders perceive the problem and its management.Put together these variables help in assessing the effectiveness or otherwise of the present solid waste management system in Mankessim Township in theMfantseman Municipality.

CHAPTER THREE

METHODOLOGY

Introductions

This chapter presents the methods employed in the collection and analysis of data for the study. A research methodology provides the research framework and principles which are closely related to a distinct paradigm or determined by a distinct paradigm translated clearly and accurately. It also provides the guidelines on acceptable research practices (Fowler, 1993). The chapter opens with a discussion on the theoretical perspective of the research design in general and an identification of the particular research design to be adopted for the study. The rest of the chapter discusses target population, sample and sampling procedure, data and sources, instruments used to collect data and data processing and analysis. The chapter concludes with some relevant demographic information on Mfantseman Municipal Assembly.

Theoretical Perspectives of the Research Design

Theoretical perspectives of social research are many and diverse. Generally, these perspectives influence the structure, process and direction of research. However, two perspectives or paradigms referred to as the positivist and the interpretive perspectives bysSarantakoss (1997) are employed in the study and discussed in relation to their resultant methodologies. Two major methodologies mostly usedin doing research i.e. the quantitative and qualitative methods have emanated from the two major perspectives (positivism and interpretivism).

Profile of Mfantseman Municipal Assembly

This section presents a profile of Mfantseman Municipal Assembly where the study is situated. The essence is to provide a background to set the context for the analysis and discussion of the data collected. The variables analyzed are relevant to solid waste management and include physical characteristics, demographic characteristics, social characteristics, economic characteristics, and housing conditions.

Physical Characteristics

The Mfantseman Municipal Assembly is located in the Central Region of Ghana. The Municipality is bounded on the South by the Atlantic Ocean (Gulf of Guinea), on the West by Abura-Asebu-Kwamankese District, on the East by Ekumfi District and on the North-East by Ajumako-Enyan-Essiam District. The municipal is about 60 meters above sea level and is drained by a number of rivers and streams that empty into the sea through a couple of lagoons such as Atufa lagoon (in Saltpond) and Etsi lagoon (in Kormantse). It has an average temperature of 24 Degrees Celsius and relative humidity of about 70 per cent. There are double rainfall seasons that peak in May-June and October.

Demographic Characteristics

The size of population and its composition has implications for waste management. According to the Ghana Statistical Service (2013), the Mfantseman Municipal Assembly had a population of 144,332 which represents 6.6 per cent of the regional population of 2,201,863 during the 2010 Population and Housing Census. Out of this, 79,409 (representing 55 per cent) were females whiles 64,923

(45 per cent) of the population were males. Mankessim is the largest township in the municipality and had a population of 38,313 (representing 26.55 per cent – more than a quarter of the entire population) in 2010. Among this, 17,290 were males and 21,023 being females. Table 1 provides projected summary population statistics of Ghana, Central Region, Mfantseman Municipality and Mankessim Township for the year 2016 based on the 2010 population statistics and growth rate of 3 per cent.

 Table 1-Summary Population Statistics

Geographical Area	Total	Males	Females
Ghana	29,097,411.14	14,190,950.22	14,906,460.92
Central Region	2,598,198.34	1,239,132.16	1,359,066.18
Mfantseman	170,311.76	76,609.14	93,702.62
Mankessim	45,209.34	20,402.2	24,807.14

Source: Author's construct

Methodology for the Study

The debate on the appropriate methodology for research is as old as the methodologies themselves. Adherents of the quantitative methodology have since time immemorial stressed the shortcomings of qualitative methodology and argued that quantitative methods are better than qualitative methods. Similarly, the qualitative researchers have also presented their methods as the most appropriate form of research for similar reasons(Sarantakoss, 1997)

Depoy and Githin (1998) assert that combing both ideologies and their attendant methods is becoming increasingly important because it offers the advantage of better understanding the phenomenon under study and helps in evening out the weakness of each methodology while complementing their respective strength. However, it is generally accepted that the number of methods that are most appropriate in each design must be evaluated in the context of the project in question.

Target Population

In this study the target population consisted of officials of the Waste Management Departments of Mfantseman Municipal Assembly (MMA), officials of the Environmental Health Department of MMA, officials ofprivate waste management companies, residents aged 18 years and above, representatives of traders' association, individual waste collectors and traditional authorities. The residents aged 18 years and above were targeted because they were more responsible for waste management. In the light of this, women weremore targeted because they played an important role in the management of the home environment. According to Songsore and Mcgranaham (1998) women manage the environment of the house compound and are primarily responsible for handling, storing and dumping of solid waste.

The Mankessim market was also a target because markets are important sources of solid waste since most of the transient population of any town is normally concentrated in the markets. Furthermore most people who do not want to carry a lot of waste to their homes tend to leave packages of products in the markets. The sanitation of markets is expected to be of high priority to the municipal authorities as these markets are important sources of revenue to the municipal assembly. As a result, an in depth interview was conducted
with representatives of selected market associations in Mankessim to solicit their views on solid waste management in the market.

Sample Size and Sampling Procedure

The sample was taken from the general public or general adult population in Mankessim using the size of the electoral register produced by the Electoral Commission for the various electoral areas. The register was deemed as an appropriate source of information for the estimation of the sample size for two reasons. First, the register contains the list of actual residents of an electoral area who are 18 years or above. Secondly, it is these same residents who normally generate and manage solid waste at the household level. The Krejcie and Morgan table (Sarantakos, 1997) was used to determine the sample size for the study. According to the table, a population of 20,000 may have a sample size of 377 whiles that of 30,000maykalso have a sample size of 379. Since the total voter population of selected electoral areas was 22,703 (Electoral Commission, 2015) the corresponding sample size of 378 was utilized. This means that 378 voters or individuals were selected for the study, from various houses. This sample was selectedusing a combination of stratified and simple random sampling procedures as discussed below.

The study area had six electoral areas. These are Anafo, Nkusukum, New Nkusukum, TwafoAkyinim, Edumadze andAhenbrom. These electoral areas were grouped into 1stclass residential area (high-income), 2nd class residential area (middle-income), and 3rd class residential area (low-income). This classification was done in collaboration with an officer from the Town and Country Planning

department of MMA. The classification was based on road network, building structures, cleanliness of the environment, and availability of social amenities. Based on the above criteria Anafo, New Nkusukum and Nkusukum were classified as 1st class residential (high-income) whiles TwafoAkyinim and Edumadze were classified as 2nd class residential areas (middle-income) and Ahenbrom was classified as 3rd class residential area (low-income). Due to resource and time constraints the researcher chose three electoral areas for the study. The selection was done such that each group was represented by an electoral area. Using simple random sampling, Nkusukum and Edumadze were chosen to represent 1st and 2nd class residential areas respectively. Ahenbrom was automatically chosen to represent the 3rd class residential area as it was the only electoral area in that grouping or category.

In order to allocate the sample to the selected electoral areas, the total number of voters in all the electoral areas was summed. A proportion of the registered voters in each electoral area to the total number were calculated. Finally, the proportion of each electoral area was multiplied by the sample size to obtain the number of voters to be selected from each selected electoral area.

Using the systematic sampling technique house from houses from which the voters were assumed to reside in were selected. This was based on recent housing census which was an integral part of the street naming project by the Mfantseman Municipal Assembly. The street naming project produced a list of houses with numbers that was used to select the sample. The housing census could not be relied on to determine the size of sample because the study focusedon adult population and the voters' register becomes more relevant than the housing census. The researcher chose to select one voter from each sampled house in the selected electoral area. This decision was taken based on Schubelers (1996) assertion that "peoples' waste generation and disposal patterns are influenced by those of their neighbors". One voter was therefore selected from each house for the study. The population sample, stratified into electoral areas (residential areas) is provided in Table 2.

Selected	Number of	Proportion to the	Number Selected
Electoral Area	Registered Voters	Total Voters	
Nkusukum	1418	0.1492	56
Edumdze	3723	0.39173	148
Ahenbrom	4363	0.45907	174
Total	9504	1	378

 Table 2-Sample Population of Household

Source: Author's Construct

Further, the author identified and interviewed key stakeholders (who form part of the study population). In all, two officials of the Waste Management Department of Mfantseman Municipal Assembly (MMA), one official of the Environmental Health Department of MMA, one official of Zoomlion Ghana Limited, five representatives of traders' associations and five individual waste collectors were interviewed.

Data and Sources

Both primary and secondary data sources were used for the study. Primary data were gathered from a cross-section of residents using questionnaires, as well as from the Waste Management Department, private waste companies, environmental health department and representatives of traders' associations using interview guides. Secondary data were sourced from published and unpublished articles in journals and magazines, official documents of Municipal Assembly, Waste Management Department, internet search and other related literature.

The data collected for this study included waste stream information such as storage, collection and existing methods of solid waste disposal, capacities of institutions for waste management, expenditure on waste management, the status of collection vehicles and equipment, existing linkages and coordination between the Waste Management Department of MMA and other stakeholders in solid waste management inMankessim as well as residents' perception on the solid waste management problem and their willingness to pay for improved services.

Instruments used to Collect Data

Since both the qualitative and quantitativemethods were employed in this study, the instruments for data collection incorporated both methods. The approach therefore made use of the following to gather the needed data:

- Structured questionnaires;
- Interviews guides; and
- Observation checklist.

Questionnaire

Questionnaires were chosen for several reasons; one because when dealing with large number of respondents, the questionnaire is the best and appropriate tool. Another reason for choosing the questionnaire was that it is easy to complete and consumes less time as compared to methods like interviewing. Finally they are very effective for getting factual information about practices and conditions of which the respondents are presumed to have knowledge on and for enquiring into opinions and attitudes of respondents. The questionnaire comprised ofclosed endedquestions where respondents were provided with options to choose from. In addition to the closed ended questions, open ended questions where respondents were free to formulate their own answers the way they consider to be the most appropriate were provided.

Interviews Guides

In depth interviews were conducted using interview guides. Officials interviewed included he head of Environmental Health Department, two officials of the Waste Management Department of MMA, one official of Zoomlion Ghana Limited, five representatives of traders' associations, five representatives of drivers' associations and five individual waste collectors. An interview guide was prepared to cover sanitation and other issues that are deemed important in providing answers to the research questions and for that matter help to achieve the objectives of the study. In order to ensure validity and reliability, responses provided were repeated by the interviewer to be confirmed by the interviewee. Also, a note taker took note of the salient points that emanated from the interview.

Observation Checklist

Study visits were made to WMD facilities in Mankessim. The solid waste facilities available in the various residential areas were also observed. The researcher joined a waste collection truck from collection point to disposal sites in order to observe how they operate. To achieve better results, an observation checklist was employed to indicate the items observed.

Data Processing and Analysis

The quantitative data gathered from the household survey were edited, coded and entered into the Statistical Product and Service Solution (SPSS) version 16.0 software. The chi-square statistic was employed to measure the difference between residents' socio-demographic and economic variables and their perception on the current waste management problem. It was also used to test whether there is any significant difference in residents willingness to pay for improved solid waste collection services between the different socio-demographic and economic variables.

Qualitative data from in-depth interviews were transcribed onto paper. Transcripts were checked and edited for analysis. Transcribed data were categorized into appropriate themes and analysed. Frequencies, chi-square, percentages and cross tabulations were generated and interpreted.

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CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents the analyses of the data collected for the study within the context of set objectives. Both qualitative and quantitative data was collected from a range of stakeholders who are key to the waste management system in Mankessim Township. They include representatives of households, officials from Waste Management Department (WMD), officials of a private waste company, private individuals involved in waste collection, officials of the Environmental Health Department, and representatives of market associations. With the exception of the data from households which were gathered using a questionnaire, all the other data was gathered with the help of interview guides.

Using the conceptual framework as a basis, data was gathered on key issues relevant to sustainable solid waste management such as current solid waste management system in Mankessim Township, regulatory regime that applied to solid waste management, institutional framework and financing mechanism for solid waste management. These main themes were identified on the basis of the conceptual framework discussed in the previous chapter. The data have been analyzed and discussed in view of the research questions and study objectives. Other key issues that are discussed in this chapter include existing partnerships for solid waste management in Mankessim, capacities of institution for managing solid waste in Mankessim, residents' perception of the solid waste problem, residents' willingness to pay for solid waste collection services and the way forward. The discussion begins with an analysis of the demographic and socioeconomic background of individuals who took part in the survey to set the context.

The analyses are conducted within a context of assessing the current situation, identifying challenges confronting the system, what can be done to improve the way solid waste is managed in the study area and to make appropriate recommendations for the improvement of current waste management practices.

Background Information of Survey Respondents

Further, to the municipality-wide information presented and discussed in Chapter 3 above, there aremore specific background demographic and socioeconomic information about survey respondents that is helpful in understanding their practices in relation to waste management. The information presented in this section includes age and sex of respondents, marital status and educational background of respondents, income, length of stay, and household size of respondents.

Sex and Age of Respondents

Depending on the culture of an area, women and men play different roles in Municipal Solid Waste Management (MSWM). Consequently, some aspects of MSWM are therefore "gendered". When planners consider the gendered nature of MSWM, it enables them to note the differences in behaviour, needs and roles played by other social groups (Bernstein, 2004). Sex of respondents was of importance for the study as it has been established in the literature that women are more responsible for the cleanliness of their immediate household environment than their male counterparts(Bernstein, 2004). Table 3 presents the age and sex distribution of respondents, showing the dominant sections of the respondents. More than three-quarters of the respondents were females and the remaining being males. In terms of age structure most respondents (129 out of 380) were within the 18-30years age bracket. The bracket is immediately followed by the 31-40years bracket with 124 respondents.

Age	Total	Percent	Males	Percent	Females	Percent
18 – 30 years	129	100.0	27	20.9	102	79.1
31 – 40 years	124	100.0	31	25	93	75
41- 50 years	70	100.0	18	25.7	52	74.3
51 years and above	57	100.0	12	21	45	79
Total	380	100.0	88	23.2	292	76.8

Table 3-Sex and Age Distribution of Respondents

Source: Fieldwork, Baidoo (2016)

Marital Status of Respondents

The marital status of a respondent is relevant when studying solid waste management issues. This is because marital status has some consequences for human activities in general but specifically for waste generation and management. It has been observed that the married people usually prepare food at home and eat from their homes more than their unmarried counterparts. This therefore implies that the unmarried generate less organic waste compared to their married counterparts. Out of the 380 respondents, the majority (nearly half) were married (see Table 4). The high level of marital status among the respondents can be associated with the prestige that married people are accorded in most parts of Ghanaian society. In Ghana almost everyone is married or intends to marry and this has implications for cooking habits and therefore waste generation and management.

Marital Status	Frequency	Percentage
Married	187	49.2
Single/Never married	123	32.4
Divorced	21	5.5
Separated	30	7.9
Widowed	19	5.0
Total	380	100.0

Table 4- Marital Status of Respondents

Source: Fieldwork, Baidoo(2016)

Educational Background of Respondents

The level of education of an individual goes a long way to influence an individual's perception and attitude towards waste. Environmental problems are appreciated better by educated individuals than the uneducated ones. For this reason, it is expected that they are more willing to pay for services aimed at cleaning the environment than uneducated counterparts. Bennagen (2001) found out that the linkage between education and attitude towards waste is weak. This implies that education does not have significant influence on people's attitude in relation to waste management. Table 5 shows the educational level of education. Out of the 380 respondents, more than a third had obtained secondary level of education, such as Senior Secondary School (or Senior High School), Vocational School or Technical School. A little over one-fifth (22.6 per cent) had

also completed tertiary level of education (training colleges, polytechnics and universities).

Educational Level	Frequency	Percentage
None	68	17.9
Primary	39	10.3
JSS/Middle	56	14.7
SSS/Voc/Tech	131	34.5
Tertiary	86	22.6
Total	380	100.0

 Table 5-Educational Level of Respondents

Source: Fieldwork, Baidoo(2016)

Educational level is often paired with income in the analysis of household waste management behaviour and characteristics because various researchers have shown that there is a positive relationship between educational level and income (Bennagen,2001 and Garner, 2001). Thus higher educational levels are usually associated with better jobs and hence higher incomes of individuals which ultimately influences the consumption patterns and for that matter the amount and composition of waste generated, with implications for waste management.

Income of Respondents

It has been observed that the demand for goods and services is positively correlated with income change. Therefore an individual's ability to access educational information on environment from media (such as television, radio and newspaper) is positively correlated with one'sincome (Garner, 2001). Also the total waste generated at the household level is positively related to the household income levels. This therefore presupposes that those with higher income and higher generation rates will demand more for solid waste services (such as frequency of collection). Meanwhile the relationship between income and quantity demanded of solid waste services (such as frequency of collection) per type of waste discarded is not always positive (Bennagen, 2001)

Household income	Frequency	Percentage
Below GHC 100	56	14.7
GHC 101 – GHC 300	139	36.6
GHC 301 – GHC 500	112	29.5
Above GHC 500	73	19.2
Total	380	100.0

 Table 6-Approximate Incomes of Respondents

Source: Fieldwork, Baidoo(2016)

Length of Stay in Community

It is generally expected that residents who have stayed in a community for longer periods are in the position to comment on issues concerning their community better than those who have stayed there for shorter periods. In a similar vein, it is expected that peoplewill be able to give accurate account of environmental problems in the communities where they stay. Table 6 presents the number of years that residents have stayed in their respective communities. Most of the residents have stayed in the community between six years and 10 years.

Length of stay (years)	Frequency	Percent
Less than 5	64	16.8
6 – 10	129	33.9
11 – 20	66	17.4
21 - 30	48	12.6
Above 30	73	19.3
Total	380	100.0

Table 7-Respondents' Length of Stay in Mankessim

Source: Fieldwork, Baidoo(2016)

Household Size

The amount of waste generated by a household obviously depends on the size of the household, making information on household size relevant in the analysis of waste management practices. Further, households constitute the base of consumption unit for many goods and services. This implies that an increase in the size of household could be as important as increase in population in relation to waste management. Evidently, households are contiguous and bound together not just by social ties but also by economic ties. Table 7 presents information on the distribution of household sizes. Households with membership between four and six dominates with nearly half (48.4 per cent) of the respondents.

Table 8-Household Size of Respondents

Household size	Frequency	Percentage
1 – 3	127	33.4
4 – 6	184	48.4
Above 6	69	18.2
Total	380	100.0

Source: Fieldwork, Baidoo(2016)

Current Solid Waste Management System in Mankessim Township

This section reviews and assesses the current waste management system in Mankessim using the conceptual framework presented in the previous chapter. The analysis is conducted along the system elements of the Integrated Sustainable Waste Management Framework discussed in Chapter 2, after some modification of the elements. The key elements discussed, therefore, are solid waste generation, solid waste minimization, composition of solid waste, separation and storage, collection, and transportation, as well as treatment of solid waste.

Solid Waste Generation in Mankessim

The conceptual framework identifies four main sources of waste generation: domestic, industrial, commercial and institutional. In Mankessim, most of the solid wastes were generated from commercial and domestic activities. The significance of waste generation from commercial activities is in view of the fact that Mankessim hosts one of the largest markets in Ghana. Typical with settlements, markets in nodal towns or cities often grow faster than markets in non-nodal towns or cities. Besides, located on the main highway that links the south-western part of the country as well as neighbouring Cote D'Ivoire to the capital city of Ghana, it also connects all the towns (both major and minor) to the north of the township to both the regional capital (Cape Coast) and the national capital (Accra). There is a nascent industrial sector (largely informal) which makes modest contribution to waste generation in the township.

According to WasteCare (2007) there is a town-wide generation rate of 0.75kg per capita per day and on the basis of a population of 30,915 in 2007, it

was estimated that a total of 23 tonnes of solid waste was generated by the Mankessimtownship every day. This excluded additional refuse generated from commercial activities and a large transient population that patronizes the markets and lorry stations in Mankessim. In an interview with officials of the Municipal Waste Department, it was observed that the 0.75kg per capita per day town-wide continued to be realistic. Consequently, with the population of Mankessim estimated at about 45,000, the total daily solid waste generated is about 34 tonnes. The population figure was estimated on the basis of 3 per cent growth rate and a population size of 38,313 returned by the 2010 population and housing census.

The increment in daily waste generation in Mankessim from 23 tonnes in 2007 to 34 tonnes in 2015 (excluding those generated from commercial activities) is attributed to increase in population. Waste generation is primarily an outcome of human activities (such as domestic, commercial and industrial). It was therefore expected that when the number of people living in the township increases, the amount of waste generated will also increase. According to Falomo (1995: pg. 5) "the volume of waste generated by the populace in any city, town or village is directly related to the population density". The increase in population of Mankessim from 30,915 in 2007 to about 45,000 in 2015 (with the geographical area remaining constant) thus suggested that the amount of solid waste generation would increase consistently as shown. It is therefore imperative that population is an important element of solid waste management.

Solid Waste Minimization

One of the key elements of integrated sustainable waste management discussed in previous chapter is waste minimization (and prevention where possible and practical). Waste minimization or prevention has three main dimensions. They are as follows: reducing the amount of waste generated, reducing the hazardous content of that waste and reducing its impact on the environment. The main principle behind this element is that when or if less waste is created, less resources are needed to either dispose of the waste or recycle them. In practice, waste minimization and prevention require that all efforts are made in order to avoid waste generation in the first place, qualitative and quantitative reduction at source and reuse of products. If these efforts are put in place, they are expected to result in a reduction in daily rate of solid waste generation (all other things being equal). It can be inferred that with the estimated daily rate of solid waste generation increasing from 23 tonnes in 2007 to 34 tonnes in 2015, there is not much of waste minimization or prevention efforts being deployed at Mankessimtownship.

The absence of waste minimization and prevention strategies and programmes at the Municipal Assembly further confirms that the issue is not receiving the needed attention within the context of sustainable waste management. This is in spite of the fact that the Assembly duly recognizes the relevance of waste prevention in its Environmental and Sanitation policy document. During interactions with traders in various markets (one of the main sources of waste generation in the township), it was observed that current attitudes of residents did not support waste prevention. An example that was frequently cited to demonstrate this is the insistence by many people to be given polythene bags for everything that is purchased in the market. It was reasoned that any drive towards waste prevention would require attitudinal changes such as citizens avoiding the use of polythene bags.

Composition of Solid Waste

The composition of solid waste is an important consideration in sustainable solid waste management system. This is because the composition informs the strategies that will be required to ensure that the waste is well managed. For example in order to estimate storage requirements and the rate at which waste is collected, it is vital to know the composition of the waste, beyond other important characteristics such as volumes, density and weight of the waste. In the course of the study, it was observed that there was very scanty information relating to the composition of solid waste generated in the Mfantseman Municipal Area. This is not surprising because in order for the Assembly to be abreast with the composition of waste generated as well as volume, it needs to have a greater role in the collection of the waste to enable it undertake various analysis that will eventually provide composition statistics. The MMA does not play any significant role in the collection and transportation of waste to various refuse dumps and treatment sites. Much of this is done by individuals themselves and supported by Zoomlion Ghana Limited and private individual waste collectors. Consequently composition of waste is difficult to obtain for MMA in general and Mankessim to be specific. Nonetheless, anecdotal evidence (through ranking) from the

Assembly and other key stakeholders in solid waste management (includingZoomlion Ghana Limited, individual collectors waste and representatives of traders' association) on the composition of waste reveal that plastic waste tops in ranking. Table 9 presents ranking of major categories of solid waste in Mankessim. The key stakeholders were asked to rank the various categories of solid waste independently, and the information gathered from those rankings served the basis for producing the ranking contained in Table 9. The rankings by the stakeholders were converted into scores and summed across stakeholders. Thereafter, the scores obtained by various categories were used to rank them.

Type of Material	Rank
Plastic waste	1 st
Organic waste (food, vegetables, fruits etc)	2^{nd}
Paper/cardboard	3 rd
Fabric/Textiles	4 th
Bottles and glass materials	5 th
Electronic waste	6 th
Metals	7 th

Table 9-Ranking of Solid Waste in Mankessim

Source: Author's Construct

Waste Separation and Storage

The extent to which generated waste is separated and stored temporarily prior to their eventual collection and transportation to treatment centres is an important determinant of the sustainability with which waste is managed. In many developing countries, there is very little effort in separating waste at both private and public places. It has been observed that separation of waste and therefore proper storage prior to collection and transportation to treatment centers are influenced by the availability of recycling operations as well as number and types of available waste treatment plants. This is because the recycling operations often provide some value (no matter how small) to the type of waste that is recycled. This provides some incentive for the separation. Further, operators of the recycling facility are often willing and/able to support the separation of waste by providing containers for both the separation and storage.

Throughout Mankessim Township (at both private and public places), there was virtually no separation of waste. As a matter of fact, in most public places as well as private places there is a culture where waste is littered indiscriminately and gathered again either daily, weekly, monthly or never at all depending on whether the place is a public place (and the type) or private places. It was observed in the course of the study that most public places, especially market areas, were always engulfed in waste. Interaction with respondents revealed that people generally did not appreciate the rationale behind separation in their context. Virtually all the refuse dumps and waste collection points in Mankessim and other such places within the municipality did not require separation. In such circumstances, separation of waste becomes irrelevant and of no use. The remark by an executive member of one of the traders association during an interview is quite instructive in explaining why there was almost no separation of waste in the township; All the waste we generate, whether they are plastics or food waste, are kept in the same refuse container. And I think that is what many people in this country do. Our refuse dumps and other places where we dispose of waste materials do not require us to separate them prior to disposal. What will therefore be the sense in separating waste in the house or market, only to go and dispose all of them at the same places?

Most of the respondents (97.6 per cent) said they were not separating their waste before disposing them off. Of these people, more than three-quarters said they did not do so because they considered all to be waste and therefore did not see the essence in separating them. Less than ten respondents (out of 380) reported that they separated their waste prior to disposal. Table 10 shows that most of those who separated reside in Nkusukm (the first class residential area). Among them was a sachet water seller who said that she has been separating pure water bags for the past two years. This respondent was found accumulating the sachets to produce other plastic materials. Though waste separation activities were found to be almost non-existent, majority of respondents (87.4 per cent) indicated their willingness to separate waste when required to do so and also on condition that they would be provided with separate containers which will eventually be emptied within regular intervals by the providers of such containers.

Residential or	Total Number in	Number of those	Percentage of those who
Electoral Area	the Sample	who do not	do not separate waste
		separate waste	
Nkusukum	56	49 (7)	12.9
Edumadze	148	146 (2)	38.6
Ahenbrom	174	174 (0)	46.1
Total	378	369 (9)	97.6

Table 10- Waste Separation across Residential or Electoral Areas

Source: Fieldwork, Baidoo(2016)

NB: Numbers of those who separate are in bracket

In terms of storage, it was found that all the individuals surveyed as well as other stakeholders interviewed had refuse containers to store waste temporarily before being transferred to the refuse dump or other such places. However, there were major differences across residential areas in terms of the type of containers in which waste was stored temporarily before being transferred to various dump sites. Majority (82.6 percent) of the residents who livedin thehigh income area stored their waste in closed container (see Table 11). The next storage system which was adequately patronized with a percentage of 51.1 was storage in open containers by respondents who lived in Ahenbrom (a low income area). Mariwah (2008) made similar observations in relation to storage types across residential areas stratified by level of income.

Residential or	Total Number	Closed	Open	Polythene
Electoral Area	in the Sample	Container	Container	Bags
Nkusukum	56	46	7	3
Edumadze	148	48	68	32
Ahenbrom	174	49	89	36
Total	378	130	161	87

 Table 11-Type of Storage Containers Across Residential or Electoral Areas

Source: Fieldwork, Baidoo(2016)

The main problem had to do with non-availability of relatively larger waste bins at public places. Throughout the markets, there were very few and isolated larger waste bins that could be sighted. These few bins were usually overflowing with wastes as they were not emptied regularly. These few waste bins do not require separation as they are meant for virtually all types of waste. The situation is worsened by indiscriminate littering attitudes in public places, resulting in filthy and dirty environment at almost all the time (especially in public places – mainly markets).

Waste Collection and Transportation

Waste collection and transportation is an important part in waste management systems as it links waste generation to waste disposal and treatment. A successful management of solid waste depends largely on arrangements that are put in place to separate, store and transfer or transport the waste to waste treatment points (Mensah&Larbi, 2005). The success or otherwise of any waste management system can be seen from the surroundings of private and public places which also mirrors storage and collection systems in place. This is to say that when good arrangements are made for the purposes of separating, storing and collecting generated waste, they have greater bearing on the success of the entire waste management system and can reflect in the cleanliness of the environment (in both public and private places). Thus if good arrangements are made at this stage, they result in clean surroundings and good public sanitation; if poor arrangements are made, litter is found everywhere and sanitation in public places is abysmal (Onibikum and Kumuyi, 2004).

Most of the collection and transportation of solid waste in Mankessim were done by individuals. The study found that 254 (67 per cent) of individuals transfered the waste to various refuse dumps. Further, 26 individuals (7 per cent) sent their waste to the skip at Nkusukum and eventually transported to the refuse site at Ewoya. In various houses, waste bins were often emptied on daily bases by a member of the household (usually a female and a teenager). The percentage of respondents who sent their waste either to the refuse dump or skip was 67 and theyindicated that a female and teenager was responsible for emptying the waste bin. Twenty six people (6 per cent) who resided in Nkusukum (a high income residential area) indicated that they had subscribed to door-to-door services with the only private company in Mankessim, Zoomlion.

Residential or	Total	Subscribers	Subscribers of	Skip	Dump
Electoral	Number in	of Zoomlion	Indiv.		
Area	the Sample		Collectors		
Nkusukum	56	18	12	26	0
Edumadze	148	5	47	0	96
Ahenbrom	174	0	16	0	158
Total	378	23 (6%)	75 (20%)	26	254
				(7%)	(67%)

Table 12-Waste Collection and Transfer Patterns across Residential Areas

Source: Fieldwork, Baidoo(2016)

In the markets, it was observed that traders had various arrangements with some individuals who collected their waste and sent them to nearby refuse dumps or transfer centres. The arrangement depended largely on volume of generation (and therefore whether collection must be done daily, weekly or twice weekly).

These arrangements were usually maintained by traders with lockable stores. Itinerant traders hardly engaged people to collect their waste irrespective of volume generated. This, coupled with the attitude of indiscriminate littering among general public and virtually non-existent public waste bins, largely explains the usually filthy environment in and around Mankessim.

Collection and transportation of waste from public places in Mankessim (especially markets and lorry parks) was a shared responsibility between the Mfantseman Municipal Assembly and other key stakeholders such as traders, drivers and the general public. The MMA is required to provide larger waste collection bins at certain places whiles the other stakeholders are to ensure that wastes generated are gathered and deposited into the bins. In the case of schools and health centres, the management of these facilities took full responsibility for waste management and health facilities were observed to be well kept. The main problem had to do with lorry stations, market places and of course some principal streets. Similar observations have been made by Mariwah (2008)

While the big waste bins that the MMA is required to provide were insufficient, even the few were not regularly emptied resulting in frequent overflow of the bins. The MMA had an arrangement with Zoomlion to manage waste in selected public places in Mankessim including markets, lorry parks and selected principal streets. However, these places were almost always filled with waste. Plate 2 is a section of the main Cape Coast station at Mankessim where the author observed heaps of waste any time a visit was made to Mankessim in the course of the study. This does not suggest that the work is not being done; rather there is an endemic culture of indiscriminate littering attitude and culture. More work is therefore needed to keep the places clean all the time.



Plate 2: Collection of waste at Cape Coast station in Mankessim Source: Field Work (2016)

Existing solid waste disposal and treatment methods in Mankessim

Disposal of waste along with treatment and recycling constitute the last system element of integrated sustainable waste management. Since sustainable waste management is a chain, each of the elements can be shown to have implications on other elements or aspects of the chain. Consequently, the manner in which solid waste is disposed, treated and/or recycled goes a long way to influence the other elements in the process. For example, if plants are established for recycling some elements of waste or for generating power from other elements of waste, it will have effect on separation and storage function in the process. Onibokum and Kummuyi(2004) discuss a variety of methods that are in use for waste disposal methods in a context of inadequate waste collection and disposal facilities.

In terms of disposal, apart from sending the waste to transfer centres or refuse dumps, Onibokum and Kummuyi (2004) made mention of people who engage in what can be described as "indiscriminate" disposal of waste where open places and gutters are converted into refuse dumps or collection centres. Such attitudes and associated disposal methods have severe repercussions on the environment and eventually public health. For instance, residents dump refuse in open spaces and along the roads in open gutters with serious health implications and also destroy the beauty of the town (Plate 3). This behaviour can be explained by the Tragedy of Commons (Hardin,1968) where people in common places maximize their own benefit and ignore the needs and feelings of others and even expect others to take responsibility for the areas.



Plate 3: Scene from waste collection point in Mankessim Source: Field Work (2016)

In MankessimTownship, the Municipal Assembly has the responsibility of disposing waste in some public areas (markets, lorry parks and some principal streets). All other waste management responsibility falls on individuals and the community at large. In various houses, waste bins were emptied almost on daily

basis. An overwhelming majority of respondents (73 per cent) disposed their waste on daily basis, 21 per cent also disposed their waste every two days whiles only 6 percent disposed of their waste on weekly basis. There were therefore several refuse dumps in and around Mankessim where most refuse were dumped. The dumps on which the wastes were emptied were managed by residents and market operators. The Assembly did not have any significant role in the maintenance of these dump sites. The dumps were supposed to be maintained on weekly basis by tradition but these traditions were no longer being strictly adhered to. Consequently these dump sites constituted a major health hazard and risk for people who lived nearby. Most of them were close to water bodies, posing additional risk to other living things.

Residential or	Total Number	Daily	Every Two	Weekly
Electoral Area	in the Sample		Days	
Nkusukum	56	26	12	18
Edumadze	148	96	47	5
Ahenbrom	174	174	20	0
Total	378	276 (73%)	79 (21%)	23 (6%)

 Table 13-Frequency of Waste Disposal across Residential Areas

Source: Fieldwork, Baidoo(2016)

The Assembly had a large dump site at Ewoyaa(see Plate 5) where all waste collected on its behalf were deposited. That site itself was not well maintained and there had been instances where members of that community had demonstrated against continuous use of the site. On this site and other refuse dump sites in Mankessim, individuals were often sited scavenging some materials from there. In the entire municipality, there was no treatment or recycling plant. The wastes were simply buried and burned from time to time. Unfortunately, these refuse dumps served as places where children and even adults eased themselves. Domestic animals were frequently seen on the dumps looking for food to eat. Plate 4 shows an image of a lagoon that has been filled with waste and turned into a refuse dump.



Plate 4: An image of a lagoon turned into a refuse dump at Mankessim Source: Field Work (2016)



Plate 5: An image of the Municipal Waste Dump at Ewoya Source: Field Work (2016)

A fundamental flaw in the solid waste management system in Mankessim is that very few communities had skips or central containers and also very few individuals (26 per cent) hadsubscribed to private collection services (see Table 11). The majority of respondents (67 per cent) indicated that they disposed off their waste at refuse dumps (most of them unapproved by the MMA) dotted in several areas in Mankessim.A couple of houses could agree on a nearby piece of land and turn it into a refuse dump without recourse to any processes or institutions. There was therefore a proliferation of refuse dumps in Mankessim that need urgent attention of municipal authorities. Also recovering resources out of the waste and processing of solid waste before disposal is almost non – existent, except for individuals who scavenged materials from time to time.

Regulatory Regime and Institutional Framework for Solid Waste

Management

This aspect of the discussion is informed by the environmental production function which deals with regulatory regime and institutional framework that applies to sustainable solid waste management. The environmental production function predicts that effective regulatory regime and institutional framework deliver better environmental outputs. The regulatory regime is discussed first followed by the institutional framework. At the heart of the regulatory regime and therefore institutional framework is the understanding that "all waste deposited in the public domain shall be the property of the Assembly", as such "the Assembly and/or its authorized agents or contractors shall be exclusively responsible for the management of both solid and liquid wastes within the entire administrative area of the Assembly". This is very instructive, even though as discussed above, the Assembly is far away from carrying out this mandate.

Regulatory Regime for Solid Waste Management in Mankessim

There are two main sources where laws and regulations governing solid waste management derive. The first is the republican state where key derived legal documents such as the Constitution, Acts of Parliament, Regulations, Policy documents and other guidelines can be mentioned. The second source is the custom and traditions of the people of Mankessim. The Local Government Act (Act 462) of 1993 and the Environmental Sanitation Policy (ESP) of 1999 empowers Municipal Assemblies to promulgate bye-laws to govern the management of waste within the administration. The ESP states that "District Assemblies (including Municipal and Metropolitan Assemblies) are to be responsible for managing and protecting the environment so as to prevent hazards to human health, conserve natural resources and maintain pleasant surroundings". In view of this, the bye-laws, among other things, designate areas and facilities for storage of waste, collection of waste, disposal of waste as well as treatment of waste. Consequently the Mfantseman Municipal Assembly has promulgated byelaws that stipulate, among other things, that a person commits an offence when found to have engaged in any of the following:

- Fails to provide a standard container for the purposes of storing waste as prescribed by the Assembly;
- b. Prevents the Assembly or its authorized agents or contractors from collecting waste from one's premises;
- c. Refuses to pay prescribed fees for waste management services;
- Indiscriminately dumps, disposes and/or discharges solid or liquid waste in open spaces, drains, gutters, behind walls or burns solid waste in one's compound; and
- e. Treats or recycle waste without the approval of the Assembly.

There were various penalties mainly in currency units that were applicable to individuals who commit any of the offences noted above. These penalties were high enough to deter people from committing these offences. However, there was a problem with the implementation of these bye-laws. There was no indication of sufficient courage on the part of the MMA to enforce these bye-laws. Despite the fact that these bye-laws were broken on daily basis by residents, evidence of residents prosecuted for breaking the bye-laws was difficult to produce. In general, these bye-laws were enforced by the Environmental Health Department, whose officers were expected to move from house to house and to various public places to arrest offenders. There were, however, some challenges that made their work difficult and therefore enforcement of the bye-laws very weak. Two of the officers interviewed indicated that there was excessive interference in the enforcement process where arrested offenders were not prosecuted because of their association with some influential people in the society. Mention was also made of delays in the court system that discouraged the officers from prosecuting arrested offenders. Finally, some respondents indicated that the officers themselves had been settling many of the cases out of court and receiving some benefits.

The other source of laws applicable to waste management in Mankessim is the custom and traditions of the people of Mankessim. By these customs and traditions, people were barred from littering homes and public places indiscriminately. People were also required to engage in communal labour to clean their environments (including public places like principal streets, markets, lorry parks and refuse dumps) on regular basis. As Mankessim becomes more cosmopolitan and hosts people from different places with little appreciation for these customs and traditions, these requirements were no longer enforced strictly. As people were able to free-ride, even those who appreciated these customs and traditions no longer felt bound by the customs and traditions. Further, the traditional authorities found it difficult to enforce their penalties for breaking these laws within a context of a democratic society. The Assembly members from various parts of Mankessim were required to play some leadership role in relation to waste management in their vicinities. However, interviews with some of them indicated that these members felt poorly resourced to be able to play that role.

Institutional Framework for Solid waste Management in Mankessim

There was a range of institutions that play various roles in solid waste management and identified in the left loop of the conceptual framework. They include governmental organizations, non-governmental organizations, traditional authorities, trade associations, faith-based organizations, community based organizations, private sector, educational institutions, informal sector, households and media. This section presents an overview of the key institutions that make up the institutional framework for managing solid waste in Mankessim.

Governmental Organizations

The key governmental organization that played a key role in the management of solid waste in Mankessim is the Mfantseman Municipal Assembly. The Assembly was established first as a District by a Legislative Instrument (LI 1374) in 1988 when Ghana changed from the local authority system of administration to the district assembly system. Mfantseman was one of the 110 districts demarcated from the then existing 140 local authorities. The District was elevated to Municipality status in January 2008 by an Executive Instrument (EI 10), and backed by Legislative Instrument (LI 1862) of 2007. The Mfantseman Municipal Assembly is the highest political and administrative authority in the Municipality charged with the responsibility of formulating and

executing plans and programmes for effective mobilization of resources for overall development of the Municipality. In relation to solid waste management, the Assembly claims (through bye-laws) ownership of all municipal wastes in the Municipality as well as taking responsibility for their management. This position is supported by Act 462 which mandates local government to manage municipal wastes.

Accordingly, the Assembly created the Waste Management Department (WMD) to manage municipal waste and to ensure that the settlements within the jurisdiction wereliveable as provided for in Act 462. This requires that adequate sanitation and waste management systems are put in place to reduce the occurrence of environmentally related diseases. The Assembly is required by the ESP to provide for treatment and disposal sites and to ensure that all waste management sites are well maintained. The Assembly is therefore the fulcrum around which all the coordination and partnerships required for effective waste management revolves. In the execution of its functions, the Assembly collaborates with other relevant governmental organizations such as Ministry of Local Government and Rural Development, Environmental Protection Agency and Regional Coordinating Council. Besides the WMD, the waste management activities of the Assembly benefit from the Environmental Health Department, both of which are direct organs of the Assembly.

Households

Another important stakeholder in the institutional framework for solid waste management is the group largely responsible for generating the waste in the first place: households. Their roles in the scheme of things and how they conduct themselves go a long way to affect the extent of success. The Assembly has passed some bye-laws to regulate the behaviour of households as far as waste management is concerned. Their level of awareness and preparedness to abide by these bye-laws has obvious implications for waste management in the Municipality. Further, this category of stakeholder is expected to abide by relevant customs and traditions for purposes of waste management. Finally, and of no less importance, is the role that householdsplayed in shaping the regulatory regime and bringing pressure to bear on authorities to ensure that the regulatory regime is applied to the latter. There is need for some level of responsibility on the part of these agents to ensure that they play their roles well towards sustainable management of waste.

Traditional Authorities

Traditional authorities continue to hold significant level of influence in the organization of societies in Ghana. In Mankessim, because most of the refuse dumps were managed by communities that relied significantly on traditions and customs, the traditional authorities become even more important stakeholders than otherwise would have been. Even though punitive measures that used to be applied strictly by traditional authorities to ensure strict adherence of customs and traditions were no longer applied strictly, they still commanded significant influence in the organization of communities in Mankessim. Therefore the conduct of traditional authorities becomes very important for the sustainable solid waste management. They also had some influence on the Assembly as well and
could leverage this influence to ensure that the Assembly was able to discharge its responsibility in the area of waste management.

Private Sector

The private sector used in this context is quite broad and covers nongovernmental formal and informal sector organizations and individuals. In this context, the focus is on individuals and profit-making organizations that operated in the waste industry and made a living from there. The Assembly often contracted agents to perform certain functions in relation to waste management on its behalf. Besides the Assembly, other stakeholders (such as institutions, households, and individuals) often entered into some agreements with actors in this sector for the purposes of undertaking some waste management functions (mainly collection and transportation). The extent to which these actors organized themselves and made their services available (and affordable) to clients went a long way to affect waste management. The Assembly, for example, had an arrangement with Zoomlion to clean certain identifiable public places (such as major roads and streets, markets and lorry stations). This madeZoomlion critical to the extent to which these public places were well maintained and therefore the discharge of the Assembly's responsibilities as far as waste management was concerned.

Apart from the contract between the Assembly and Zoomlion, there were some households who subscribed to Zoomlion's house-to-house waste collection. According to the company ninety (90) people were currently subscribed to that service. The other part of the private sector in waste industry in Mankessim (as it is in many parts of the country) was the individual waste collectors. These individuals could be grouped into two: those who picked recyclable materials (such as metals, sachet or plastics) mainly from public places (including dump sites) and those who collected and transferred waste for a fee. Even though the actual number of these individuals could not be obtained, conversation with some officials at the Assembly as well as individual waste collectors interviewed points to more than 20 of such people in Mankessim. The activities of those individuals who scavenged waste materials for recycling purposes were very important in waste management as they reduced the amount of waste that must eventually be treated. This notwithstanding, the poor conditions in which they worked and the fact that they did not put on protective clothes made their work very dangerous. They were also usually ignored in the formulation of waste policies.

Existing Partnerships for Solid Waste Management in Mankessim

The literature on waste management as well as discussion offered so far point to the relevance of partnerships between key stakeholders for sustainable waste management. The overview of stakeholders and the roles they played discussed above requires that in order for waste to be well managed, there must be a strong collaboration among the stakeholders. For example the Assembly has the power to make waste management related bye-laws to govern the conduct of households in waste management. In order for this power to be exercised in a manner that best fulfils the purpose, the households must be consulted and made to provide inputs in making these bye-laws. Even in the implementation of the bye-laws, the households can play very critical role by way of encouraging and urging others to abide by the rules and regulations contained in the bye-laws. They can do this effectively if they are and indeed feel part of the process leading to the passage of the bye-laws.

The Assembly, given its special roles in waste management, has a larger responsibility in building partnerships between itself and all other stakeholders, and at the same time urging other stakeholders to collaborate in the discharge of their duties and responsibilities. It was observed during the study that there existed a working relationship between the Assembly and other key government organizations such as the Regional Coordinating Council and Environmental Protection Agency. There was, however, more room to make this relationship beneficial to waste management. This is because, notwithstanding the working relationship referenced above, interviews with relevant officials at the Assembly revealed that there was little interaction in the area of waste management between the organizations. Given the expertise of EPA for example, more structured interaction with the Assembly could be beneficial in resolving the problems that the Assembly currently faced in the area of waste management in Mankessim and other places in the municipality.

The partnership existing between the Assembly and other nongovernmental stakeholders can be looked at from many perspectives. One popular and more relevant perspective is within the context of governance, which could be defined as concrete relationships between the private sector, civil society and the state in solving societal problems such as managing solid waste. Among the private sector actors in waste management in Mankessim, the Assembly already had an executed contract with Zoomlion that defined the partnership with the company. Interview with representatives of both entities reveal that even though the contract remained in force, there had been a couple of challenges that had affected the realization of the objectives set out in the contract. The company frequently identified regular delays in release of funds as agreed in the contract with important consequences for discharging duties and responsibilities. The Assembly also pointed out with some concerns inability on the part of the company to regularly undertake cleaning and collection of waste in designated areas.

In order for the Assembly to address the funding challenge, it might have to resort to a more reliable source of funding rather than hand-outs from central government, the release of which often becomes difficult to predict. When the payment challenge is addressed, it is expected that the company can improve on its performance, failure of which can result in a change in service providers. It was observed during the study that the Assembly had virtually no relationship with the individuals who operated as waste management service providers (informal waste collectors or pickers). Even though the Assembly may have no contract with such economic agents, it was expected that some organs of the Assembly (particularly the WMD and EHD) would regularly engage them in their activities. However, that was not the case. This points to a weakness in partnership that must be addressed. At the very least, since these individuals are economic agents, they can be registered as a way of recognizing them but more importantly the WMD and EHD also needed to create a database of these individuals and to establish some platform for purposes of engaging them from time to time.

Last but not least in terms of partnerships is the partnership between the Assembly and traditional authorities, households, commercials entities and community-based organizations. Here also, some working relationship existed but more will be required to optimize the benefits that can be derived from such relationship. Households and traders were already involved in the management of waste by way of cleaning public places, including refuse dumps, on regular bases. There were, however, no direct payments made for purposes of managing solid waste (except for those who have arrangements with private waste collectors). Interviews with some opinion leaders revealed that there was a weak culture of consultation on the part of the Assembly and therefore inadequate involvement of critical stakeholders in the formulation of policies and bye-laws as well as their implementation.

Capacities of Institutions for Managing Solid Waste in Mankessim

Generally the management of waste involves all activities from storage, collection, transportation to treatment and or disposal. What goes on in the entire process of solid waste management is indeed a complex task which require adequate capacities (both personnel and logistics) from all the actors involved in order to ensure effective and efficient execution of their duties. The success of any waste management largely depends on the capacities of institutions involved. Institutions concerned with the management of waste will not be able to work to achieve the desired results if these institutions have weak capacities in terms of logistics and personnel. The discussion above on partnerships demonstrated the relevance of resources to ensuring that duties and responsibilities were discharged. Even though capacities in themselves cannot guarantee efficient and sustainable waste management services as leadership is critical, it is well acknowledged that they are necessary to waste management. As a matter of fact the relevance of adequate capacities goes beyond waste management and regards other spheres of life.

The focus on assessing capacities of key institutions in the waste management system is on the Assembly (particularly relevant organs – WMD and EHD) and private sector operators. The assessment itself focuses around two main dimensions of capacities: personnel and logistics. In general (and as shown in various empirical studies on waste management) the capacities of these institutions with respect to waste management is usually low (Kendie, 1999 and Tsiboe&Marbell, 2004). The findings of the study do not deviate from this general observation. In terms of human resources, the Assembly and Zoomlion reported that they did not have the full complement of all the people they needed to carry out their assigned responsibilities. Besides the numbers, is the skill set of the personnel they had at the moment, which was also inadequate within the context of executing assigned tasks. This is contrary to indications in the ESP to the effect that provision of adequate environmental sanitation service is critically dependent on availability of sufficient numbers of suitably qualified sanitary engineers and specially trained technical staff. The situation was not different in the area of logistics (see Plate 6). All the tricycles that were sighted in the

courseof the study were dysfunctional, yet in use. Even though the institutions did not have sufficient equipment, a sizeable proportion of what they had at the moment were dysfunctional.



Plate 6: Dysfunctional Tricycle in Use by Zoomlion Ghana Limited at Mankessim Source: Field Work (2016)

The insufficiencies with regards to logistics were very visible at the collection stage of waste in the chain of events. In most public places, there were no refuse bins (both small and large) for the purposes of collecting waste, not to talk about separate bins for separating waste. The situation was so dire that people simply dropped waste of various types in open places. At some places, especially in the markets and lorry parks, it seemed that the build-up of waste at some open

places was sanctioned by relevant authorities. The consequences of this situation were quite obvious as waste collected were dispersed again and often finding their way into gutters and other such places.

One of the main reasons frequently cited for the inadequacies (of both personnel and logistics) is deficiency of financial resources. This is obviously an important issue given that the attraction and retention of sufficient well trained staff requires resources. A very good condition of service which depends significantly on financial resources is necessary in this regard. The personnel already at post did not seem to be well motivated. This therefore leads us to our next issue of discussion which focuses on generating sufficient financial resources for solid waste management.

Financing Solid Waste Management in Mankessim

Having discussed existing partnerships and institutional capacities relevant for solid waste management, where availability of financial resources was identified as critical for successful and sustainable solid waste management, it is important to delve into financing solid waste management in Mankessim. It was noted that funding constraints that faced key stakeholders (especially the Mfantseman Municipal Assembly, households and private operators in the waste sector) were major barriers to solid waste management. The Assembly had three main sources of funding for running the administration. These are central government subventions (such as District Assemblies Common Fund), external grants from donors and Internally Generated Funds). Households and private operators, on the other hand, had their various income earning activities as the main sources of funding for their roles in waste management.

Financial constraint is one of the main barriers to the proper managements of municipal solid waste. For the households and traders, this reflected in challenges in obtaining and maintaining proper waste bins for collection and temporary storage of waste generated. This was especially so in the markets where various items were being used as refuse containers. The other area where this constraint reflects in relation to households and traders regards the frequency with which waste was collected (in cases where generators have agreement with private waste collectors). Most of the survey participants (62 per cent) who had arrangement with private waste collectors could not afford daily collections and had a collection frequency regime. Consequently, the study observed that most of the waste containers were often overflowing with waste. On the part of private waste collectors (individuals and companies alike), the financing constraint reflected in inadequate equipment. But for Zoomlion, financing also reflected in inadequate personnel. These challenges must be addressed in order to ensure that solid waste is properly and sustainably managed in Mankessim.

The consequences of inadequate financial resources are many for the Assembly. This is because the Assembly has the largest responsibility in solid waste management: from collection through to treatment, the Assembly has a role in there. Throughout MankessimTownship, the inadequacy of waste bins which is a direct reflection of the financial challenges was very visible as noted earlier. Further, there were related challenges with the transportation of refuse from collection centres at Mankessim to the treatment site at Ewoyaa. Typically, the Assembly relied on central government support or subvention to make substantial waste-related capital investment such as refuse trucks, skip containers, and trucks. This was often inadequate and as a result the Assembly injected some of its internally generated funds in acquisition of capital equipment. In the past, external donors such as the World Bank offered some support in waste management through projects such as the Urban Sanitation Project. Some of the workers at the Assembly (mainly the monthly-rated workers) were paid by the central government whiles the Assembly paid daily-rated workers and provided resources to cover recurrent expenditure items.

These arrangements, notwithstanding, there was still need for additional financial resources to ensure proper solid waste management. There were usually two main sources from where these additional financial resources might be obtained: more from existing source or turn to those who generated waste and impose direct waste-related levies. In terms of existing sources of funds to the Assembly, the internally generated funds tended to be more reliable (given delays in receiving central government subventions in the recent past). The Assembly must therefore seriously consider optimizing the collection of internally generated funds. The next usual source of obtaining additional resource is discussed below

User Charges for Solid Waste Collection

The other main source of funding to boost the Assembly's financial resources was to apply user charges. This was applied in many municipal and metropolitan areas throughout the country. The Mfantseman Municipal Assembly

did not collect user fees at the moment and may consider it. Already, some solid waste generators paid these charges to private waste collectors and the evidence gathered point to weak willingness to pay as subscribers often wished they could avoid such payment. Another concern for the Assembly was the fact that such a move results in the privatization (in whole or part) of an essential service like waste management. This is because there will be a move to a regime where citizens pay for services that were previously offered by the public for "free". User charge is a commonly used instrument which requires waste generators to pay for the collection, transportation and disposal of waste. It has been referred to as "Polluter Pays Principle" in some metropolitan and municipal areas where user charges are applied.

The Assembly already had some sort of experience in this area through its management of toilet facilities where users were made to pay a charge prior to the use of the facilities. The Assembly must be prepared to deal with some challenges it faces in the area of toilet facilities (such as some influential people influencing determination of caretakers) as far as applying user charges to waste management was concerned. Further, the Assembly's bye-laws on waste generation supports the imposition of such chargers as it notes that "the Assembly shall impose prescribed fees on an owner or occupier of premises where services are rendered for the disposal of liquid or solid wastes and such fees shall be reviewed from time to time by a fee fixing resolution of the Assembly".

In implementing user charge, there were some issues that the Assembly had to deal with. The first regards the arrangement between the Assembly and caretaker or the one who directly manned the facility and collected the charges. The second issue is about determining applicable rate or charge and how frequent that must be paid (daily, weekly or monthly). The last major issue to deal with regards willingness to pay on the part of residents. This is quite important because solid waste is quite different from toilet where citizens have a stronger motivation to pay in order to ease oneself. In the case of solid waste, there was a real concern that citizens might resort to dumping waste in unapproved places (including gutters) in order to avoid such payment. It is worthy of note that private waste collectors were already in the system and had arrangements with those who were more willing and able to pay. Consequently the Assembly's application of user charges would affect segments of the society less willing and less able to pay.

Generators' Perception of the Solid Waste Problem

This section focuses on perception of waste generators on the nature of the solid waste problem and how to address it. The essence of the section is to examine perception of respondents regarding the nature of the garbage problem, factors responsible for the problem, level of satisfaction with the current system and how (in their view) the problem could better be addressed. The information gathered from an assessment of respondents' perception together with discussions above will help in devising a strategy for improving solid waste management in Mankessim. It is believed that people's beliefs, social ideals, morals and attitudes affect the way they treat and manage waste. The assessment of respondents' perception of solid waste management begins with an attempt to put the current garbage problem in a historical context. Most of the respondents indicated that the garbage problem has become serious in respective neighbourhoods, and constituted a major threat to the environment (see Table 14). Those who thoughtthat the current garbage problem was more serious compared to past constitute more than two-thirds of all the respondents.

Further to the proportions of respondents who indicated various seriousness of the garbage problem, a Chi-square test was conducted in order to determine if perceptions of the nature of garbage problem were significantly different across the three main income groups studied (high, middle and low). It was found that indeed the perceptions of these different income groups in relation to the garbage problem were significantly different ($\chi^2 = 18.942$; $\rho=0.01$)

Nature of garbage	High	Middle	Low	Total in	Ν
problem in historical	Income	Income	Income	Percentage	
context					
Extremely serious	16.2	21.4	2.0	11.32	43
Quite serious	48.6	46.3	117.1	56.32	214
Not serious	31.8	28.9	15.0	20.00	76
Not at all serious	2.1	2.7	22.7	7.37	28
Don't know or No	1.3	0.7	17.1	5.00	17
Option					
Total %	100.0	100.0	100.0	100.00	378
Ν	56	148	174	378	

Table 14: Nature of the Garbage Problem

Chi-square (χ^2) = 18.942 (ρ =0.01) Significant at 0.05

Source: Fieldwork, Baidoo (2016)

Respondents were asked what they thought was the main factor responsible for the worsening garbage problem in Mankessimtownship and most of them (46 per cent) indicated that waste management did not seem to be a priority to the Assembly. This is followed by those who assigned the situation to inadequate financial resources for waste management. In a focus group discussion, further explanation was sought on the factors responsible for the situation. It was noted that the Assembly was not sufficiently committed to dealing with the waste problem with some participants adding that a strong commitment would show the Assembly where to get more resources to manage the waste. In total, sixty-one per cent of the sample was of the view that waste management was not a priority of MMA (see Table 15). The view is more predominant among middle income area (42.0%) and low income area (44.1%). However, more than half of respondents in low income area (51.5%) indicated that indiscriminate dumping is the major reason for worsening garbage problem.

Table 15-Reasons for Worsening Garbage Problem in Across ResidentialAreas (in percentage)

Residential or	Percentage	Not Priority	Inadequate	Indiscriminate
Electoral Area	in the	for MMA	Funds	Dumping
	Sample			
High income	14.8	13.9	31.0	16.2
Middle income	39.2	42.0	32.8	32.3
Lowincome	46.0	44.1	36.2	51.5
Total	100.0	100.0	100.0	100.0

Source: Fieldwork, Baidoo(2016)

One participant, during a focus group discussion, stated that all stakeholders in waste management needed to do more, admitting that efforts on the part of private operators as well as individuals, households and traders were on the low side. However, given the powers of the Assembly it needed to provide leadership in order to improve waste management. That leadership was difficult to see. The weak leadership on the part of the Assembly visibly reflected in lackadaisical attitude on its part to enforcing bye-laws that related to waste management. This is in spite of the fact that most respondents were aware that indiscriminate littering or dumping was an offence. Consequently, there was widespread indiscriminate littering of refuse in the township.

CHAPTER FIVE

SUMMARY, CONOLUSIONS AND RECOMMENDATIONS Introduction

The study's main objective was to assess the existing waste management system in Mankessim Township in the Mfantseman Municipality. This was to help the researcher understand the challenges of solid waste management and to examine the extent to which actors or stakeholders performed their respective roles in Mankessim Township, their capacity to perform their role and the existing coordination among them. The specific objectives of the study were to:

- Assess the existing solid waste collection and disposal methods in Mankessim Township;
- Evaluate the diverse combinations of partnerships between the major stakeholders in managing solid waste in Mankessim Township;
- Assess the capacity (personnel, logistics, finance, and technology) of waste management institutions involved in solid waste management in Mankessim Township;
- Assess the attitudes and perceptions of households towards solid waste and its management; and
- Make recommendations for improving municipal solid waste management system and practices.

This chapter presents summary of findings, conclusions and recommendations. The study employed the mixed method approach to research. A proportional allocation of three hundred and seventy-eighthousehold heads were sampled, from three suburbs with each representing a particular income grouping from the three main income groupings (low, middle and high income), for the administration of the household questionnaire. In addition, officials from the waste management department and private waste companies, individuals involved in solid waste collection and representatives of market associations were interviewed. The study reviewed related literature on various aspects of solid waste management, including but not limited to conceptual issues, theoretical issues and empirical studies. The study was mainly guided by the integrated solid waste management model by Klundert (2000) with complements from the Environmental "Production Function" and thePred's Behavioural Model. Data gathered were discussed using tables and chi-square statistic to measure the degree of relationship between residents' socio-economic and economic variables on the one hand and their perception of current waste management problem and their willingness to pay for waste management services on the other hand.

Summary of Major Findings

1. Current Solid Waste Collection, Disposal and Treatment Methods in Mankessim

There were three main methods used in the collection of solid waste in Mankessim. The dominant method was the one that involves residents or waste generators themselves gathering the waste and disposing them off at various refuse dumps or skip loaders within the township. It was observed that most of these individuals had (and some continue to have) some association or working relationship with Zoomlion Ghana Limited.In all the three stratified communities where the study was undertaken, most of the residents indicated that they disposed off their waste on daily basis. In the case of the communities, the main challenge observed regarded the use of children to dispose of the waste at various refuse dumps. In the case of the collection and disposal by the Assembly (through Zoomlion) the main challenges included insufficient equipment (such as tricycles and skip loaders), poor conditions of existing equipment (mainly tricycles) and insufficient personnel. This resulted in lower refuse collection rates in the commercial areas as compared to residential areas. The main waste treatment strategy in use regards burning of waste on unapproved dumpsites in the communities. At the Ewoyaa disposal site where the Assembly treated its waste, the main strategy in use was burying the waste in the ground.

2. Financing Solid Waste Management in Mankessim

There were two main ways in which waste management in Mankessim were financed: public finance and private finance. The public finance regards funding of waste management activities by the Mfantseman Municipal Assembly. The assembly relied mostly on the contribution of District Assembly Common Fund to finance its waste management activities. The Assembly did not implement user charges as a source of raising funds to finance waste management activities. The private finance of waste management in Mankessim took two forms. The first involved various arrangements that residents, especially those in commercial areas, had with individual waste collectors. The second form which was largely indirect finance is the case where residents undertake this activity. 3. Existing Partnerships for Solid Waste Management in Mankessim

There were various partnerships formed in support of managing solid sustainably in Mankessim. These partnerships involved the key stakeholders in the waste management framework, including the Mfantseman Municipal Assembly (especially the Waste Management Department and the Environmental Health Department), Zoomlion Ghana Limited, households, traders, traditional authorities, religious bodies and the general public. The Waste Management Department (through Zoomlion) was responsible for collecting and disposing of all solid waste in identifiable public areas such as lorry parks and market areas. The households were also responsible for gathering all the waste they generate and dispose of them either into few skip loaders in the township or to various refuse dumps. The Environmental Health Department was also responsible for ensuring that households keep their houses and refuse dumps (especially small unapproved dump sites at various backyards) are well maintained. The traditional authorities also enforce customs and traditions related to waste management in the township.

The stakeholders recognized the important roles they play in overall management of solid waste within the township and the relevance of collaborations among them. However, key stakeholders such as the Assembly was observed not to have done enough in the area of building partnerships among the stakeholders to ensure that each stakeholder undertakes all the activities assigned. Interview with key personnel in the Assembly and some of the stakeholders revealed that most of the stakeholders needed some orientation to improve existing partnerships among them.

4. Capacities of Institution for Managing Solid Waste in Mankessim

One of the areas where attention was mostly needed in relation to waste management in Mankessim is in the area of capacity, especially of public agencies. Results from the study showed that there were major capacity constraints especially in the areas of equipment and personnel. In the area of waste collection from identifiable public places, most of the tricycles in use sighted in the course of the study were in very deplorable state. In one case, the collector could not ride but had to pull the waste which was very difficult and energy consuming. The Waste Management Department did not have the full complement of logistics needed to supervise the activities of Zoomlion Ghana Limited.

5. Residents' Perception of the Solid Waste Problem and the Way Forward

The perception of residents about the solid waste management problem was an important issue in improving solid waste management. Most of the respondents indicated that the garbage problem has become serious in respective neighbourhoods, and constitute a major threat to the environment. Those who thought that the current garbage problem was more serious compared to past constituted more than two-thirds of all the respondents. Respondents were asked what they think was the main factor responsible for worsening garbage problem in MankessimTownshipand most of the respondents (46 per cent) indicated that waste management does not seem to be a priority to the Assembly. This was followed by those who assigned the situation to inadequate financial resources for waste management. In a focused group discussion, further explanation was sought on the factors responsible for the situation. It was noted that the Assembly is not sufficiently committed to dealing with the waste problem with some participants adding that a strong commitment will show the Assembly where to get more resources to manage the waste.

Conclusions

The study found out that solid waste management in Mankessimtownship faced some challenges resulting in a poor waste management situation. The following conclusions are therefore drawn from the study.

In the first place, waste management in the township did receive the needed attention from many stakeholders, especially the Mfantseman Municipal Assembly. Even though there was an insufficient resource, the extent to which residents flouted waste management bye-laws of the Assembly and went scot free clearly shows that the Assembly did not attach the needed priority to waste management. If the bye-laws of the Assembly were strictly enforced, even in the midst of insufficient resources, the situation would have clearly been a lot better. Strict enforcement of the bye-laws themselves can bring in some revenue to support the activities of the Assembly in the area of waste management. Yet very little was done in this area.

More so, the capacity of key stakeholders (such as equipment and personnel) was observed to be low in relation to the amount of work that must be done. In terms of human resources, the Assembly and Zoomlion reported that they do not have the full complement of all the people they need to carry out their assigned responsibilities. Besides the numbers is skill set of the personnel they have at the moment, which was also inadequate within the context of executing assigned tasks. This is contrary to an understanding in the ESP to the effect that provision of adequate environmental sanitation service is critically dependent on availability of sufficient numbers of suitably qualified sanitary engineers and specially trained technical staff. The situation was not different in the area of logistics. In fact it was worse. Even though the institutions did not have sufficient equipment, a sizeable proportion of what they had at the moment are not functional.

Finally, the study also observed that people in Mankessim (especially those in commercial areas) had very poor attitudes towards solid waste and its management. The severity of the problem could be related to apathy and ignorance of people towards general sanitation and waste management issue. This is now becoming a new norm. One of the main factors that can be identified as being responsible, at least in part, is the weak enforcement regime of waste management related bye-laws mentioned earlier.

Recommendations

The study makes three recommendations to key stakeholders in Mankessimtownshipfor improving waste management. They are as follows:

• The Assembly must raise the level of priority it attached to waste management issues and therefore the attention it provides to the sector. This is expected to enhance the extent to which waste management related

bye-laws are enforced. Further, an increase in the level of attention to waste management issues is expected to improve monitoring of various waste management activities. Finally, increase in attention would compel the Assembly to look for additional and more reliable resources to support waste management activities.

- The Assembly must undertake educational campaigns to increase knowledge of all stakeholders about solid waste management and their roles. This can be a way of dealing with the level of apathy and ignorance discussed above. The educational campaigns can, subsequently, improve waste management.
- Finally all other stakeholders must take their roles seriously and also bring some pressure to bear on the Assembly in order to ensure that the right things are done. The general public, especially residents, must recognize that they stand a greater of suffering the consequences of poor waste management and must therefore do whatever is expected of them to improve the situation.

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APPENDIX A

Household Questionnaire UNIVERSITY OF CAPE COAST

INSTITUTE OF DEVELOPMENT STUDIES

HOUSEHOLD QUESTIONAIRE

Dear resident,

This stud y seeks to find out the solid waste management practices in this household. You are therefore invited to share your views on the issues under investigation. The responses are purely for academic purposes and your confidentiality is greatly assured.

Please are you willing to be interviewed?	Yes []	No []
If no, kindly provide reasons		
LOCATION	D ATE	
TIME STARTED	TIME ENDED	

NAME OF INTERVIEWER.....

BACKROUND INFORMATION

(1) How many years have you lived in this community?.....

(2)	Sex	Male []	2.Female []		
(3)	Age				
(4)	Educational Level				
(5)	What is your curre	ent marital status?			
	Married []	Single and neve	r married []		
	Divorced []	Separated	[] W	idowed	[]

(6) If married, what level of education has your spouse attained?
(7) Occupation/Profession
 (8) Please what is the approximate income of your household per month (including that of your spouse if married) Below GHC 100 [] GHC101-200 [] GHC201-400 [] GHC401-700 [] GHC 701-1000 [] Above GHC 1000 []
(9) How many people live in your household?
HOUSEHOLD WASTE MANAGEMENT PRACTICES
 (1) How do you store your waste before disposal? In a closed container [] In an opened container [] In polyethylene bags or sacks [] Other (specify)
 (2) How often is the waste emptied? Every day [] Every two days [] Every three days [] Every week [] Every two weeks [] Irregular
(3) Who does this
 (4) How do you dispose off your refuse generated in this household? Collected [] Burnt [] Public dump [] Buried [] Dump it anywhere we can find space []
(5) Do you know that indiscriminate dumping is an offence? Yes [] No []
 (6) If yes to Q5, what is the punishment for this offence? Fine [] Imprisonment [] Both fine and imprisonment [] Do not know [] Other (specify)
(7) Do you separate your waste before disposal? Yes [] No []
(8) Give reasons
 (9) Do you have a transfer station or central container where waste is disposed in this area? Yes [] No []

(10)	0) What is the distance between your house and the tr container)?	ansfer stat	ion (central es)
(11)	1) Do you consider the distance to be too long?	Yes []	No []
(12)	2) How often is the transfer station in your area emptied?		
	PARTNERSHIPS IN SOLID WASTE MANGE	MENT	
(1)) What local group(s) is/ are responsible for solid waste community? If none, skip to Q7	manageme	ent in this
(2)) Is it a voluntary or compulsory group /organization? Compulsory []	Voluntary	[]
(3)) Does any member of your household belong to this gro] No []	oup/organiz	zation? Yes [
(4)) Are members of the group remunerated? Yes [] N	lo[]
(5)	Who is responsible for organizing this group(s)?Chief []Assembly member []Unit cHouseholds []MMA []NGO []Other (committee (specify)	[]
(6)) Who provides funding for their activities?Chief []Assembly member []Unit cHouseholds []MMA []NGOOther (specify)	committee	[]
(7)) Who provide receptacles /containers for the storage of community? (Mark all that is applicable) Chief [] Assembly member [] Unit c Households [] MMA [] NGO [] Other (specify)	solid wast	e in this
(8)) Do you take part in the clean-up exercise? Yes []	No []	
(9)) Who organizes the clean-up exercise?		

Ch	ief[]	Assembly men	ber []	Unit comm	nittee []	
HC	busenoids []	ΜΜΑ[]	NGO[]	Other (spec	:11y)	•
(10)	Are you invol	ved in the plann	ing of a cle	an-up exercise	? Yes [] No	[]
(11) No	Do you make	financial contrib	outions tow	ards clean up e	xercises? Yes []
(12)	If yes, how much?					
(13)	Are you invol No []	ved in the select	ion of a dis	posal site? Ye	s []	
(14) co	What are the containers)	criteria for select	ing a dispo	sal site (includ	ing central	
 (15) dis Hi	What is the le sposal sites?	vel of communit	y participa	tion in the man	agement of	
111	gn[]	Average	LO	~ []		
(16) No	How often do one [] Skip to	environmental h Q21 Every wee	ealth offic k [] Eve	ers (samansama ery month [] C	an) visit this are)ther (specify)	a?
(17)	What do they	do when they vi	sit?			
(18)	Do they educa	ate you on solid	waste mana	agement issues	? Yes [] No	[]
(19)	Are you satisf	ied with their ro	les? Yes	s[]	No []	
(20)	If no what do	you want them t	o do?			
(21)	Do you pay fo	or solid waste co	llection? Y	Yes [] No []	Skip to Q	
(22) Gł	If yes how mu	ich do you curre	ntly pay in	a month?		
(23) Ye	Are you satisf s [] No [ied with the serv	vices they p	provide (freque	ncy of collection	n)?

(24) Gr Ag Hi Ina Ot	If no, why? reat distances between the houses and the refuse depot [] gents employed do not come regularly [] gh charges [] adequacy of refuse collection and disposal facilities [] her (specify)
(25)	Are you prepared to pay more for improved services? Yes [] No [
(26)	If yes how much more? GHC
(27)	If no, why?
(28) coi	Would you support the Municipal Assembly to enact laws and enforce mpliance on the payment for improved waste management services? Yes No []
(29)	If no, why not?

PERCEPTION ON WASTE DISPOSAL PROBLEMS AND SOLUTIONS

Please tick $[\sqrt{}]$ where appropriate

(1) What would you say is the most important environmental problem? (tick only one answer)
Air pollution [] unsafe drinking water [] insufficient water supply [] inadequate solid waste collection [] unsafe solid waste disposal [] traffic and congestion []

other (specify)

- (2) On a scale of 1 to 5 (1 is extremely serious and 5 is not at all serious), how do you perceive the seriousness of the garbage problem as a major nuisance?
- (3) If your answer to Q2 above is either 1 or 2 (extremely serious or quite serious) what do you think might be the factor (s) responsible for such an awful situation?

The Assembly's priority is not waste management even though there is sufficient revenue [] Lack of sufficient revenue for waste management [] Indiscriminate dumping [] Other (specify).....
- (4) How concerned are you in dealing with the garbage disposal problems in your community?
 Very concerned []
 Not concerned []
 Not at all concerned []
- (5) Please indicate the favourability or otherwise of the following waste disposal methods in this town

Method	Very	Unfavour	Neutral	Favourable	Very
	Unfavourable	able			favourable
Incineration					
Landfills					
Composting					
Recycling					
Controlled					
dumping					

(6) Who do you think should be responsible for waste collection and disposal in your community?

Community members []	Assembly []
Individual households []	Other specify

- (7) What solid waste disposal method would you recommend for your community?Incineration [] Landfill [] Controlled dumping []
 - Composting [] Recycling [] Others (specify).....
- (8) Give reasons for your recommended method.....
- (9) Please read the following statements about garbage disposal and indicate (with a tick) the extent of your agreement or otherwise

	Item	Strongly	Disagree	Neutral	Agree	Strongly
		disagree				agree
1	Waste disposal is not a					
	burden for my					
	household					
2	It is everyone's					
	business to reduce the					

	amount garbage he or			
	she generates			
3	Garbage disposal			
	should reflect use. The			
	more you generate the			
	more you pay			
4	I have very little			
	control over what			
	other members of my			
	household do in terms			
	of dumping of waste			
5	Our garbage problem			
	is the responsibility of			
	the government			
6	Technology will			
	always solve our			
	problems			
7	It is more convenient			
	for me to throw			
	rubbish anywhere			

OPTIONS FOR IMPROVING WASTE MANAGEMENT WITHIN THE MANKESSIM TOWNSHIP

(1) If you were given the opportunity to choose a strategy for the improvement of solid waste management service provision, which of the following option would you choose?

Full privatization of the waste management function of the Assembly [] Private / Assembly partnership []Increasing basic rates paid by residents []

(2) Supposing full privatization of the waste management function turns out to be the preferred strategy for improvement of solid waste management service. How would you want rates of fees to be fixed?
A flat rate per each household for all resident within Mankessim []
Fees to be charged based on how much waste one generates []
Fees to be charged based on the location of the household []
Fees based on household income []

- (3) What problems do you encounter in the management of solid waste at the household level?.....
- (4) What are you doing to solve these problems?
- (5) On a scale of 1 to 5 (1 is poor, 2 is average, 3 is good, 4 is very good and 5 is excellent) how will you rate the performance of the following stakeholders in solid waste management?

Stakeholders	Rate	Reason(s)
MMA		
Private Sector		
Local group		
Environmental health		
officer		
Judicial service		
Youth		
Development committee		
General public		
Market Associations		

APPENDIX B

Questionnaire for Private Waste Management Companies UNIVERSITY OF CAPE COAST

INSTITUTE OF DEVELOPMENT STUDIES

QUESTIONAIRE FOR PRIVATE WASTE MANEGEMENT COMPANIES

Dear Sir /Madam,

This stud y seeks to find out the solid waste management practices in Mankessim Township. You are therefore invited to share your views on the issues under investigation. The responses are purely for academic purposes and your confidentiality is greatly assured.

Name of company.....

Number of years in operation.....

Number of households in your area of operation.....

GENERAL ISSUES

1)	Which of the following services do you provide? Door to door services [] Central container lifting [] Street cleaning [] other (specify)
2)	Which areas of Mankessim town do you operate?
3)	How will you classify your area of operation in terms of income?Low-income []Middle-income []High-income []
4)	Who hires your services in the metropolis? Assembly [] ` Central government [] NGO [] Individuals [] other (specify) []
5)	What is the nature of the contract or agreement? (please write on a separate sheet if necessary)

6)	What is the mode of payment?
	Fixed monthly payment [] Payment per amount of waste collected []
7)	Are you satisfied with this mode of payment? Yes [] No []
8)	If no what do you recommend?
9)	Do you receive prompt payment? Yes [] No []
10) If no how do you operate in such situations?
W	ASTE MANAGEMENT ISSUES
11)) What is the main means of storing solid waste in Mankessim Township? Central container [] Receptacles [] Other (specify)
12) Who provides receptacles for the storage of solid waste in Mankessim Township? (Mark all that apply) Households [] Assembly [] Private Sector [] Other (specify)
13	Are you satisfied with the type of receptacle used? Yes [] No []
14) If no what do you recommend?
15)	How many times in a day or week is solid waste collected from receptacles and transported to the disposal sites During raining season During the dry season
16	What methods of disposal does the assembly use?(Mark all that apply)Open dump []Controlled dump []Engineered landfill []Other (specify) []
17) How many disposal sites (including central containers) are located in your area of operation?

18) Where are the disposal sited (including Low-income areas []] Middle –ir	ng central containers) located? ncome areas [] High- income areas []
19) What is the criteria for selecting or lo containers)	ocating a disposal site (including central
20) Who are involved in the selection of containers)?	disposal sites (including central
21) What is the level of community partisites?	cipation in the management of disposal
High [] Average []	Low []
22) Give reason	
23) Do you charge residents for your was No []	ste management services? Yes []
24) If yes, how much per month? For high –income groups For middle-income groups For low –income groups	····· ·····
25) Do residents complain about the char	rges? Yes [] No []
26) If yes, what do they complain about?	?
27) What problems do you encounter in that apply)	the management of waste? (Rank those
Inadequate finance []	Inadequate personnel []
Inadequate []	Inadequate legislature []
Weak enforcement of bye-laws [] Other (specify)	Inadequate public cooperation []
28) What time of the year do you encour	nter more problems in the management of

waste in this metropolis? Rainy season [] Dry season []

29)	Please explain your answer
30)	Which aspect of waste management poses the greatest problem?
	Separation [] Storage [] Collection [] Transportation [] Disposal []
31)	Please explain your answer
32)	Which part of Mankessim do you face more problems with the management of waste?
33)	What efforts are being made by your outfit to ensure effective waste management?
34)	On a scale of 1 to 5 (1 is poor, 2 is average, 3 is good, 4 is very good and 5 is

34) On a scale of 1 to 5 (1 is poor, 2 is average, 3 is good, 4 is very good and 5 is excellent) how will you rate the performance of the following stakeholders in solid waste management?

Stakeholders	Rate	Reason(s)
MMA		
Private Sector		
Local group		
Environmental health		
officer		
Judicial service		
Youth		
Development committee		
General public		
Market Associations		

PLEASECOMPLETE THE FOLLOWING TABLES

WASTE MANAGEMENT COSTS

Item	Expenditure
Vehicle operation	
Overhead expenditure	
Capital expenses	
Salaries	
Other logistics	
Others	

FINANCIAL INDICATORS OF SOLID WASTE MANAGEMENT

Year	Waste collected (in	Cost of	Per cent of your
	tonnes or	collection	budget
	kilogramme)		

INSTITUTIONAL CAPACITY

Personnel

Personnel	Number Available	Number Required
Sanitary officers		
Sanitary Engineer		
Labourers		
Sweepers		
Drivers		
Others		

Logistics

Facility	Number available	Number in working condition	Number required
Health van			
Container trucks			
Fork-lift trucks			
Compactor trucks			
Graders			
Skip loaders			
Tractors			
Pick-ups			
Bulldozers			
Communal containers			
Plastic /metal receptacles			
Pick axes/ Rakes			
Wheelbarrows			
Tricycles			
Others			

APPENDIX C

Questionnaire for Waste Management Department of MMA UNIVERSITY OF CAPE COAST

INSTITUTE OF DEVELOPMENT STUDIES

QUESTIONAIRE FOR WASTE MANEGEMENT DEPARTMENT

Dear Sir /Madam,

This stud y seeks to find out the solid waste management practices in Mankessim Township. You are therefore invited to share your views on the issues under investigation. The responses are purely for academic purposes and your confidentiality is greatly assured.

PARTNERSHIPS IN SOLID WASTE MANAGEMENT

1) Apart from the waste management department who are the other stakeholders of solid waste management in this municipality?

.....

2) What is the level of coordination between the assembly and the following stakeholders in the management of solid waste?

STAKEHOLDERS	LEVEL OF COORDINATION			REASONS	
	STRONG	FAIR	WEAK	NONE	
MLGRDE					
EPA					
Ministry of Finance					
Ministry of health					
Judicial service					
Private sector					
Assembly members					
Unit committee members					
Local groups					
General public					
Market associations					

3)	Are you satisfied with the kind of coordination that exists between the WMD and other stakeholders? Yes [] No []
4)	If no, what do you think should be done?
••••	
5)	Are there local groups responsible for solid waste management? Yes [] No [] Skip to Q12
6)	If yes what is the name?
7)	Is it a voluntary or compulsory group or organization? Voluntary [] Compulsory []
8)	Do members receive remuneration? Yes [] No []
9)	Who is responsible for organizing this group(s)? Chiefs [] Assembly member [] Unit Committee members [] other specify)
10)	Who provides funding for their activities? Chiefs [] Assembly member [] Unit committee member [] Households [] Municipal assembly [] NGO [] Other(specify). Other(Other(
11)) How often do you consult these groups in solid waste management issues in their respective areas? Very often [] Quite often [] Never []
12)) Do you encourage citizens to participate in waste management? Yes [] No []
13)) If yes, how do you involve them?
14)) How do you rate citizen's involvement in waste management? High [] Moderate [] Low []

15) What accounts for this?		
16)	If no, why don't you involve them?	
FU	NDING OF SOLID WASTE MANAGEMENT	
1)	What are the Assembly's sources of revenue? Internally generated funds [] Foreign aid [] NGO [] other specify	
2)	How much does the Assembly devote for the management of solid waste (in term of the percentage of assembly's revenue?	
3)	Is the revenue enough for the management of waste generated in Mankessim? Yes [] No []	
4)	If no to Q3, does the assembly have any intention of involving the private sector in the management of solid waste generated in Mankessim? Yes [] No []	
5)	If yes to Q4, which areas of the town does the assembly want to involve the private sector? (Rank all that apply) High- income areas [] Middle income areas [] Low income areas []	
6)	Which aspects of the waste management chain does the assembly want to involve the private sector? (Rank all that apply) Separation [] Storage [] Collection [] Transportation [] Disposal []	
7)	<pre>Who finances the collection and disposal of solid waste in Mankessim? (Mark all that apply) Households [] Private Sector [] Assembly [] Foreign aid [] NGO [] Other (specify)</pre>	
8)	Does the assembly charge residents of Mankessim for its solid waste management services? Yes [] No []	
9)	If yes to Q8, how much?	

10) Do residents complain about the charges? Yes [] No []
11) If yes what do you complain about?
GENERAL WASTE MANAGEMENT ISSUES
1) What is the main means of storing solid waste in Mankessim Central container [] Receptacle [] Other (specify)
 Who provides the receptacles for storing solid waste in Mankessim? (Mark all that apply) Household [] Assembly [] Private sector [] Other (specify)
3) How many times the solid waste is collected and transported to the disposal sites?During the rainy seasonDuring the dry season
4) Do you involve the private sector in the collection and disposal of solid waste? Yes [] No []
5) If yes who pay for their services in Mankessim? Assembly [] Central government [] NGO [] Individuals [] other (specify)
6) What is the nature of their contract or agreement?
7) What is the mode of payment? Fixed monthly payment [] Payment based on the amount of waste collected [] Other (specify)
8) Are you satisfied with this mode of payment? Yes [] No []
9) If no, then what do you recommend?

10) How will you rate your le private sector?	evel of satisfa	ction with	h the services pro	vided	by the
High [] Give reason(s)	Moderate []	Low []	
11) Does the assembly organ No []	ize general cl	eaning in	Mankessim?	Yes []
12) If yes to Q11, how often? year []	• Every mor	nth []	Every quarter []	Once a
13) If no to Q11, why?					
14) Do other organizations he No []	elp in organiz	ing the cl	ean-up exercise?	Yes []
15) What form of help or sup	port do they	give?			
16) In organizing clean ups, v	what problem	s are enco	ountered? (Rank	all that	t apply
Inadequate finance [] Inadequate logistics []		Inadec Lack c	uate personnel [of public cooperat] tion []
17) Does the assembly organ	ize environm	ental edu	cation? Yes []		No []
18) If yes to Q17, how often? year []	' Every mont	h []	Every quarter []	Once a
19) What form does the educ	ation take?				
20) What methods of waste d all that apply) Open dum Engineered landfill [] Other (specify)	lisposal does t	the assem Contro	bly use in Manke blled dumping []	essim?	(Rank
21) What is the number of ap municipality?	proved dispo	sal sites i	n the		

22) What is the number of u	napproved dispo	sal sites?	
23) What criteria are used in	1 selecting dispos	al site (including cen	tral containers)?
24) Who are involved in sele	ecting disposal s	ites (including central	containers)
25) What is the level of com sites?	munity participa	tion in the manageme	ent of disposal
High []	Average []	Low []
 26) What problems does the waste? (Rank all that ap personnel [] Inadequeregulations [] Weak e Lack of public cooperations 27) What time of the year does in Mankessim? 	assembly encou ply) Inadequa uate logistic [nforcement of la ion [] o you face more	nter in the manageme te finance [] Inad] Inadequate la ws and regulations[problems in the mana	ent of solid dequate aws and] gement of waste
Dry season [] Rainy (specify)	/ season []	Other	
28) Please explain your answ	<i>w</i> er		
29) Which aspect of the soli	d waste manager	nent chain poses mor	e problems?
Separation [] Storag Disposal []	;e []	Collection []	
30) Please explain your answ	<i>w</i> er		
31) Which part of Mankessi solid waste?	m do you face m	uch problems in the r	nanagement of
32) Please explain your answ	wer		

- 33) What efforts are being made by the assembly to ensure effective management of solid waste?
- 34) Rank the following in order of priority of the assembly Education [] Agriculture [] Health [] Waste management []

35) Any comments on solid waste management in Mankessim?

.....

PLEASE COMPLETE THE FOLLOWING TABLES

WASTE MANGEMENT COST

Service	Estimated cost	Per cent of waste
	(GHC)	management fund
Waste Separation		
Waste storage		
Waste collection and		
transport		
Waste disposal		

FINANACIAL INDICATORS OF SOLID WASTE MANGEMENT

Year	Population	Waste	Waste	Cost of	Percent of
		generated	collected	collection	municipal
					budget
2010					
2011					
2012					
2013					
2014					

INSTITUTIONAL CAPACITY OF WMDs

Personnel

Personnel	Number available	Number required
Sanitary officers		
Sanitary engineers		
Labourers		
Sweepers		
Drivers		
Others		

Logistics

Facility	Number	Number in working	Number required
	available	condition	
Health van			
Crusher trucks			
Fork-lift trucks			
Compactor trucks			
Graders			
Skip loader			
Tractors			

APPENDIX D Interview Guide for Environmental Health Department UNIVERSITY OF CAPE COAST

INSTITUTE OF DEVELOPMENT STUDIES

INTERVIEW GUIDE FOR ENVIRONMENTAL HEALTH DEPARTMENT

- What role does your department play in ensuring effective management of solid waste in Mankessim?
- 2) What challenges do you face in the exercise of this role?
- 3) Are you mandated as a department to enforce environmental and sanitation regulations?
- 4) If yes, what challenges do you face?
- 5) What are the efforts being made by your department to ensure effective waste management?
- 6) What are the efforts being made by your department to ensure effective enforcement of environmental and sanitation regulations?
- 7) How would you describe the level of coordination between your department and the Waste Management Department?
- 8) How would you describe the level of coordination between your department and the general public?
- 9) What are the factors that inhibit effective cooperation between your department and the various stakeholders (mainly household and WMD)?
- 10) How would you rate your performance in waste management issues and enforcement of environmental and sanitation regulation.
- 11) What are the factors responsible for your current state of performance?

APPENDIX E

Interview Guide for Representatives of Traders' Associations UNIVERSITY OF CAPE COAST

INSTITUTE OF DEVELOPMENT STUDIES

INTERVIEW GUIDE FOR REPRESENTATIVE OF MARKET ASSOCIATION

- Who is responsible for the collection and disposal of waste generated in this market?
- 2) How is waste stored prior to collection?
- 3) What time of the day is waste collected?
- 4) Are you comfortable with the time of waste collection?
- 5) If no to Q4, when will be more appropriate to collect waste?
- 6) Is there any group in this market who occasionally engage in clean –up exercises?
- 7) If yes how are their activities organized and who provides funding for their activities?
- 8) Does the Assembly consult you on decisions concerning the sitting of central containers for this markets use?
- 9) How will you rate the performance of the following stakeholders (Assembly or private sector, Market Women Association) in the management of solid waste generated in this market?

APPENDIX F

Interview Guide for Individual Waste Collectors UNIVERSITY OF CAPE COAST

INSTITUTE OF DEVELOPMENT STUDIES

INTERVIEW GUIDE FOR PRIVATE (INDIVIDUALS) WASTE COLLECTORS

Dear Sir /Madam,

This stud y seeks to find out the solid waste management practices in Mankessim Township. You are therefore invited to share your views on the issues under investigation. The responses are purely for academic purposes and your confidentiality is greatly assured.

Nun	nber	of yea	rs in									
oper	atio	n		•••••	•••••	 	•••••	•••••	•••••	•••••	••••	
•												

Number of households you serve.....

GENERAL ISSUES

- 1) What kind of service(s) do you offer your clients?
- 2) Which areas of Mankessim town do you operate?.....
- How will you classify your area of operation in terms of income? Low-income [] Middle-income [] High-income []
- 4) Who hires your services in the metropolis? Assembly [] ` Central government [] NGO [] Individuals [] other (specify) [] Other (specify)

WASTE MANAGEMENT ISSUES

1) What do you do with the waste you collect from your clients?.....

2)	Who provides receptacles for the storage of solid waste in your area of operation? (Mark all that apply) Households [] Assembly [] Private Sector [] Other (specify)					
3)	Are you satisfied with the type of receptacle used? Yes [] No []					
4)	If no what do you recommend?					
5)	How many times in a day or week is solid waste collected from receptacles and transported to the disposal sites?a. During the raining seasonb. During the dry season					
6)	What methods of disposal does the assembly use? (Mark all that apply) Open dump [] Controlled dump [] No idea [] Engineered landfill [] Other (specify) []					
7)	How many disposal sites (including central containers) are located in your area of operation?					
8)	Where are they located? Low-income areas [] Middle –income areas [] High- income areas					
9)	What are the criteria for selecting or locating a disposal site (including central containers)?					
10)	Who are involved in the selection of disposal sites (including central containers)?					
11)	What is the level of community participation in the management of disposal sites?					
12)	High []Average []Low []Give reason					
13)	Do your clients pay for the services you offer? Yes [] No []					
14)	If yes, how much per month? For high –income groups For middle-income groups For low –income groups					
15) 16)	Do residents complain about the charges? Yes [] No [] If yes, what do they complain about?					

17) What problems do you en your clients?	counter in	n providing waste management services to				
18) What time of the year do y waste management servica. Rainy season []b. Dry season []	you encor es?	unter more problems in the delivery of				
19) Please explain your answer						
20) Which aspect of waste ma	inagemen	t poses the greatest problem?				
Separation [] Storage [] Collection [] Transportation [] Disposal []						
21) Please explain your answer						
22) Which part of your areas of management of waste?	of operati	on do you face more problems with the				
23) Give reasons for your answer						
24) What efforts are you make	ing to ens	sure effective waste management?				
25) On a scale of 1 to 5 (1 is p excellent) how will you ra solid waste management?	boor, 2 is the the per-	average, 3 is good, 4 is very good and 5 is rformance of the following stakeholders in				
sonte music munugement:						
Stakeholders	Rate	Reason(s)				
MMA						
Private Sector						

MMA	
Private Sector	
Local group	
Environmental health	
officer	
Judicial service	
Youth	
Development committee	
General public	
Market Associations	

26) What kinds of equipment do you use and what other cost elements or items do you incur in the provision of your services?